WORKS APPROVAL APPLICATION

Clinker Grinding Facility, 37-65 Walchs Road, North Shore, Victoria

CLP215412

Prepared for
Boral Cement Ltd

June 2017

Cardno
Shaping the Future

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Works Approval Application

Clinker Grinding Facility, 37-65 Walchs Road, North Shore, VIC

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List of Abbreviations and Units

AHD	Australian Height Datum
BPA	Best Practice Assessment
CEMP	Construction Environmental Management Plan
CoGG	City of Greater Geelong
dB	Decibel
EHP	Ecology and Heritage Partners Pty Ltd
EMS	Environmental Management System
EPA	Environment Protection Authority (VIC)
ERA	Environmental Risk Assessment
DDO	Design and Development Overlay
FEL	Front End Loader
Ha	Hectare
ISO	International Standards Organisation
Km	Kilometers
Kt	Kilo-tonnes
NEPM	National Environment Protection Measure
NGER	National Greenhouse and Energy Report Act 2007
NEPM AAQ	National Environment Protection Measure for Ambient Air Quality
NIRV	Noise from Industry in Rural Victoria
MDA	Marshall Day Acoustics
MSDS	Material Safety Data Sheet
m	Metres
m^2	Square metres
m^3	Cubic metres
mm	Millimetres
Mt	Mega-tonnes
PEL	Pacific Environment Limited
$PM_{2.5}$	Particulate matter with an aerodynamic diameter less than 2.5 µm
PM_{10}	Particulate matter with an aerodynamic diameter less than 10 µm
PZ	Port Zone
SEPP	State Environment Protection Policy
TSP	Total Suspended Solids
QMS	Quality Management System
t	Tonnes
y	Year

Works Approval Application

Clinker Grinding Facility, 37-65 Walchs Road, North Shore, VIC

1 General Information

1.1 Primary Information

Cardno Victoria Pty Ltd (Cardno) has been engaged by Boral Cement Limited (Boral), a wholly owned subsidiary of Boral Limited (Boral Ltd), to prepare an application to EPA Victoria (EPA) for a clinker grinding activity to occur at Clinker Grinding Facility, 37-65 Walchs Road, North Shore, VIC (the site).

Table 1-1 summarises the key details defining the site. The location and main features of the site are shown on Figure 1 presented in Appendix B.

Table 1-1: Site Identification Details

Item	Description
Address	37-65 Walchs Road, North Shore, VIC
Proposed Activity	Clinker Grinding Facility
Proposed Scheduled Activity	H01 Non-Metallic Minerals (Cement) Cement works in which – (ii) cement clinker or clays or limestone or like materials are ground
Site Area	Approximately 6.1 Ha
Title Details	Lot 2 PS434155
Municipality	City of Greater Geelong (CoGG)
Planning Zone	Port Zone (PZ)
Planning Overlay	Design and Development Overlay – Schedule 20 (DDO)
Areas of Aboriginal Cultural Heritage Sensitivity	Located within 200 m of the high water mark of the coastal waters of Victoria or any sea within the limits of Victoria

The completed EPA Company Legal Entity form is provided as Appendix A.

1.2 Report Objectives

The objectives of this Works Approval application report are (subject to the limitations provided in Section 5 and exclusions to the application in Section 1.5) are to:

1. Document the proposed Works Approval application to EPA in accordance with EPA's Works Approval application requirements.
2. Summarise the technical studies prepared and other activities completed in support of the Works Approval application.
3. Demonstrate that the proposed works would meet or exceed the EPA requirements for issuing a Works Approval to enable clinker grinding to occur at the site.

1.3 Accompanying Documents

This Works Approval Application Report should be read in conjunction with the following supporting documents:

> **Green House Gas and Air Quality Impact Assessment**: Pacific Environment (2017) Boral Cement Geelong Clinker Grinding Facility GHG and Air Quality Assessment – Appendix D.

> **Environmental Noise Assessment:** Marshall Day Acoustics (2017) Clinker Grinding Plant Environmental Noise Assessment - Appendix E.

> **Planning Permit Application Report:** Calibre Consulting (2017) Planning Submission - Appendix F.

> **Traffic and Transport Assessment:** Cardno (2017) Traffic and Transport Assessment Geelong – Victoria Cement Supply Site - Appendix G.

> **Stormwater Management:** Thyssenkrupp (2017) Stormwater Management Technical Note – Appendix H.

> **Preliminary Cultural Heritage Study:** Ecology and Heritage Partners (2016a) Preliminary Cultural Heritage Study: Proposed Grinding Plant and Import Terminal, Lascelles Wharf, North Shore, Victoria - Appendix I.

> **Biodiversity Assessment:** Ecology and Heritage Partners (2016b) Biodiversity Assessment, 37-65 Walchs Road, North Shore, North Shore, Victoria - Appendix I.

> **Community Engagement:** Boral (2016) Geelong Portside Cement Proposal Stakeholder Engagement and Consultation Plan (September 2016) - Appendix J.

> **Pre-Application Correspondence:** Port of Geelong and Geelong City Council Correspondence – Appendix K.

While this Works Approval Application Report has been undertaken in accordance with the current industry standards of practice and has endeavoured to accurately summarise the key points of the technical studies and supporting information prepared to support the application, there may be some limitations on its meaning and use. The reader is advised to consult the relevant technical report for a full description both of the work completed and the proposed facility.

1.4 Purposed Scheduled Activity

Boral are proposing to construct and operate a Clinker Grinding Facility at the site and are seeking a Works Approval under Section 19B of the *Environment Protection Act 1970* (“the Act”) to undertake clinker grinding at the site.

The proposed clinker grinding activity falls under Schedule 1 of the *Environment Protection (Scheduled Premises and Exemptions) Regulations 2007* (S.R. No. 77/2007) (“the Regulations”). Schedule type H01 – Non-Metallic Minerals (Cement) provides the following description for a facility requiring a works approval and/or licence:

Cement works in which –

(ii) cement clinker or clays or limestone or like materials are ground

The extent (boundary) of the Works Approval application is shown on Figure 1, Appendix B.

1.5 Exclusions from the Application

Boral is seeking a Works Approval for activities within the proposed Works Approval boundary only. The delivery and transfer of all raw materials to site, including ship unloading at the Geelong Port and delivery of materials to the site via the conveyor system, is outside the scope of this application.

The conveyor system that is proposed to deliver the raw materials to the site will be constructed, owned and operated by Geelong Ports and as such they are responsible for all necessary approvals of this component. Geelong Ports has confirmed this to Boral via correspondence dated 21 December 2016, which is included as Appendix K1.

The components of the conveyor system that are excluded from this application are marked in red on plan GEL-G-SLT-0002-04, Appendix B.

Boral will take responsibility for all aspects of the conveyor from within the site boundary.

1.6 Choice of Location for New Premises and Drivers for the Application

Boral is seeking to construct a new Clinker Grinding Facility to replace the existing and aging Waurn Ponds facility. Currently clinker is imported through Lascelles Wharf at the Geelong Port and transported 30 km to the existing Boral plant at Waurn Ponds. Materials arriving at the port need to be transported immediately from the ship to the cement plant, due to the lack of a temporary holding yard or a storage facility close to the berth. This is a significant logistics exercise and requires extensive pre-planning for round-the-clock clinker transport. As a result of this, the traffic volumes in the surrounding streets often experience a short-term spike (especially heavy vehicles) when a ship is berthed.

This model is now unsustainable for Boral due to the double-handling of materials and aging infrastructure at Waurn Ponds. With this application, Boral is seeking to streamline their operational capacity in Victoria.

A number of sites and business options were discussed, however the proposed site and process was chosen at Geelong Port for greatest efficiency, based on the following:

> The availability of a vacant site within the Geelong Port allows Boral to retain a presence in the Geelong region.

> The site is located in an industrial setting and offers close proximity to major arterial roads (particularly into Melbourne).

> The Geelong Port setting enables raw materials to be delivered and stored at site from the port without the need for trucking.

> A new plant offers modern equipment and improved processing efficiency.

> Increased grinding capacity (compared to Waurn Ponds).

> Reduced environmental footprint from:

- Covered clinker storage (to prevent escape of dust)
- Modern plant and equipment
- Efficient site layout and flexible storage options
- Reduced vehicle movements.

1.7 Project Cost and Works Approval Application Fee

The project will cost Boral in excess of $100 million.

The Works Approval fee is $62,730 (4,500 fee units).

1.8 Land Use

The site proposed by Boral is currently vacant. The site was previously used as an industrial steel “rod mill” between 1976 and 1999 by BHP (Coffey, 2016). It is understood that the site has been vacant since this time.

Boral propose to lease the site from Geelong Ports. The site retains building footings, underground infrastructure and services from the previous use. The site is fenced and closed to the public. Boral anticipates that the site will be cleared of the majority of the remaining infrastructure and services and levelled where required prior to construction works commencing (where practicable to do so).

1.8.1 Zoning

The site is zoned under the City of Greater Geelong planning scheme as Ports Zone (PZ).

The following planning overlays apply:

> Design and Development Overlay – Schedule 20 (DDO20)

A Planning Zone map is included as Figure 2, Appendix B.

1.8.2 Planning and Other Approvals

City of Greater Geelong (CoGG) has confirmed via correspondence to Calibre Consulting (Boral's engaged Planning consultants) dated 16 December 2016 that a Building and Works Permit is required for the proposed facility under the Design and Development Overlay (DDO20).

CoGG has also confirmed that the application would be exempt from notice and review pursuant to Clause 2.0 of DDO20[1].

The planning application report prepared by Calibre Consulting for the Buildings and Works Permit is included in this application as Appendix F. Correspondence from the CoGG confirming the need for a Buildings and Works Permit is included as Appendix K2.

A Preliminary Cultural Heritage Study has been completed and included as Appendix **I**, which demonstrates that a cultural heritage management plan is not required under *Aboriginal Heritage Act 2009*.

A Biodiversity Assessment has also been completed (also included as Appendix **I**), which demonstrates that the application is unlikely to have a significant impact on any matter of national environmental significance (under the *Environment Protection and Biodiversity Conservation Act* 1999) and no species listed or protected under the *Flora and Fauna Guarantee Act* 1988 were recorded or considered likely to occur at the site. A planning permit will be required to remove, destroy or lop any native vegetation at the site.

1.9 Track Record

The Works Approval application is for a new site to be leased by Boral – there are no existing Boral operations at the site and Boral has no "track record" at this particular site. Boral is able to demonstrate an established track record for operation of licensed facilities engaged in the production of building materials (including cement) across Victoria and Australia as discussed in Section 1.9.1.

1.9.1 The Applicant

The applicant, and proposed operator of the Clinker Grinding Facility is Boral Cement Limited (Boral). Boral Cement is a wholly owned subsidiary of Boral Limited (Boral Ltd), a multinational company that specialises in building and construction materials.

Founded in 1946, Boral Ltd is now Australia's largest building and construction materials supplier with over 550 operating sites[2] and employing over 12,000 staff in the production and distribution of a broad range of construction materials and building products with operations concentrated in three key geographical markets - Australia, the USA and Asia.

Boral Ltd is registered on the Australian Securities Exchange (ASX) and has an annual revenue in excess of $5 Billion.

In Victoria, Boral Ltd operate EPA licensed facilities as listed in Table 1-2.

[1] Schedule 20 of the Design and Development Overlay (CoGG Planning Scheme).
[2] at 30 June 2016

Table 1-2: Boral Ltd Licensed Facilities (Victoria)

Licence No.	Issued	Facility Address	Scheduled Categories
4565	23 May 1975	531 Maroondah Highway, Coldstream, Vic 3770	C01 – Extractive Industry and Mining
516	27 May 1977	Wellington Road, Lysterfield, Vic 3156	C01 – Extractive Industry and Mining
EW841	27 August 1992	Canterbury Road, Montrose, Vic 3765	C01 – Extractive Industry and Mining
11108	19 June 1997	170 Reservoir Road, Waurn Ponds, Vic 3216	A05 – Landfills H01 – Cement Works

Across Australia, Boral Ltd operates numerous other facilities involved in the production and distribution of cement products, including:

> Multiple depots for batching cementitious products (including in Somerton, Vic)
> Multiple cement manufacturing plants (including Berrima, NSW)
> Numerous quarries for various raw material types (including Marulan in NSW for limestone).

Boral Ltd publish Annual Reviews and Reports that allows open and transparent communication to their shareholders, employees and other stakeholders. Per Boral Ltd's 2016 Annual Report, Boral Ltd understands that the nature of their operations means there will be impacts on the environment. However, Boral Ltd remain committed to a goal of Zero Harm and working to eliminate adverse environmental impacts. Where elimination is not possible, they seek to minimise the adverse environmental impacts and secure improved environmental outcomes.

Boral Ltd's company profile and financial performance information is available at www.boral.com.au

1.10 Community Engagement

Boral has actively engaged with stakeholders for the proposed facility development. In March 2016, Boral prepared the Stakeholder Engagement and Consultation Plan (Boral, 2016a) for the Geelong Portside Cement Proposal. The Plan was updated in September 2016 and is included as Appendix J. From the Stakeholder Engagement and Consultation Plan (Boral, 2016a), the key stakeholders are summarised in Table 1-3.

Table 1-3: Key Stakeholders of the proposed site (Boral, 2016a).

Key Stakeholder	Involvement
Geelong City Council	▪ Assessing authority for planning related applications. ▪ Ensuring planning permits contain conditions governing environmental management and residential amenity.
Geelong Port	▪ Management of lands in Geelong Port precinct. ▪ Lessor to Boral for Lascelles site. ▪ Ensuring Boral proposal does not unduly affect Geelong Port, its stakeholders or their amenity.
Industrial neighbours to Port operations site	▪ Avoid impacts to neighbouring operations. ▪ Management of Boral proposal/operations so as to minimise impacts. ▪ Ongoing management of environmental obligations to avoid influence on employees and customers/stakeholders.
Geelong Port Community Liaison and Committee / North Shore community (North Shore Residents Group)	▪ Management of operations to ensure residents are not affected by proposed Port operations. ▪ Management of heavy vehicle movements to avoid untoward noise, and maintenance of safe driver behaviours. ▪ Ongoing commitment to ensuring environmental protection of surrounds, primarily the waters off the Port. ▪ Ongoing communication of business progress, both during establishment and once operational.
VIC Department of Economic Development, Jobs, Transport and Resources (DEDJTR) – Invest Assist	▪ Liaison between State Government and Council as part of planning and development process. ▪ Enhancement of Geelong Port as an economic driver of activity for region and wider Victoria.
Environment Protection Authority	▪ Authority responsible for assessing and approving the required Works Approval. ▪ Environmental impacts.
VIC Minister for Ports	▪ Holds ultimate responsibility for the State's ports. ▪ Interested in ensuring infrastructure is put to best use for economic gain of Victoria.

A summary of the community engagement activities is provided in Table 1-4.

Table 1-4: Community Engagement Chronology

Date	Engagement Activity
18 November 2015	Presentation to Geelong Port Community Consultative Committee
6 April 2016	Meeting with fence line neighbour (Omya)
6 April 2016	Meeting with fence line neighbour (OneSteel)
6 April 2016	Meeting with fence line neighbour (Incitec Pivot)
6 April 2016	Meeting with precinct neighbour (Viva Energy)
15 April 2016	Meeting with State Member of Parliament (Barwon South)
28 April 2016	Meeting with Federal Member of Parliament (Corio)
5 May 2016	Meeting with Geelong Chamber of Commerce
5 May 2016	Meeting with Committee for Geelong
6 May 2016	Meeting with G21 Geelong Regional Alliance
6 May 2016	Meeting with Geelong Manufacturing Council
20 May 2016	Meeting with State Members of Parliament (Lara and Geelong)
1 June 2016	Meeting with State Upper House Member of Parliament (Western Victoria)
23 June 2016	Meeting with City of Geelong CEO and senior administration
2 September 2016	Meeting with City of Geelong Council Planning team
4 October 2016	Approvals Pathway Form submitted to EPA
16 November 2016	Meeting with precinct neighbour (Viva Energy)
17 November 2016	Meeting with fence line neighbour (OneSteel)
17 November 2016	Distribution of community newsletter – North Shore residential area, fence line neighbours
17 November 2016	Presentation of Technical Studies (Air Quality and Noise) to EPA
22-23 November 2016	Responses to resident queries arising from newsletter distribution (email)
23 November 2016	Update at Geelong Port Community Liaison Committee meeting
5 December 2016	Letter and community newsletter to Local/State/Federal representatives, business groups
9 December 2016	Response to resident query arising from newsletter distribution (email)
10 December 2016	Article published in *Geelong Advertiser* on proposal
14 December 2016	A community briefing hosted by the President of North Shore Residents Group with a representative from Boral. The briefing was attended by approximately 25-30 residents.
14 December 2016	Site tour with EPA
14 December 2016	Meeting with fence line neighbour (Omya)
17 January 2017	Distribution of community newsletter update – North Shore residential area, fence line neighbours
24-25 January 2017	Letter and community newsletter update to Local/State/Federal representatives, business groups
15 February 2017	Follow up meeting with State Member for Barwon South and State Upper House Member of Parliament (Western Victoria)
15 February 2017	Follow-up briefing with North Shore Residents Group
15 March 2017	Update at Geelong Port Community Consultative Committee
24 March 2017	Meeting with Federal Member of Parliament (Corangamite)

Table 1-5 presents a summary of the engagement feedback and Boral's response.

Table 1-5: Community Engagement Summary

Community Feedback	Boral Response / Actions taken
Potential clinker dust contamination of Omya stockpiles which will affect the integrity and colour of their product.	▪ Boral design decision in response to concerns to site raw material storage at the southern boundary of the site away from Omya stockpile.
Reduced access to public wharf (Incitec Pivot)	▪ Commercial arrangement – no action.
Supportive of proposal and grateful for engagement (multiple parties).	▪ No action.
Environment considerations e.g. dust, noise, trucks, chemicals, safety (Community meeting of 14 December 2016)	Boral provided the following information to the community at the meeting: ▪ Process is 2 ball mills that are fully enclosed in buildings (refer to Section 2.2.16). ▪ Truck exit/entry will be from Madden Ave, Shell Parade, St Georges Rd, Geelong Ring Rd; not through residential area. ▪ Residents concerned about trucks heading west, however were informed there were only 3-4 per day. The direction is to be advised. Residents asked that it not to be south via Abery Rd and through Geelong, rather similar to Melbourne trucks heading north to Geelong Ring Rd. ▪ A Noise assessment will be reported to EPA and included in the application. ▪ Regarding alarms - 3 audible alarms on conveyor belts sound when conveyor belt starts – 4 honks equivalent sound to a truck reversing. All other alarms are inside control centre. Boral representative expected they would not be heard by residents (residents requested especially not at night). ▪ There would be no direct release of water to the bay. ▪ There will be no net increase in trucks; now 1,000 go to Waurn Ponds in 4-5 days (250 per day) when ships come in, in future 50-60 per day/2-3 per hour 24/7 (less anticipated on weekends). ▪ Residents concerned over risk to cyclists, however Boral engages in truck driver responsibility training to ensure awareness for the safety of cyclists. Boral also encourages employees to cycle and has facilities and site safety procedures to protect cyclists. ▪ Truck cleaning process is not related to onsite dust rather general washing/safety. ▪ Noise reduction operations similar to Omya in North Shore already (can't hear from road beside operations). ▪ Steel storage silos anticipated to be used. ▪ Approximately 75– 95 kilo tonnes clinker storage. ▪ Nothing volatile used in the process e.g. coal, grain, bitumen. ▪ Nothing anticipated to react in air with other industrial neighbours or form dangerous compounds e.g. with Viva, OneSteel or Incitec Pivot. ▪ All materials will be transferred via enclosed conveyor belts with dust collection systems. ▪ Boral are not able to quench but fully enclosed to mitigate any weather conditions e.g. wind. ▪ Vacuum trucks and sweepers would be used 2-3 times per week. ▪ Hoppers on existing Lascelles Wharf will be upgraded and will close after loading to minimise dust. ▪ Raw materials - Gypsum, slag and limestone not undercover but create no dust because they're quite rocky, can wet-down stockpiles and form crust and have 6-10% moisture. Hoppers used have dust collection systems on them.

Community Feedback	Boral Response / Actions taken
	▪ Trucks will load from dust-proof sock, rubber sealed with dust collection self-closing spout, so zero dust emissions. ▪ Truck waiting/parking is onsite (including driver amenities). ▪ The premises will include 30 staff car park spaces. ▪ No kilns will be used in the process. ▪ Local energy supply/needs are currently sufficient. ▪ Gypsum, limestone and slag is from Australia; clinker is from SE Asia. ▪ A number of other alternatives have been considered and the Lascelles site is the preferred location. ▪ There are no plans to import cement i.e. not a cement handling facility; clinker grinding only. ▪ All dust collected will be used/recycled, not wasted or emitted beyond the site boundary. ▪ Cooling water is recycled and if disposed, will be done so by an EPA licensed contractor. ▪ Storm water running through site will be cleaned in accordance with the licence.
Community Meeting 15th February 2017	Boral provided a presentation to the North Shore Residents Group on the process for environmental approvals. The community generally expressed concerns over traffic movements to and from the site. Boral explained that they would use existing heavy goods routes to direct traffic to the freeway. The majority of the traffic would be headings towards Melbourne.

Evidence of community engagement, including newsletters, letters and presentation slides are included as Appendix J.

Following submission of this Works Approval application, Boral will continue to engage with stakeholders and the wider community to address concerns as they are raised in line with best practice standards and will keep EPA notified of such consultation in the event of a request by EPA for such information.

2 Process and Integrated Environmental Assessment

2.1 Site Setting

The proposed site is located within North Shore and is part of the Geelong Port complex as presented in Figure 2-1 below and Figure 1, Appendix B. The site was previously utilised as an industrial steel mill facility by BHP. The north-east section of the site is reclaimed land where no major plant, equipment or buildings will be placed.

Figure 2-1: Site Location

The site is situated within a large Port Zone (PZ), which extends to the north, east and south-east. The land along the western and southern boundaries of the site sit within an Industrial 2 Zone (IN2Z). A complete picture of the zoning in the area is presented in Figure 2, Appendix B.

The site is adjacent to local roads The Esplanade (east), Walchs Road (south) and Madden Avenue (north). The main site entrance is along the eastern boundary onto The Esplanade.

Industrial facilities surrounding the site are summarised in Table 2-1.

Table 2-1: Commercial/Industrial uses in the vicinity of the site

Direction	Land Use or Activity
North	OMYA processing plant (opposite Madden Avenue): ▪ Produces ground calcium. ▪ Calcite stockpiles are located within close proximity to the site boundary.
East	Geelong Port (opposite The Esplanade): ▪ Ships are unloaded into port facilities and transported from the berth area via trucks.
South	Incitec Pivot (opposite Walchs Road): ▪ Produces fertiliser which is imported via Geelong Port. ▪ Utilises the same ship berth as used currently by Boral. ▪ Pre-fertiliser product is moved from the port to the Incitec Pivot site with road trucks.
West	OneSteel (adjacent to site): ▪ All operations are contained within enclosed manufacturing facilities.

Sensitive receptors surrounding the site are summarised in Table 2-2.

Table 2-2: Sensitive receptors around the site

Sensitive Receptor	Detail
Residential	▪ 460 m to the south (south of Sea Breeze Parade) ▪ 1 km west of the site (west of Station Street).
Water bodies	▪ Port Philip Bay (140 m to the east) ▪ Rollerama Drain (570 m to the north), drains into Port Philip Bay.

2.2 Proposed Facility - Description and Operation

The designed plant and equipment shall be compliant to the appropriate industry, and or mandatory standards.

2.2.1 Site Layout

The proposed site layout is presented in the following plans (provided in Appendix B):

> Cardno Figures:
  - Figure 1 – Site Location
  - Figure 2 – Planning Zones.

> Boral Facility Design Plans:
  - GEL-G-SLT-0002-01 – Port and Site Layout
  - GEL-G-SLT-0002-02 – Raw Materials Storage Site Layout
  - GEL-G-SLT-0002-03 – Cement Grinding Site Layout
  - GEL-G-SLT-0002-04 – Port Conveyors to Clinker Store General Arrangement
  - GEL-G-SLT-0002-05 – Ancillary Buildings and Setbacks Site Layout
  - GEL-G-SLT-0002-06 – Office and Workshop Floor Plan Site Layout
  - GEL-G-SLT-0002-07 – Office and Workshop Elevations Site Layout
  - GEL-C-SLT-0008-01 – Traffic Flow Site Layout
  - GEL-M-MFD-0002rB – Clinker and Slag Grinding Material Flow Diagram.

An interactive 3D visualisation of the plant layout and infrastructure is also provided in Appendix B (electronic report version only).

2.2.2 Hours of Operation

The facility is proposed to operate 24 hours of the day, 7 days a week, with the exception of planned maintenance shutdowns (totalling approximately 2 weeks per year) or breakdowns.

2.2.3 Port Unloading and Raw Material Transfer to Storage

This component of the operation is not included in the Works Approval application and is provided here for information and context only.

Geelong Port necessitates that the berth utilised by Boral be available for other ships to unload cargo unrelated to Boral operations. This requires the reception hoppers and initial conveying equipment to be of a portable type that can be easily mobilised, de-mobilised and stored within the port complex. This portable arrangement will feed onto a fixed conveyor system that will transport clinker, slag and gypsum into the Boral facility. The Geelong Port will undertake the design, construction, operation and maintenance of the unloading and delivery infrastructure that will transport materials from the port to the facility.

2.2.4 Raw Material Storage

Clinker Store

A covered store is to be provided for the clinker. This store shall have a nominal capacity range of 75-95kt and is proposed to be of concrete construction with a dome profile to minimise physical footprint and maximise live capacity. The store shall have a dust filtration system designed to meet statutory requirements and of a capacity to suit the incoming feed rate and the volumetric capacity of the store. Collected clinker dust shall be fed back into the clinker transport system. Entry into the store will be via a sealed entrance door, suitable for truck, front end loader and other mobile equipment to safely access and egress. The doors shall be electrically operated with a mechanical slide arrangement sealed from dust ingress. Entry to the store by mobile equipment will only be required 2-3 times per year.

Slag Storage

Slag will be stored in an open stockpile of a nominal 55kt capacity. Concrete retaining walls on three sides shall segregate the material. Water mist spraying or other approved industry standard dust suppression system will be utilised around the slag storage area and the discharge chute.

Gypsum Storage

Gypsum will be stored in an open stockpile of a nominal 35kt capacity. Concrete retaining walls on three sides shall segregate the material.

Limestone Storage

Limestone will be stored in an open stockpile of a nominal 3.5kt capacity. Concrete retaining walls on three sides shall segregate the material. Limestone is to be delivered into site via truck.

2.2.5 Raw Material Reclaim and Transport

To maintain an efficient operation, the size of the front end loader along with the required manpower, capacity of the hopper, transfer conveying systems and dosing bins shall all be designed to maintain the necessary throughput into the milling circuit for slag, gypsum and limestone materials.

2.2.6 Clinker Reclaim and Transport

The clinker store shall have sufficient outlets to achieve the desired live clinker loading. Clinker discharge shall be via clam shell feed gates or similar arrangement with rod gates for isolation. Each outlet shall have a local filtration system attached with collected dust deposited directly onto the local conveyor belt. A series of conveyor belts and bucket elevator will transport the clinker into the dosing bin. The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms. As a minimum all transfer points shall have adequate dust collection capable of maintaining required clean air discharge. Collected dust shall discharge onto the following conveyor of the series.

2.2.7 Slag Reclaim and Transport

Slag will be collected from the stockpile with a front end loader and fed into the slag dryer reception hopper.

2.2.8 Slag Drying

Slag will be dried to the required specification through the dryer system. The dryer shall be a natural gas type unit and will have dust collection facilities and filter media capable of normal operation at the elevated operating temperatures. The slag dryer will feed dry slag into a screw conveyor or similar approved steel conveying system into a bucket elevator. The elevator shall convey material to a height suitable of transfer via a further screw conveyor or similar approved steel conveyor into the slag dosing bin. The bucket elevator shall be designed to suit the temperature and abrasive profile of the material conveyed and shall incorporate guarding and safety mechanisms.

The fixed steel conveyor systems shall be designed for the temperature and abrasive profile of the conveyed material, prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms. As a minimum all transfer points shall have adequate dust collection and filter media capable of normal operation at the elevated operating temperatures. Collected dust shall discharge onto the following conveyor of the series or dosing bin.

2.2.9 Gypsum and Limestone Reclaim and Transport

Gypsum and Limestone will be collected from the respective stockpiles with a front end loader and fed into a strategically located reception hopper. The hopper will feed gypsum or limestone onto a belt conveyor that will transport the material into either the gypsum or limestone dosing bins via a diverter chute. The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms.

As a minimum all transfer points shall have adequate dust collection systems with collected dust discharging onto the following conveyor of the series or dosing bin.

2.2.10 Clinker Dosing Bin and Feed

Clinker will be stored in a single dosing bin which will feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure clinker onto the feed conveyor system into the ball mills (refer to Section 2.2.16). The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms. As a minimum all transfer points and the silo shall have adequate dust collection systems. Collected dust shall discharge into the dosing bin or onto the following conveyor of the series.

2.2.11 Slag Dosing Bin and Feed

Slag will be stored in two dosing bins to feed the ball mills within the grinding circuit. The dosing bins will have automatic feed system at the outlet which will measure slag onto the feed conveyor system into the ball mills. The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways, guarding and safety mechanisms. As a minimum all transfer points and the silo shall have adequate dust collection systems. Collected dust shall discharge into the dosing bins or onto the following conveyor of the series.

2.2.12 Gypsum Dosing Bin and Feed

Gypsum will be stored in a single dosing bin to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure gypsum onto the feed conveyor system into the ball mills. The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms. As a minimum all transfer points and the silo shall have adequate dust collection systems. Collected dust shall discharge into the dosing bin or onto the following conveyor of the series.

2.2.13 Limestone Dosing Bin and Feed

Limestone will be stored in a single dosing bin to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure limestone onto the feed conveyor system into the ball mills. The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms. As a minimum all transfer points and the silo shall have adequate dust collection systems. Collected dust shall discharge into the dosing bin or onto the following conveyor of the series.

2.2.14 Clinker Grinding

The grinding circuit will primarily consist of two ball mills and the facility will include dynamic, high efficiency separation within a closed circuit. The circuit will require hot gas generation and a recirculation duct and damper arrangement will be required from the mill outlet back to the inlet to enable the mill outlet temperature to be controlled. An emergency cold air bleed arrangement will be also be required at the inlet to the main dust collector to provide protection from overheating. The discharge from the main dust collector will be ducted to an exhaust fan which will in turn discharge the gas to the main stack for discharge to the atmosphere. Finished product shall leave the circuit via a bucket elevator and feed airslides into the finished product silos. The bucket elevator shall be designed to suit the temperature and abrasive profile of the material conveyed and shall incorporate guarding and safety mechanisms.

Airslides shall be designed to convey product efficiently, they shall have access walkways as specified and guarding and safety mechanisms. Strategically located filters are required to ensure that the circuit operates in a completely dust free manner. As a minimum transfer points shall have adequate dust collection systems with collected dust returned to the grinding circuit or finished product silos respectively.

2.2.15 Finished Product Storage and Dispatch

It is proposed that finished product silos will be erected with a capacity to meet the storage requirements of the facility and the sales demand throughout the year. The silos will be of steel construction with inlet and outlet dust collection facilities. The product shall be fed from the silo via airslides to a loading spout. Weighbridge facilities will be located below and/or or adjacent to the loading spouts. The silos shall include an integral aeration and discharge facility at the outlet. Airslides shall be designed to convey product efficiently, they shall have access walkways as specified and guarding and safety mechanisms. As a minimum transfer points into the silo and loading spouts shall have adequate dust collection systems. Collected dust shall discharge back into the silo.

A summary materials flow process diagram is included as Plan GEL-M-MFD-0002rB, Appendix B.

2.2.16 Choice of Process and Technology

The proposed technology for clinker grinding is ball milling. Ball milling is an industry standard technology for grinding clinker and is a proven technology. Boral has opted for ball milling with 3800-4500kw (100tph cement production) capacity as the preferred technology for the facility for the following reasons:

> Reliable process equipment from a wider selection of proven suppliers.

> Technology allows for a staged increase in production from the equipment.

> Technology allows for relatively easy switching between cement products.

> Two process lines selected to allow production to be continued whilst one line is on scheduled maintenance or unforeseen breakdown.

A typical ball mill is shown in Figure 2-2.

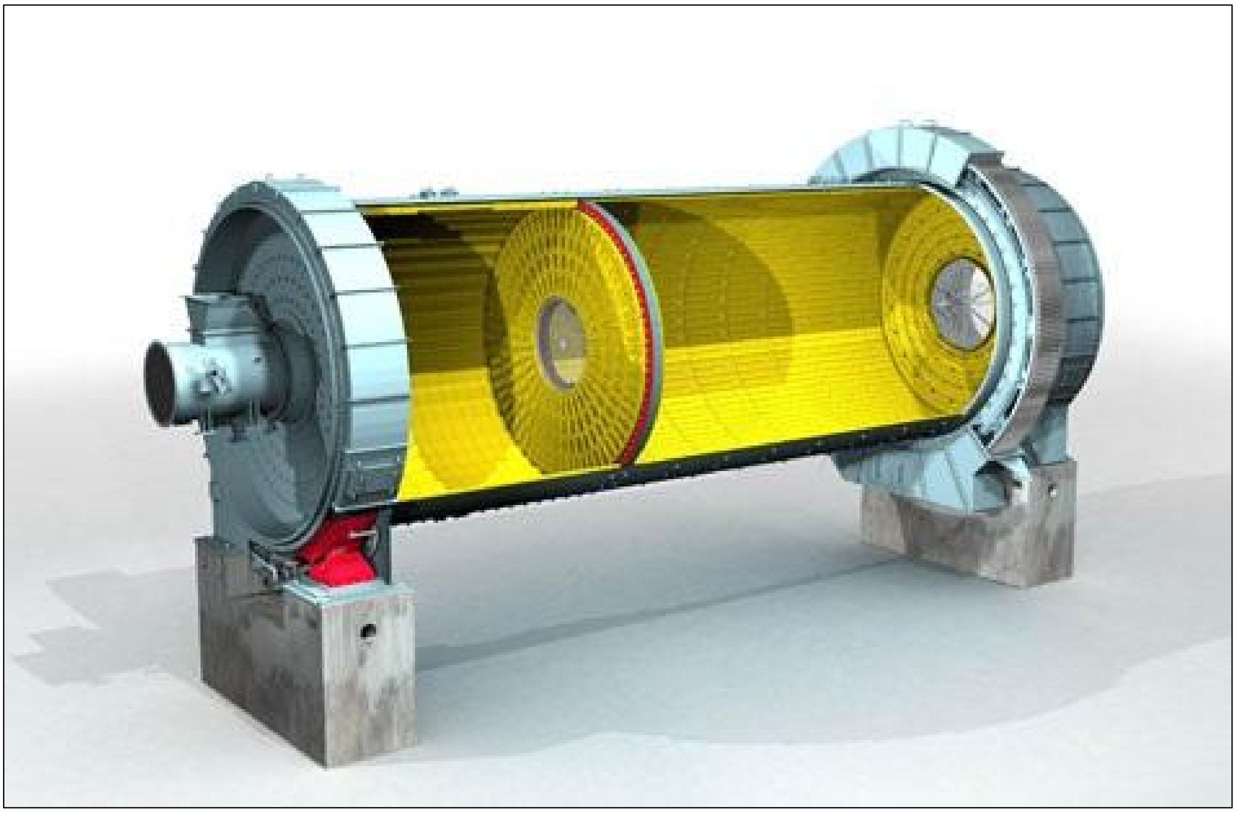

Figure 2-2: Typical Ball Mill

2.3 Traffic Impacts

Cardno has completed a Traffic and Transport Assessment (Cardno, 2016) to support the works approval application. The assessment is included in Appendix G.

Traffic generated at the site, based on information provided by Boral, is:

> A peak cement collection truck flow of 18 trucks per hour is anticipated to occur during three peak periods of three hours each, being 5:00am – 8:00am, 10:00am – 1:00pm and 2:00pm to 4:00pm, Monday to Friday. This represents 80% of total cement collections:

> The remaining 20% of cement collections are distributed from:

- 4:00am – 5:00am and 5:00pm – 8:00pm at an average flow of 3.6 trucks per hour;
- 3:00am – 4:00am and 9:00pm – 10:00pm at a flow of two trucks per hour; and
- 10:00pm to 3:00am at a flow of one truck per hour.

> Limestone deliveries are anticipated to occur at a flow of 2 trucks per hour from 6:00am – 4:00pm.

The anticipated peak hour traffic movements are presented in Table 2-3.

Table 2-3: Anticipated Peak Hour Traffic Movements

	AM Peak (7:00am – 8:00am)			PM Peak (4:00pm – 5:00pm)		
	In	Out	Total	In	Out	Total
Heavy Vehicles	20	20	40	18	18	36
Light Vehicles	13	8	21	13	8	21
Total	**33**	**28**	**61**	**31**	**26**	**57**

The proposed facility will replace the current, high-intensity traffic patterns required to immediately transfer clinker to Waurn Ponds. Generated traffic from the new facility will be spread across the day, reducing the existing impact on the surrounding road network.

The proposed development is anticipated to generate 33 inbound and 28 outbound movements in the AM peak, equivalent to approximately one vehicle every two minutes in each direction, and 31 inbound and 26 outbound movements in the PM peak, again equivalent to approximately one vehicle movement every two minutes in each direction. This is considered low in traffic engineering terms, and is considered unlikely to impact on the function of the surrounding road network.

Furthermore, it is anticipated that the proposed development will minimise and distribute previous high-activity volumes across a number of days and hours of the day. Given that the current site generated regular high-activity traffic volumes, the abovementioned traffic generation is considered to improve the current operating conditions.

2.4 Fire Management

A fire water system will be installed on site. This is likely to consist of a ring main around the plant with hydrants, although the specific system will be subject to the final design of the site. Fire water storage will be fed from the stormwater settling pond with back-up supply from town water mains supply. Fire pumps and water storage onsite will be sufficient to comply with appropriate industry, and or mandatory standards.

2.5 Facility Capacity

Table 2-4, Table 2-5 and Table 2-6 present a summary of the major facility capacity information.

Table 2-4: Raw Materials Storage Capacity

Material	Storage Capacity (Kt)
Clinker	85
Gypsum and Slag	75
Limestone	3.5

Table 2-5: Annual Material Handling (2020 and 2040)

Raw Material	GP Cement Product Ratio	HES Cement Production Ration	Slag Product Ratio	Annual Material Handling Rate 2020	Annual Material Handling Rate 2040
Clinker	87.5%	90%	-	678,000t	922,000t
Raw Slag	-	-	95%	146,000t	198,000t
Limestone	7.5%	5%	-	79,000t	108,000t
Gypsum	5%	5%	5%	47,000t	64,000t

Table 2-6: Cement Production Capacity

Year	Cement Production (tonnes per year)
2020	950,000
2040	1,300,000

All technical studies prepared in support of this application have assumed that the plant will be running at full capacity to present the “worst-case” within the modelled emissions.

2.6 Environmental Best Practice Assessment

2.6.1 Objectives of Best Practice Assessment

The objectives of the Best Practice Assessment (BPA) is to demonstrate best practice for the proposed Clinker Grinding Facility, as outlined in EPA Publication 1517 Demonstrating Best Practice Guideline (EPA, 2013).

An Environmental Risk Assessment (ERA) for non-routine operations has been completed for the proposed Clinker Grinding Facility and the outcome of the ERA is used to guide the scope and purpose of the BPA. From a risk-based approach, the proposal’s highest environmental risk is to air and noise, in accordance with SEPP Noise (N-1) and SEPP Air Quality Management.

2.6.2 Options Overview

In selecting the site and the proposed Clinker Grinding Facility, Boral initial assessed 4 broad business solutions and their ability their key criteria; these being:

> Proximity to markets

> Site availability

> Securing approvals and site tenure

> Site suitability and capital requirements.

The 4 options that were considered in prior to the selection of the proposed site and operation were:

> Enhancing current operations at Waurn Ponds:
  - This option assessed the feasibility of further investment at Waurn Ponds

> Hybrid Option:
  - Waurn Ponds would be decommissioned and Boral cement demand would be met via a combination of competitor supply and product from interstate

> Portside Clinker Grinding:
  - Including at Geelong, Melbourne and Port of Hastings

> Portside Cement Import Solution:
  - Including at Geelong, Melbourne and Port of Hastings.

Based on the analysis conducted by Boral and referred to above, portside grinding at Geelong met the key selection criteria of this assessment. Enhancing operations at Waurn Ponds was not considered viable due to the age of the plant. Hybrid options and cement import options do not meet the business demands of Boral.

2.6.3 Best Practice Analysis

Site Selection and Management Systems

An assessment of environmental impact needs to consider the sensitivity of the receiving environment. The best practice assessment applies to site selection, site layout, site operation and management systems to ensure that human health and amenity, and the environment, are protected.

Best practice has been applied to the site selection and management systems in the following ways:

> The site location:
  - The site is in the vicinity of the Geelong Port where raw materials (clinker, slag and gypsum) are received by ship. This reduces the impact from transport vehicles carting raw material to the site.
  - The site is within an industrial area that is surrounded by existing industrial activities.
  - The surrounding road network directly links the site to the motorway to allow for delivery of raw materials (limestone) and dispatch of final product.
  - The site has been vacant since the 1990's and provides an opportunity to bring a derelict site back into use.

> The site layout:
  - Siting of stockpiles within the site has been designed to allow for minimal cross-contamination of material from neighbouring facilities.
  - Siting of equipment and the movement of materials within the site has been designed so that plant movement is minimised and flow of materials is uncomplicated.
  - Raw material storage sited closer to the Port operations to minimise conveyor lengths.

> The site operation:
  - Modern equipment will be used throughout the operation with higher efficiency and in-built emissions mitigation.
  - Maintenance regimes to maintain serviceability of all equipment.
  - Conveying of materials from the Port rather than movement by road.
  - The stored clinker will be enclosed to prevent the escape of dust.
  - Uncovered stockpiles are proposed to be located at the southern end of the site which is the furthest away from the neighbouring facility's stockpiles.
  - Industry standard third party accredited environmental and quality management systems (ISO14001 and ISO9001) will be implemented throughout the operation.
  - Dedicated personnel within Boral responsible for the oversight and management of environmental matters across all cement operations.

Preventative Actions

Best practice contributes to ensuring that the proposed environmental impact is prevented or minimised, as far as practicable. As identified by the ERA, Air and Noise were considered to have the highest environmental risk. Therefore, preventative measures to reduce risk is described in the following sections.

Air Quality Protection

State Environment Protection Policy (Air Quality Management) (SEPP AQM) and National Environment Protection Measure for Ambient Air Quality (NEPM AAQ) contains design criteria concentrations for particulate matter relevant for dust impacts (PM_{10}, $PM_{2.5}$ and TSP[3]). Based on the Air Quality Assessment (PEL, 2016), risks associated with air quality impacts from the proposed Clinker Grinding Facility can be managed.

[3] TSP: Total suspended particles (TSP)
PM_{10}: Particulate matter with an aerodynamic diameter less than 10 µm.
$PM_{2.5}$: Particulate matter with an aerodynamic diameter less than 2.5 µm.

Preventative measures to prevent or minimise dust impact include the following:

> Siting of equipment and stockpiles so that uncovered stockpiles are located at the southern end of the site which is the furthest away from the neighbouring site stockpiles. This reduces the risk of cross-contamination with the neighbour's product.

> The siting of material reception hoppers close to relevant stockpiles to limit the transfer distance of materials via the FEL.

> Dust mitigation and/or filtration systems built into the clinker grinding technology.

> Fully enclosed conveyor belts to transfer materials which reduces the double handling and the use of trucks and front end loaders.

> Fully enclosed clinker stockpile with dust filtration system designed to meet statutory requirements.

> State of the art enclosed ball mill with air quality mitigation and dust collection facilities throughout the clinker grinding process.

> Hardstand constructed in areas of vehicle traffic.

> Reduced internal vehicle movements and double handling of materials.

Stockpiles for slag and gypsum are not covered to allow for flexible storage. However, due to the nature of these materials having a high natural moisture content, industry practice is to apply water mist sprays or other approved dust mitigation equipment. Naturally, slag forms a self-sealing crust.

Limestone will be delivered to the site as a rock material and stored in an open stockpile. Dust suppression is not required due to the composition of the rock material.

Noise Mitigation

As the detailed plant designed is yet to be finalised, a range of measures to prevent or minimise noise impact are being considered that are commensurate to the risk, as outlined in the Marshall Day Acoustics (MDA) Preliminary Draft Environmental Noise Assessment (MDA, 2016) and discussed further in Section 3.4.

Further noise modelling will be completed upon final design of the facility to demonstrate that the anticipated noise impacts have been designed out of the project and will achieve the relevant noise criteria.

All Practicable Measures

Decisions with regard to practicability, when assessing best practice, should have regard to technical, logistical and financial considerations. The proposed approach should be cost effective and the preferred option should be proportional to the environmental risk.

The proposed Clinker Grinding Facility incorporates modern, state of the art technologies which are more efficient and therefore better for the environment. Mitigation measures have been incorporated in the design of the plant which includes enclosed automated conveyor systems, dust capture and filter systems and water suppression to reduce the environmental impact. These mitigation measures target fugitive dust and nuisance noise which were identified as the higher risk environmental impacts of the proposed facility. Maintenance regimes will also be implemented to maintain the serviceability of equipment.

Waste is also managed in accordance with the waste hierarchy in the following ways:

> Avoidance and re-use

- Non-compliant (off-specification) material will be recycled within the process to avoid waste generation
- Stormwater will be captured in a suitably sized open reservoir to allow settlement of solids and then re-used for process and cooling water to reduce the volume of mains water required.
- Process water will be contained and recirculated rather than discharged to sewer. An oil trap system and water filter ensure that water losses are minimal.

> Containment and disposal
  - LEAN manufacturing principles
  - Other waste streams including oil from equipment servicing is to be recycled by specialist provider.

Despite the proposed technologies and processes, the project is still financially viable. This integrates economic, social and environmental considerations (Section 1B of the principles in the EP Act 1970).

2.6.4 Internationally Demonstrated and Locally Available

As discussed in Section 2.2.16 the proposed technology is ball milling. This technology is the industry standard and proven technique for grinding of clinker.

2.6.5 Principles of Environmental Protection

The Act describes 11 principles of environmental protection which underpin the whole Act. Table 2-7 provides an assessment of how the proposed facility and operation meets each principle of the Act.

Table 2-7: Principles of Environment Protection

Principles of Environment Protection	Proposed Clinker Grinding Facility
Integration of economic, social and environmental considerations	Sound environmental practice including: ▪ Inclusion of environmental mitigation measures within the design: o Covered storage o Water suppression o Dust mitigation measures o Noise mitigation measures o Chemical storage bunding ▪ Demonstrated economic commitment to the Geelong region ▪ Overall reduction in vehicle movements by moving operations closer to raw materials sources ▪ Use of technology (such as conveyors) to further reduce the environmental footprint ▪ Uncovered flexible storage systems utilise in-built water suppression technology to reduce environmental impacts ▪ Modern, more efficient process.
The precautionary principle	▪ Inclusion of integrated environmental mitigation technology from the outset. ▪ Emissions assessments and modelling have been completed on the “worst case” scenario”.
Intergenerational equity	▪ Environment sensitive design – i.e. inclusion of dust and noise mitigation ▪ Demonstrated economic commitment to the Geelong region ▪ A demonstrated commitment to community consultation and action in response.
Conservation of biological diversity and ecological integrity	▪ Boral is proposing to develop a vacant industrial site in and industrial setting in preference to a greenfield location.
Improved valuation, pricing and incentive mechanisms	▪ Boral recognise the costs associated with Environmental Protection and this is factored into the decision making process.
The principle of shared responsibility	▪ Boral has a documented environmental policy and commits to allocating sufficient resources to meet the commitments of this Policy.
Product stewardship	▪ Implementation on ISO14001 accredited environmental management system ▪ Commitment to zero harm by Boral.

Principles of Environment Protection	Proposed Clinker Grinding Facility
The waste hierarchy	▪ Materials will be re-used wherever possible. ▪ Boral has a commitment to reducing waste in all forms, by application of LEAN manufacturing principles.
Integrated environmental management	Integrated environmental management is a key operating feature of all Boral facilities to ensure the protection of the environment, specifically: ▪ Site selection (existing industrial) ▪ Design: Inclusion of environmental mitigation measures within the design: o Covered storage o Water suppression o Dust mitigation measures o Noise mitigation measures o Chemical storage bunding ▪ Operation: o ISO14001 / ISO9001 accreditations o Commitment to zero harm by Boral.
Enforcement	Under the commitments made in Boral's environmental policy they commit to complying with environmental legislation, regulations, standards and codes of practice relevant to the particular business.
Accountability	Boral is accountable on a number of fronts, including: ▪ Environmental performance (via EPA licensing) ▪ The community (reputational risk) ▪ Boral Shareholders (to meet the commitments of the Environmental Policy).

2.6.6 Best Practice Conclusions

The proposed Clinker Grinding Facility is considered to be best practice and fulfils the requirements of EPA Publication 1517 for the following reasons:

1. **Siting:**
   - In the vicinity of the Geelong Port where raw materials (clinker, slag and gypsum) are received by ship. This reduces the impact from transport vehicles carting raw material to the site
   - Within an industrial area that is surrounded by existing industrial activities.
   - Directly linked to the motorway to allow for delivery of raw materials (limestone) and dispatch of final product
   - Vacant since the 1990's and provides an opportunity to bring a derelict site back into use.
2. **Preventative Actions:**
   - Siting of stockpiles to allow for minimal cross-contamination of material from and to neighbouring facilities
   - Siting of equipment and stockpiles so that plant movement is minimised and flow of materials is uncomplicated
   - Conveying of materials rather than movement by road.
3. **Technology Selection:**
   - Modern equipment with higher efficiency and in-built emissions mitigation
   - Proven technology.
4. **Environmental Performance and Management:**
   - Covered storage of clinker
   - Water suppression included in uncovered storage

- Implementation of industry standard and third party accredited environmental and quality management systems (ISO14001 and ISO9001)
- Dedicated personnel for management of environmental matters.

5. The Principles of Environmental Protection:

- The proposal meets the 11 principles of environmental protection as described in Table 2-7.

3 Environmental Information

3.1 Energy Use and Greenhouse Gas Emissions

Pacific Environment Limited (PEL), on behalf of Boral, completed a Greenhouse Gas and Air Quality Assessment (PEL, 2017) to support the works approval application. The assessment is included in Appendix D.

For the assessment, greenhouse gas emissions are separated into two categories:

> **Scope 1** - Direct greenhouse gas emissions that occur from sources owned or controlled by the reporting entity.

> **Scope 2** - Indirect greenhouse gas emissions from the generation of purchased energy products by the entity.

Identified sources of greenhouse gas emission are summarised in Table 3-1.

Table 3-1: Identified sources of greenhouse gas emissions (PEL, 2017)

Emission Source	Description	Emissions	Scope	Projected emissions for 2040 (tonnes CO_2-e/year)
Natural gas combustion	Emissions associated with the combustion of natural gas in the dryer	CO_2, CH_4, N_2O	Scope 1	4,908
Diesel combustion	Emissions associated with the combustion of diesel in the mobile equipment (e.g. front end loads)	CO_2, CH_4, N_2O	Scope 1	205
Electricity consumption	Electricity purchased from the main grid	CO_2, CH_4, N_2O	Scope 2	13,356

As summarised in Table 3-1, the majority of the greenhouse emissions associated with this project are anticipated to be from the consumption of purchased electricity from the grid.

The assessment showed that the projected greenhouse gas emissions for the worst-case scenario (i.e. when the final planned capacity is reached in 2040) are not anticipated to significantly contribute to Victoria's greenhouse emission inventory based on published historical data for 2014 (PEL, 2016). In addition, the project's emissions were considered reasonable in comparison to published greenhouse emissions reported under the NGER[4] scheme for FY2015 for existing clinker production operations in Australia.

Table 3-2 provides the results of the energy use and GHG emissions information in the required EPA table format.

[4] National Greenhouse and Energy Reporting (NGER) Act 2007

Table 3-2: Energy Use and Greenhouse Gas Emissions (EPA Table Format)

Total annual energy use (TJ/yr)	Total energy-related GHG emissions (tCO_{2}-e/yr)	Total non-energy related GHG emissions (tCO_{2}-e/yr)
FY 2020 Natural gas: 70.226 TJ/yr Diesel combustion: 2.432 TJ/yr Electricity consumption: 7,588,103 kWh/yr	TOTAL (FY 2020): 12,060 Natural Gas: 3,619 Diesel combustion: 171 Electricity consumption: 8,271	NA
FY 2040 Natural Gas: 95.238 TJ/yr Diesel combustion: 2.918 TJ/yr Electricity consumption: 12,252,843 kWh/yr	TOTAL (FY 2040): 18,468 Natural Gas: 4,908 Diesel combustion: 205 Electricity consumption: 13,356	NA

3.2 Water Use

Clinker grinding is not a water intensive activity. Within the process, water will be used for cooling of process equipment and cement cooling only. Losses from this process will not exceed $10m^3$/hr at peak. Water will also be used for dust suppression and potable water for ablutions and the truck wash station.

Thyssenkrupp Industrials Solutions (Thyssenkrupp), on behalf of Boral, completed a Stormwater Management Technical Note (Thyssenkrupp, 2017) for a proposed strategy for management, both treatment and disposal, of stormwater to support the works approval application. Stormwater will be captured in a suitably sized open sedimentation pond system which will consist of an inlet pond and a settling pond. This system will enable settlement of solids and then re-use of water for the process and cooling water to reduce the volume of mains water required.

Reticulated water supply will be used for the administration facilities and the laboratory.

3.3 Air Emissions

3.3.1 Air Emission Assessment

Pacific Environment Limited (PEL), on behalf of Boral, completed a Greenhouse Gas and Air Quality Assessment (PEL, 2017) to support the works approval application. The assessment is included in Appendix E.

Although the initial production capacity is planned to 950,000 tonnes per annum, the air emission assessment was assessed for the estimated 2040 planned production capacity of 1,300,000 tonnes per annum and operating 24 hours per day.

Air Emissions Sources

Dust is measured as Total Suspended Particles (TSP), particulate matter (PM) with an aerodynamic diameter less than 10 µm (PM_{10}) and PM with an aerodynamic diameter less than 2.5 µm ($PM_{2.5}$).

A summary of fugitive air emissions, as assessed by PEL, is presented in Table 3-3. Dust emissions have been modelled on the “worst case” operation scenario.

Table 3-3: Summary for dust emissions of Clinker Grinding Facility (PEL, 2017)

Source	PM_{10} Emissions		$PM_{2.5}$ Emissions		Total Particulate Emissions	
	Kg/year	*Source contribution*	*Kg/year*	*Source contribution*	*Kg/year*	*Source contribution*
Materials handling and transfer points	12,858	10%	4,065	7%	-	-
Product truck loading	5,022	4%	1,507	3%	-	-
Stack sources	83,738	66%	46,047	82%	117,234	100%
Wind erosion	8,350	7%	835	1%	-	
Wheel generated dust (paved roads)	16,424	13%	3,948	7%	-	
Total	126,391	-	56,401	-	117,234	-

Air Quality Management Best Practice

The proposed air quality management measures taken for the facility is summarised in Table 3-4.

Table 3-4: Details of proposed process and air quality management measures (PEL, 2017)

Source	Detail	Mitigation measures
Materials handling and transfer points	▪ Mechanical troughed belt conveyors will be used to move material from the port to the raw material storage buildings where the material is transferred between consecutive conveyors. ▪ Bucket elevators will be used to elevate material where troughed belt conveyors are impractical due to excessive inclination angles. ▪ Front end loader (FEL) will be used for the reclaiming of slag, gypsum and limestone from stockpiles. ▪ Other mobile plant could include a forklift, small capacity crane, and elevated working platform (EWP) for maintenance purposes, skid-steer and vacuum/road sweeper for general plant cleaning.	▪ Conveyors will be covered to prevent airborne dust release. ▪ Clinker storage will be in a sealed building. ▪ All material transfer points will be managed with nuisance dust filters. ▪ The slag drier will have a process filter to control the emission of process gases after the drying plant.
Product truck loading	▪ Finished product will be collected and transferred via mechanical conveyors to the finished product silos, whilst oversized material will be recirculated within the grinding circuit for secondary processing. ▪ Cement products can be loaded 24 hours per day, 7 days per week, 365 days per year. ▪ Option for fly-ash and other cementitious products. ▪ Limestone deliveries on Monday to Friday - 6am to 6pm delivered via truck and trailer road transport. ▪ Possible ISO container deliveries and dispatch.	▪ The cement silos will each have a nuisance filter to control the filling and discharge process. ▪ Enclosed pneumatic air slides will be installed for distribution on top of the cement storage silos, as well as for silo extraction and tanker loading. ▪ Concrete roads approaching and passing through the cement dispatch silos. ▪ Compacted and sealed ground adjacent to the contained slag and gypsum store. ▪ Concrete apron around the limestone stockpile, suitable for trailer delivery and tipping.
Stack sources	▪ Grinding operation will be through closed circuit ball mills. ▪ The mills will be controlled and monitored from a remote control room.	▪ Clinker grinding mill will be within a sheeted building. ▪ Gases exhausted by the grinding plant and slag dryer will be cleaned by passing through a process filter. The positive barrier

Source	Detail	Mitigation measures
	▪ Slag dryer and heat generation for cement mills involve combustion process which will both utilise natural gas facilities. ▪ Storage of fuel for FEL.	of the filter collects the cementitious dust on the bags, which are cleaned by a pulse of high pressure air, allowing the cement to be collected in the hopper of the dust collector and the cleaned gases to be emitted to atmosphere. ▪ The main process filters will be fitted with burst bag detectors so failure of the process filter media will be detected allowing corrective action to be taken.
Other	▪ Employees at the site will be working in administration, technical support and control room buildings.	▪ Administration and technical support buildings will have reverse cycle air conditioning ▪ The electrical motor control centre will have air conditioning. ▪ All other process buildings will be naturally ventilated.

Air Quality Impact Assessment

This dust impact assessment of the proposed Clinker Grinding Facility at the site was assessed for the 2040 planned production capacity of 1,300,000 tonnes per annum. The assessment was performed with detailed emissions estimation and variable emissions for the proposed site activities for continuous (24 hour) operations.

Background Air Quality

Background air quality was collected for three and a half months during a monitoring campaign prior to completion of modelling. EPA Geelong South PM_{10} and $PM_{2.5}$ data was also used in the assessment to determine cumulative impacts. This air quality data was provided to PEL by the EPA from the EPA Geelong South air quality monitoring station which is located approximately 9 km south of the site. The site specific monitoring data was used for a general evaluation of the model outputs.

Assessment of Proposed Clinker Grinding Facility

The dust monitoring was performed in accordance with AS/NZS 3580.9.11:2016 for PM_{10} beta attenuation monitors.

Table 3-5 provides the results of the energy use and GHG emissions information in the required EPA table format.

Table 3-5: Point Source Emission Assessment Results (EPA Table Format)

Model used	Dispersion Modelling (CALPUFF)			
Met file used	CALMET 2014 (from obs data)			
Indicator	Predicted maximum GLC (projected)[1] mg/m^3	Background concentration mg/m^3	Predicted maximum GLCs (total) mg/m^3	Design criteria mg/m^3
PM_{10} (24 hour)	0.0271	0.0218	0.0489	0.050
PM_{10} (1 year) SEPP	0.0027	0.0191	0.0218	0.020
PM_{10} (1 year) NEPM	0.0027	0.0191	0.0218	0.025
$PM_{2.5}$ (24 hour)	0.0087	0.0081	0.0168	0.025
$PM_{2.5}$ (1 year)	0.0009	0.0071	0.0080	0.008
Note: 1. Predicted maximum GLC at nearest sensitive receptor with highest impacts				

The assessment demonstrates compliance with peak impact assessment criteria provided that additional facility dust control measures consisting of:

> Water sprays for material unloading from the conveyer from the ship unloading at the slag stockpiles.

> Improved loading in the bulk materials handling area. No specific sweeping regime was proposed for this area. However, wheel generated dust emissions from this area has a significant potential for offsite dust emissions and regular sweeping to reduce the surface silt loading will be important in reducing site emissions.

A number of small exceedances of PM10 and PM2.5 for the annual average criteria were predicted however the report notes that the clinker grinding facility impacts are conservatively assessed and low compared to the background concentrations applied in the cumulative assessment.

The Air Quality Assessment concludes that overall concludes that the risks associated with air quality impacts can be managed.

A Dust Management Plan (PEL, 2017) has been prepared and incorporates these measures. This management plan will be implemented throughout operations.

3.4 Noise Emissions and Assessment

3.4.1 Detailed Noise Impact Assessment

An Environmental Noise Assessment has been completed (January 2017) by Marshall Day Acoustics (MDA) in support of the Works Approval application and provides details of relevant noise criteria, measurement surveys and predicted noise levels associated with the proposed operations at the site in accordance with the relevant environmental noise regulations. Noise criteria have been calculated in accordance with:

> State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 “SEPP N-1”

> EPA Publication 1411-1413 Noise from Industry in Regional Victoria “NIRV”

The Noise Assessment is included as Appendix E.

Noise Emission Sources

Noise sources for the proposed facility are summarised in Table 3-6.

Table 3-6: Noise Sources (MDA, 2017)

Item	Associated Process/Location	Quantity
Extraction Fan Motor	Extraction of dust on conveyors	1
Dust Collection Units	Collection of dust from conveyors	36
Positive Displacement Blowers	Installed and ball mills and silos	4
Hot Gas Generator	Drying of raw materials	2
Standard Conveyor Motors	Movement of materials around site	15
Dispatch Trucks	Dispatch of material	8
Ball Mills	Processing of raw materials	2
Front End Loader	Distribution of material around site	1
Load-out Silos	Dispatch of materials	6
Limestone Tankers (trucks)	Delivery of limestone	1
Bucket Elevator	Movement of materials around site	3
Roll Press	Processing of raw materials	2

Noise Impact Assessment

A noise model was created based on topographical data, locations of noise sources and receptors and meteorological conditions to estimate noise emissions at the most sensitive receptors. The sensitive locations are identified as:

> 183 Sparks Road (west of the subject site)

> 33 Sea Breeze Parade (south of the subject site).

Preliminary noise emissions have been calculated the worst case noise emission scenario and are shown in Figure 3-1 and in Table 3-7.

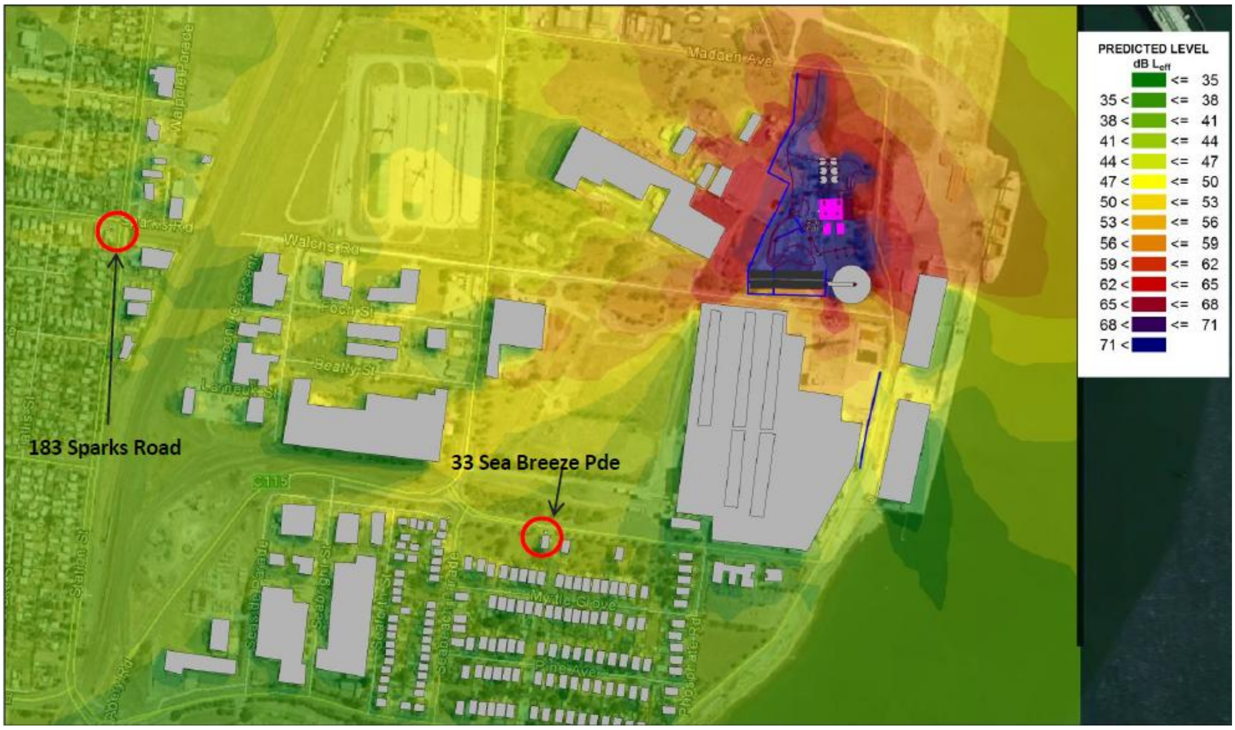

Figure 3-1: Predicted Noise Levels (MDA, 2017)

Table 3-7: Predicted Noise Levels – Worst Case (MDA, 2017)

Address	Predicted Noise Levels, L_{eff} dB 183 Sparks Road	33 sea Breeze Parade
Predicted Noise Level (dB L_{eff})	42	43
Recommended Night Noise Level (NIRV)	47	48
Cumulative Target Noise Criteria (night)	42	43
Compliance with NIRV	Yes	Yes

The preliminary noise modelling results predicted that the site will comply with the EPA Publications 1411-1413 Noise from Industry in Regional Victoria (NIRV) recommended levels, and also the target recommended levels, provided that appropriate noise mitigation measures are implemented.

Noise Impact Assessment Results (EPA Table Format)

Table 3-8 provides the results of the Noise Impact Assessment in the required EPA table format.

Table 3-8: Noise Impact Assessment Results (EPA Table Format)

Noise receptor(s)	Time periods	Background noise level dB(A)	Existing noise level (Site) dB(A)	Total noise level dB(A)[1]	Noise limits dB(A)
33 Sea Breeze Parade (south of site)	Daytime	42	No noise at site	43	55
	Evening	40	No noise at site	43	50
	Night-time	47[2]	No noise at site	43	48
183 Sparks Road (west of site)	Daytime	46	No noise at site	42	57
	Evening	43	No noise at site	42	52
	Night-time	49[2]	No noise at site	42	47

Notes:
1. Total predicted noise level from site operations, dB L_{eff} (Refer Section 7 of Acoustic Report). Total Noise Level' refers only to the total noise level predicted *from the subject site*. It does not include noise from surrounding industry sites.
2. Measured night background not used to determine noise limits (Refer Appendix D1.2). The night background noise levels listed are as measured, but they were not used to calculate the noise limits to enable a conservative assessment, as discussed in the report. Figures that would give a 'neutral' limit were used instead.

Best Practice Noise Control Measures

Conceptual noise mitigation incorporated into the Noise Assessment are provided in Table 3-9.

Table 3-9: Noise Mitigation incorporated into assessment (MDA, 2017)

Description of Plant	Mitigation Incorporated	Anticipated Mitigation Noise Reduction
Stockpile conveyor belt	▪ Place motor at ground level ▪ Construct screening of 1.5m in height along the southern and western sides of the conveyor ▪ Regular conveyor maintenance	▪ 5dB overall from screening conveyor ▪ >10dB from placement of conveyor motor at ground level
Discharge stack 1 and 2 (separator fan)	▪ Fitted with enclosure, or muffler / attenuator device	▪ 5 dB per unit
Dust collection units of top of clinker building	▪ Enclosed within Penthouse structures or attenuated	▪ 5-10 dB per unit
Dust collection units on top of ball mill building	▪ Enclosed within Penthouse structures or attenuated	▪ 5-10 dB per unit
Hot gas generator	▪ Localised screening around plant at ground level	▪ 5-10 dB per unit

Description of Plant	Mitigation Incorporated	Anticipated Mitigation Noise Reduction
	▪ Screening must be 1m higher than the top of the plant and installed on west and southern sides of the plant	
Loader	▪ CAT972 (smaller unit with lower operating noise level than other plant)	▪ 4 dB quieter than CAT988 loader
All sources	▪ 3m screening around the site along with west and south of the site	▪ 5-10 dB reduction – predominantly effective for mobile plant and low level conveyors and motors

The conceptual noise mitigation measures will be reviewed and changed if required to maintain compliance with the target recommended levels.

3.5 Water

3.5.1 Managing Stormwater Run-Off Discharge

A Stormwater Management Plan (SWMP) (Thyssenkrupp, 2017) has been prepared to support the Works approval application and is provided as Appendix H.

The purpose of the SWMP is to identify the strategy for management, both treatment and disposal, of stormwater at the site.

Stormwater management will comprise a combination of source control and structural control, including:

> Source control:
  - Handling and storage of materials, including use and maintenance of dust suppression systems and bunding of chemicals and fuels
  - Clean-up programs including regular sweeping and good housekeeping and immediate clean-up of any spills
  - Education, training, procedures and appropriate signage
  - Infrastructure including grates, inlet screens and/or traps.

> Structural control:
  - Sedimentation Pond System comprising a series of lined ponds:
    - An inlet pond to receive flow from the stormwater drainage system via a gross pollutant trap
    - Settling pond to receive water from the inlet pond and capture smaller sedimentation particles
    - At the end of the settling pond, the treated stormwater will then be discharged into Corio Bay via the existing stormwater easement.

The proposed cross-section of the sedimentation pond system is shown in Figure 3-2.

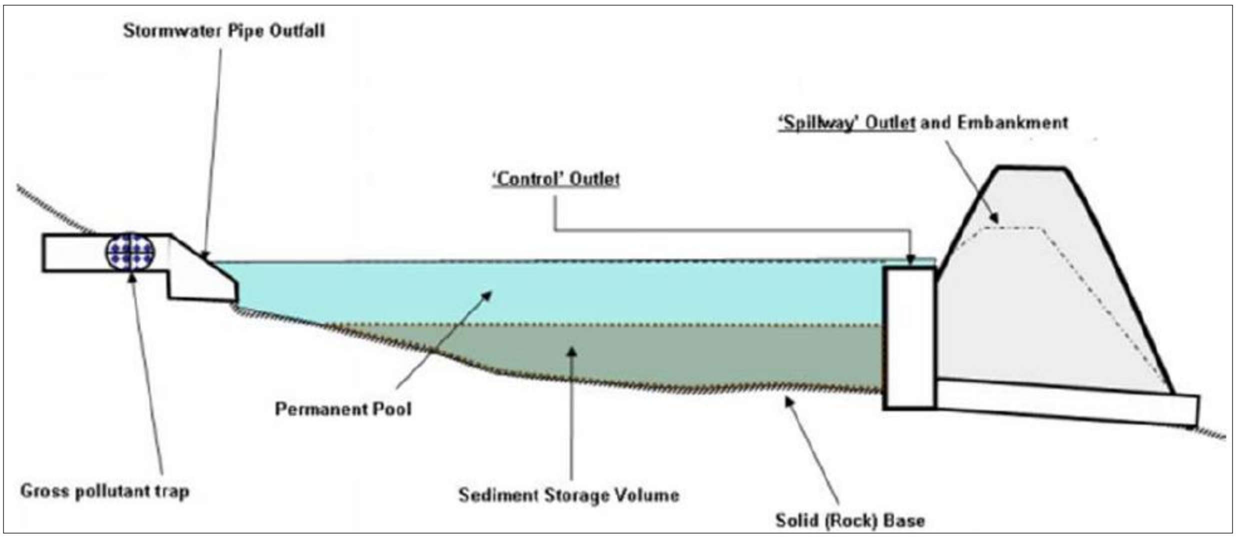

Figure 3-2: Cross-section of proposed sedimentation pond system (Thyssenkrupp, 2017)

Hydrological modelling has been completed to size the stormwater management system to ensure it is sufficient to address the stormwater flows from a 1 in 100 year storm event. The required pond volumes are reported in the SWMP (Appendix H).

Process water will be recirculated within the system where ever practicable to do so and no process water will be discharged from the site untreated and in will be in accordance with the site EPA licence. A monthly sample frequency, taken close to the site discharge, is proposed in order to allow for the seasonal variations throughout the year and to provide suitable annual data distribution.

Existing stormwater infrastructure drainage channels will be retained where practicable to do so.

3.6 Land and Groundwater

There are no emissions to land and groundwater from the scheduled activity.

The process will require Boral to keep a small quantity of fuel, lubricants and chemicals at site. All fuels, lubricants and chemicals will be kept in bunded areas and MSDS[5] information for all substances onsite will be held at the site.

Boral will seek to reduce both the likelihood and impact of leaks and spills through the following control and contingency measures at the site:

> Appropriate bunding for bulk storage of petroleum fuels and chemicals
> Safe working procedures for handling of fuels and chemicals
> Regular training of staff and refreshers
> Availability of spill kits in site compounds and in proximity to chemical storage areas.

3.7 Waste

Prescribed waste[6] will not be generated by the proposed activity or stored at the premises. General wastes that are generated at the site will be managed in accordance with the waste hierarchy as summarised in Table 3-10.

[5] Material Safety Data Sheet
[6] Prescribed waste as defined under the *Environment Protection (Industrial Waste Resource) Regulations 2009*

Table 3-10: Summary of Proposed Waste Management

Waste stream	Waste Management	Waste Hierarchy
Sanitary and office water	Sanitary water will be treated in a waste water treatment plant (a septic tank) on site before being discharged. Stormwater will be trapped in an industrial interceptor and settlement pond.	Treatment
Oil from equipment servicing	Oil from equipment servicing is to be recycled by specialist provider.	Containment and disposal offsite by licensed waste contractor
Worn process equipment (e.g. filter bags, grinding plates)	Worn process equipment is to be recycled by specialist provider or to be disposed at a licensed disposal facility.	Containment and disposal offsite by licensed waste contractor
Stormwater	Stormwater will be captured in a suitably sized open reservoir to allow settlement of solids and then re-used for process and cooling water to reduce the volume of mains water required.	Avoidance and re-use
Process water	Process water will be contained and recirculated rather than discharged to sewer. An oil trap system and water filter ensure that water losses are minimal.	Avoidance and re-use
Non-compliant (off-specification) material	Non-compliant (off-specification) material will be recycled within the process to avoid waste generation	Avoidance and re-use

3.8 Environmental Management

3.8.1 Risk Assessment of Non-Routine Operations

Assessment Methodology

An Environmental Risk Assessment (ERA) of Non-Routine Operations is presented in Appendix D.

The ERA was conducted using the principles of EPA Publication 1321.2 *Licence Assessment Guidelines - Guidelines for Using a Risk Assessment Approach to Assess Compliance with Licence Conditions* (June 2011) and modified with scoring.

Table 3-11 presents qualitative measures of likelihood, ranging from Level 1 (rare) to Level 5 (almost certain), while Table 3-12 presents qualitative measures of consequence or impact, ranging from Level 1 (negligible) to Level 5 (severe).

Table 3-11: Qualitative Measures of Likelihood (from EPA Pub 1321.2)

Rating	Indicator	Description	Frequency
5	Almost certain	Multiple incidents have been recorded.	Expected to occur almost all the time
4	Likely	Several incidents have been recorded.	Expected to occur most of the time.
3	Probable	Some incidents have been recorded.	Might occur
2	Not likely	Few recorded or known incidents.	Might occur but not expected to.
1	Rare	No recorded or known incidents.	Only expect to occur under atypical conditions.

Table 3-12: Qualitative Measures of Consequence / Impact (from EPA Pub 1321.2)

Rating	Indicator	Human factor	Environment	Economic
5	Severe	Death/permanent injury	Catastrophic offsite impact	Immense financial loss
4	Significant	Extensive injuries/illness	Substantial offsite impacts	Major financial loss
3	Medium	Some health impacts	Some external impacts	Large financial loss
2	Minor	First aid treatment	Minimal offsite impacts	Small financial loss
1	Negligible	Operations cause no injuries	No offsite impacts	Negligible financial loss

Combinations of the two measures of likelihood and consequence are then used to estimate the level of risk, as shown in Table 3-13.

Table 3-13: Risk Analysis Matrix (modified from EPA Publication 1321.2)

Likelihood	**Consequences**				
	Severe (5)	**Significant (4)**	**Medium (3)**	**Minor (2)**	**Negligible (1)**
Almost certain (5)	Very High (15-25)	Very High (15-25)	Very High (15-25)	High (9-14)	Low (1-5)
Likely (4)	Very High (15-25)	Very High (15-25)	High (9-14)	Medium (6-8)	Low (1-5)
Probable (3)	Very High (15-25)	High (9-14)	High (9-14)	Medium (6-8)	Low (1-5)
Not likely (2)	High (9-14)	Medium (6-8)	Medium (6-8)	Low (1-5)	Low (1-5)
Rare (1)	Low (1-5)	Low (1-5)	Low (1-5)	Low (1-5)	Low (1-5)

Notes
1. **Very High Risk** (15-25): Immediate action required
2. **High Risk** (9-14): Management required from senior staff
3. **Medium Risk** (6-8): Specify required management
4. **Low Risk** (5 or less): Manage with standard operating procedure

Risk Assessment Outcome and Controls

In summary, the risks identified related to the potential for environmental emissions of dust and noise from process or equipment failure. In all cases, the initial assessed risk has been reduced to medium or low levels (residual risk level) with the design mitigation and contingency measures proposed. The design measures and contingencies for both management of air and noise have been discussed in Sections 3.3 and 3.4.

Boral uses a hierarchical approach to controlling risks as shown in Table of risk controls as shown in Table 3-14.

Table 3-14: Hierarchy of Controls

Hierarchy	Control	Example of Description
1	Elimination	Is there a need to use the plant, process, product or substance that created the risk?
2	Substitution	Can the hazardous item or product be substituted with another item that has less risk?
3	Isolation	Can the hazard or product be isolated from the person?
4	Engineering	Can the risk be minimised be redesigning the plant, substance, product or process?
5	Administrative / Behavioural	Examples include job rotation, standard operating procedures, training, signage, supervision and inspections.
6	Personal Protective Equipment (PPE)	This is the least desirable method, which must only be used in combination with other controls or of other controls are not suitable. Employees issued with PPE must have it fitted correctly and be trained in its use and maintenance.

A total of 28 non-routine activities were assessed. No residual risk levels from non-routine activities were assessed to be very high or high with the inclusion of controls. Twelve activities were assessed as medium and remaining 16 non-routine activities had a low residual risk level with the application of controls. A summary of activities assessed to have a medium residual risk level along with the proposed control or mitigation is provided in Table 3-15. Refer to Appendix C for complete risk assessment.

Table 3-15: Medium Residual Risk Levels and Mitigation

Item	Non-routine activity	Proposed Mitigation and Controls
1	Fugitive dust emissions impacting off-site receptors due to conveyor failure during raw material delivery	▪ Engineering controls to monitor equipment and conveyor which will stop the process in the event of equipment failure (e.g. conveyor belt tracking and underspeed detection) ▪ Conveyors covered to prevent airborne dust release ▪ Material transfer points to have dust filters ▪ Enclosed pneumatic airslides ▪ Maintenance regimes to maintain serviceability of equipment ▪ Dust management plan ▪ Standard operating procedures ▪ Dust monitoring program
2	Nuisance noise impacting off-site receptors due to conveyor failure during raw material delivery	▪ Motors attenuated or positioned as to reduce noise ▪ Conveyor maintenance ▪ Alarms focused within site ▪ regular monitoring ▪ Incident investigation and reporting
6	Odour and air quality impact due to fire caused by equipment failure during raw material delivery	▪ Site fire protection system ▪ Maintenance regimes to maintain serviceability of equipment ▪ Emergency incident response protocols to contain fire ▪ Fully trained staff

Item	Non-routine activity	Proposed Mitigation and Controls
7	Fugitive dust emissions from clinker stockpiles and transport due to failure of water suppression and/or equipment.	▪ Clinker store sealed during normal operation, sized appropriately to minimise manual manipulation of material ▪ Dust collection and filtration of clinker store and transfer points to prevent fugitive dust emissions ▪ Entry into the store is via a sealed entrance door, for front end loader access only. Store is sized to reduce the need to enter the store (approx. 6 months) ▪ Water trucks and road sweepers to contain fugitive dusts ▪ Dust management plan ▪ Dust monitoring program
12	Fugitive dust emissions from slag collection and transport due to water system failure	▪ Water trucks and road sweepers to contain fugitive dusts ▪ Dust management plan ▪ Dust monitoring program
13	Fugitive dust impacting off-site receptors from operation of slag dryer and operation of FEL due to equipment failure	▪ Dust collection and filtration of slag dryer and feed/discharge equipment to prevent fugitive dust emissions ▪ Appropriate design of transfer points to contain spillage ▪ Control and monitoring of equipment and process to stop the process in the event of equipment failure ▪ Collected dust shall discharge onto the following conveyor of the series or dosing bin ▪ Dust monitoring program ▪ Dust management plan
14	Nuisance noise impacting off-site receptors from operation of slag dryer and operation of FEL due to equipment failure	▪ Motors attenuated or positioned as to reduce noise ▪ Alarms focused within site ▪ Maintenance regimes to maintain serviceability of equipment ▪ Regular monitoring ▪ Incident investigation and reporting
18	Odour and air quality impact due to fire caused by equipment failure during slag drying	▪ Site fire protection system ▪ Maintenance regimes to maintain serviceability of equipment ▪ Emergency incident response protocols to contain fire ▪ Fully trained staff
19	Fugitive dust emissions to off-site receptors due to equipment failure of the rolls press and ball mill operation	▪ Ball Mills and grinding process equipment contained within an enclosed building to reduce noise and contain fugitive dust ▪ Dust collection and filtration systems included as part of the ball mill and grinding process ▪ Dust collection and filtration systems for all material transfer points, systems and silos to prevent fugitive dust ▪ Control and monitoring of equipment and process to stop the process in the event of equipment failure, e.g. burst bag detection for dust filtration system
20	Nuisance noise impacting off-site receptors from grinding operations due to equipment failure of the rolls press and ball mill operation	▪ Ball Mill fully enclosed ▪ Motors attenuated or positioned as to reduce noise ▪ Alarms focused within site ▪ Conveyor maintenance ▪ regular monitoring ▪ Incident investigation and reporting
24	Odour and Air Quality impacts due to fire caused by equipment failure during the rolls press and ball mill operation	▪ Site fire protection system. ▪ Maintenance regimes to maintain serviceability of equipment. ▪ Emergency incident response protocols to contain fire ▪ Fully trained staff
25	Fugitive dust emissions from product stockpiles and transport due to delivery truck malfunction	▪ Maintenance regimes to maintain serviceability of equipment ▪ Truck loading spout has integrated dust collection and filtration. Spout is self-closing when raising and lowering

Item	Non-routine activity	Proposed Mitigation and Controls
	/ accident - leading to release of product	▪ Loading takes place within an enclosed building to contain fugitive dust ▪ Truck tanker is sealed prior to leaving site ▪ Loading control system implemented to prevent damage to plant and equipment ▪ Trucks do not travel through residential areas

3.8.2 Environmental Management Systems

Boral operates an Environmental Management System (EMS) in accordance with ISO14001 that also requires Boral to consider the environmental commitment of their suppliers. Boral also operates a quality management system (QMS) certified to ISO9001.
Boral's cement division has a dedicated Environmental Manager. The Cement Environmental Manager is responsible for overseeing the environmental performance of Boral Cement operations including for development, implementation and monitoring of environmental systems that promote environmental best practice and sustainable development, including:

> Implementing environmental policies and practices.

> Devising strategies to meet targets and to encourage best practice.

> Devising the best tools and systems to monitor performance and to implement strategies.

> Ensuring compliance with environmental legislation.

> Assessing, analysing and collating environmental performance data and reporting. Information to internal staff, clients and regulatory bodies.

> Acting as a champion for environmental issues within your organisation.

> Providing environmental training to staff at all levels.

> Keeping up to date with relevant changes in environmental legislation and initiatives including international legislation where applicable.

> Producing educational or information resources for staff.

> Liaising with regulatory bodies.

3.9 Construction Environmental Management

3.9.1 Construction Risk Management

As part of the pre-construction planning and design, a construction risk assessment will be prepared. The purpose of the risk assessment is to identify likely environmental hazards and consequences as part of the construction process and rank the risks by their magnitude and importance

Boral's approach to environmental risk management during construction is as follows:

> **Risk Avoidance:** Eliminate or change the task to remove the risk.

> **Risk Reduction:** Scheduling tasks to more favourable conditions or increasing surveillance during such tasks to reduce the significance of the hazard or the magnitude of the consequence of failure.

> **Risk Control:** Installation of such controls to manage risks (such as sediment control, dust suppression practices) to prevent unacceptable emission.

The risk assessment will be revisited as the phases of construction progress or in response to any deficiencies that are identified during construction.

3.9.2 Construction Environmental Management Plan

The Construction Environmental Management Plan (CEMP) will be prepared prior to any major construction works commencing at the site. The purpose of the CEMP will be to implement any risk management measures identified as part of the construction risk assessment.

The CEMP will consist of the following components per EPA Publication 480 (1996):

> **Works Scheduling**: Actions taken to avoid environmental impacts by scheduling specific tasks to certain times of the day (such as noisy works).
> **Land Disturbance:** Identification of areas of within the site that might be subject to disturbance and erosion such as steep slopes and unsealed internal haul roads.
> **Environmental Control Measures**: Including operation precautions, stormwater management, dust, noise and vibration
> **Contingency Planning**: Including actions to address specific high risk task and emergency procedures.
> **Site Management:** Including management of stockpiles, storage of fuels and chemicals, waste minimisation and litter prevention).
> **Surveillance:** Maintenance, inspections and surveillance throughout construction.
> **Ongoing Risk Assessment and Management**: Including updating the plan to reflect changing tasks and risks as required or in response to any deficiencies identified.

3.9.3 Construction Environmental Control Measures

Stormwater Management

Specific stormwater controls will be developed during construction works as needed, including:

> Provision of appropriate cut-off drains and diversion channels.
> Construction of an interceptor and settlement pond initially and use of diversion channels.
> Construction and use of interceptor and settlement ponds as an initial task.

Dust

Boral will use a combination of techniques to manage dust and general air quality from construction:

> Prevention of dust emissions through dust suppression measures, such as water spraying or covering stockpiles during any excavation works.
> Use of dedicated haul roads by works plant.
> Maintenance of appropriate contingencies, such as retention of water during dryer months to ensure availability and use of water trucks to access all area of the site.
> Wheel-washing of trucks prior to departure from site.
> Implementation of a traffic management plan (to contain traffic to certain areas and control speed).

Noise and Vibration

Boral will use a combination of techniques to manage noise and vibration from construction:

> Scheduling of works, as far as practicable, to be during the day.
> Use of enclosed plant or modified vehicles to reduce noise emission and vibration.
> Advising neighbours of, and prior to, any unavoidable out-of-hours works (that might generate excessive noise or vibration).

Maintenance, Inspections and Surveillance

Boral will implement such maintenance procedures, inspection and monitoring regimes and surveillance to manage and prevent unacceptable environmental emissions, including:

> Preparation of an inspection and monitoring regime that responds to the risk identified as part of construction tasks.

> Preparation of maintenance schedules for plant and vehicles to reduce likelihood of failure.
> Document roles and responsibilities for monitoring, inspection and reporting.
> Document monitoring locations, standards and frequencies to reach the required standard of industry practice.
> Document contingencies and emergency response procedures.
> Site induction, workplace safety awareness and maintenance of task specific training.
> Diligent site management and good house-keeping.
> Provision and use of contingency measures such as spill kits and emergency bunding.
> Implementation of a document tracking procedure.
> Periodic review of tasks, risks and management controls.

4 Other Approvals

Currently no further approvals from EPA are sought. A planning permit application to CoGG is running concurrently with this works approval application.

5 Post Decision – Operational Requirements

Table 5-1 below confirms the information requirements under Section 15 of EPA Publication 1307.10 (EPA 2015).

Table 5-1: EPA 1307 Section 15 – Post Decision Operational Requirements

Post Decision – Operational Requirement	Comments
Financial Assurance	Not applicable to H01 scheduled activity
PCBs Management	Not applicable – the process does not involve storing, handling, using and / or transporting PCBs
Monitoring	A monitoring plan will be developed for the site that meets the requirements of EPA Publication 1321 *Licence Assessment Guidelines* and will enable Boral to demonstrate compliance with the licence. A Dust Management Plan (PEL 2017) has already been prepared and is included within the GHG and Air Quality Impact Assessment (Appendix D).
Reporting Annual Performance	Annual Performance Statements (APS) will be prepared and submitted in accordance with the licence requirements.

6 Limitations

The agreed scope of this report and Works Approval Application has been limited for the current purposes of the Client. While this *Works Approval Application Report* has been undertaken in accordance with the current industry standards of practice and has endeavoured to accurately summarise the key points of the geotechnical and environmental investigations completed at the site, there may be some limitations on its meaning and use. The reader is advised to consult the relevant technical report for a full description of the work completed and design proposed.

This report relies on information obtained from other consultant reports made available to Cardno and does not include any detailed investigation or assessment of site conditions by Cardno. To the extent that those reports are found to be inaccurate or misleading, Cardno disclaims any reliance on those reports and cannot be liable for any loss consequent to issuing this report.

The standard limitations of all Cardno Environmental reports is included in Appendix L.

7 References

Legislation, Regulations and Policy

1. Environment Protection Act, 1970 (Act No.8056/1970), Victoria.
2. Environment Protection (Scheduled Premises and Exemptions) Regulations, 2007, Victoria. Version No. 005 incorporating amendments as at 21 July 2016.
3. Government of Victoria (2001) *State Environment Protection Policy (Air Quality Management).* Victorian Government Gazette, S40, 21 December 2001.
4. Government of Victoria (2001) *Variation to State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1.* Victorian Government Gazette, S183, 31 October 2001.
5. Government of Victoria (2016) No. G 15 Thursday 14 April 2016.

Guidelines

6. EPA (2011) *Licence Assessment Guidelines*, Publication 1321.2, June 2011, Environmental Protection Authority, Victoria.
7. EPA (2013a) *Demonstrating Best Practice Guideline*, Publication 1517, February 2013, Environmental Protection Authority, Victoria.
8. EPA (2013b) *Recommended Separation Distances for Industrial Residual Air Emissions Guideline*, Publication 1518, March 2013, Environmental Protection Authority, Victoria.
9. EPA (2015) *Works Approval Application Guideline*, Publication 1307.10, April 2015, Environment Protection Authority, Victoria.
10. EPA (1996) Best Practice Environmental Management *Environmental Guidelines for Major Construction Sites.* Publication 480, February 1996, Environment Protection Authority, Victoria.

Site Specific References

11. Boral (2015) *Cement Grinding Plant and Import Terminal, Lascelles Wharf Geelong. Technical Studies Background Information.* Prepared by Boral Cement Limited, December 2015.
12. Boral (2016a) *Geelong Portside Cement Proposal, Stakeholder Engagement and Consultation Plan.* Prepared by Boral Cement Limited, September 2016.
13. Boral (2016b) *Boral Cement in Geelong, Information for our community.* Prepared by Boral Cement Limited, November 2016.
14. Boral (2017) *Boral Cement in Geelong, Information for our community.* Prepared by Boral Cement Limited, January 2017.
15. Cardno (2016) *Traffic and Transport Assessment, Geelong Victoria Clinker Grinding Facility.* Prepared for Boral Property Group by Cardno Victoria Pty Ltd, 23 January 2017.
16. Coffey (2016) *Cement Grinding Plant and Import Terminal, Former Lascelles Wharf Geelong, Environmental Site Assessment.* Prepared for Boral Cement Limited by Coffey Environments Australia Pty Ltd.
17. EHP (2016a) *Preliminary Cultural Heritage Study: Proposed Grinding Plant and Import Terminal, Lascelles Wharf, North Shore, Victoria*. Prepared for Boral Cement Ltd by Ecology and Heritage Partners Pty Ltd, 26 April 2016.
18. EHP (2016b) *Biodiversity Assessment, 37-65 Walchs Road, North Shore, Victoria*. Prepared for Boral Cement Limited by Ecology and Heritage Partners Pty Ltd, April 2016.
19. MDA (2017) *Clinker Grinding Plant Environmental Noise Assessment*. Prepared for Boral Cement by Marshall Day Acoustics Pty Ltd. 1 June 2017.

20. PEL (2016) *Boral Cement, Geelong Clinker Grinding Facility, GHG and Air Quality Assessment.* Prepared for Boral Cement by Pacific Environment Operations Pty Ltd, 22 May 2017.

21. Thyssenkrupp (2017) Technical Note – Pacienter Project, Stormwater Management. Prepared for Boral Cement Limited by Thyssenkrupp Industrial Solutions (Australia) Pty Ltd, 21 March 2017.

Appendix A

9 Pages

Boral Company Entity Information

EPA Works Approval Application Supporting Information Table

EPA Works Approvals Guideline Table of Contents

EPA Company Legal Entity Form

ASIC Company Search Record 6 June 2017

1. Status of application

Please ☒ to indicate if this form is submitted as a Draft Application or Formal Application:

Draft ☐ Formal ☒

2. Scheduled premises

Please specify scheduled premises:

Proposed Clinker Grinding facility at 37-65 Walchs Road, North Shore, VIC.
Scheduled premises category:
H01 Non-Metallic Minerals (Cement):
Cement works in which –
(ii) cement clinker or clays or limestone or like materials are ground.

3. Pathway process

Please ☒ to indicate which pathway EPA has advised you to apply for:

Fast Track ☐ Standard ☒

Briefly summarise the basis for the decision:

EPA reference: SO1002441. EPA Response to Works Approval Pathway Form:
As noted in the pathway documents, the proposed location and activities occurring at the site will require significant consideration of the potential impacts, including: noise (including under full operational conditions – 24/7); dust and other air emissions (potential sensitive receptors [North Shore residential zone] within recommended separation buffer distances); traffic (increase in truck movements, access to wharf facility); stakeholder concerns and objections (community groups, local authorities); and demonstration that all efforts are made to achieve industry best practice and resource efficiency (waste, energy, water and design).

4. Auditor-approved application

Please ☒ if the application has been approved by an EPA-appointed auditor:

Yes ☐ *Please attach the auditor's report/statement.*

5. Application fee

Application Fee ($)	Payment status	Please ☒ relevant box	Payment date
$62,730	By cheque	☐	
	By credit card	☐	
	Have not paid	☒	EFT

6. Proposal summary

Provide a simple, one-line project description:

Proposed new clinker grinding facility within the Geelong Port complex to replace Boral's aging Waurn Ponds facility.

Proposed dates:

Start construction (month/year):	**01/2018**	Start operation (month/year):	**09/2019**

6. Proposal summary *continued*

Is there a plan for future expansion within the next two years?

Yes ☐ **No** ☒

If yes, briefly explain why the planned expansion is not included in this application:

7. Checklist

Please ☒ to indicate you have attached the completed checklist after this page:

Yes ☒

Applicant statement

I declare that to the best of my knowledge the information in this application is true and correct, that I have made all the necessary enquiries and that no matters of significance have been withheld from EPA

Signed by CEO or delegate:

Signature	R. T. Harper
Full name	ROSS HARPER
Date	7/6/2017

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ENVIRONMENT PROTECTION ACT 1970

WORKS APPROVAL APPLICATION
COMPANY LEGAL ENTITY

Applicant type (select ☒ relevant box below)

Company	X	State government	☐	Owners corporation	☐
Partnership	☐	Local government	☐		

Corporation

Full name of company^: Boral Cement Limited

Trading name: Boral Cement Limited

ABN: 62 008 528 523 ACN:

Registered address: Level 3, 40 Mount Street

Suburb/Town: North Sydney State: NSW Post Code: 2060

Attach – ASIC company search, not more than 14 days old

^ In the case of a partnership, the application must specify the full names of the individual partners under company name, in addition to referring to the trading name and supplying a business name certificate. Please see page 2.

Owners corporation

Address for service of notices:

Suburb/Town: State: Post Code:

Attach – a certified copy of the registered plan of subdivision or plan of strata creating the owners corporation

Incorporated association

Name of the public officer:

Address of the public:

Suburb/Town: State: Post Code:

Attach – a certified copy of the certificate of incorporation

Other comments

Comments:

Business partner details

Name business partner

Address of business partner

Suburb/Town   State   Post Code

Attach – a business name certificate

Name of business partner

Address of the business partner

Suburb/Town   State   Post Code

Attach – a business name certificate

Name of business partner

Address of the business partner

Suburb/Town   State   Post Code

Attach – a business name certificate

Name of business partner

Address of the business partner

Suburb/Town   State   Post Code

Attach – a business name certificate

Name of business partner

Address of the business partner

Suburb/Town   State   Post Code

Attach – a business name certificate

Name of business partner

Address of the business partner

Suburb/Town   State   Post Code

Attach – a business name certificate

ASIC
Australian Securities & Investments Commission

Australian Company

BORAL CEMENT LIMITED
ACN 008 528 523

Extracted from ASIC's database at AEST 16:26:12 on 06/06/2017

Company Summary	
Name:	BORAL CEMENT LIMITED
ACN:	008 528 523
ABN:	62 008 528 523
Previous State Number:	CL00014087
Previous State of Registration:	Australian Capital Territory
Registration Date:	13/09/1976
Next Review Date:	19/12/2017
Former Name(s):	BLUE CIRCLE SOUTHERN CEMENT LTD, BLUE CIRCLE SOUTHERN CEMENT PTY LIMITED, BCSC SERVICES PTY. LIMITED
Status:	Registered
Type:	Australian Public Company, Limited By Shares
Locality of Registered Office:	NORTH SYDNEY NSW 2060
Regulator:	Australian Securities & Investments Commission

Further information relating to this organisation may be purchased from ASIC.

Appendix B

9 Pages

Figures

Figure 1: Site Locality Plan (Cardno)

Figure 2: Planning Zone (Cardno)

GEL-G-SLT-0002-01 – Port and Site Layout (Boral)

GEL-G-SLT-0002-02 – Raw Materials Storage Layout (Boral)

GEL-G-SLT-0002-03 – Cement Grinding Layout (Boral)

GEL-G-SLT-0002-04 – Port Conveyors to Clinker Store (General Arrangement) (Boral)

GEL-G-SLT-0002-05 – Ancillary Buildings and Setbacks Layout (Boral)

GEL-C-SLT-0008-01 – Traffic Flow Layout (Boral)

GEL-M-MFD-0002rB – Material Flow Diagram (Boral)

Facility Design and Layout (Boral) (Interactive PDF – Electronic Only)

Boral Cement

N

1:3,000 Scale at A3

Metres
0 50 100

Site Locality Plan

WORKS APPROVAL APPLICATION
37-65 WALCHS ROAD, NORTH SHORE
BORAL CEMENT LIMITED
FIGURE 1

Cardno

Map Produced by Cardno Geoscience and Environment
Date: 2016-08-19
Coordinate System: GDA 1994 MGA Zone 55
Project: CLP215412
Map: CLP215412-GS-001-SiteLoc.mxd 01
Aerial imagery supplied by nearmap (April 2016)

Boral Cement

N

1:7,500 Scale at A3

Metres
0 100 200

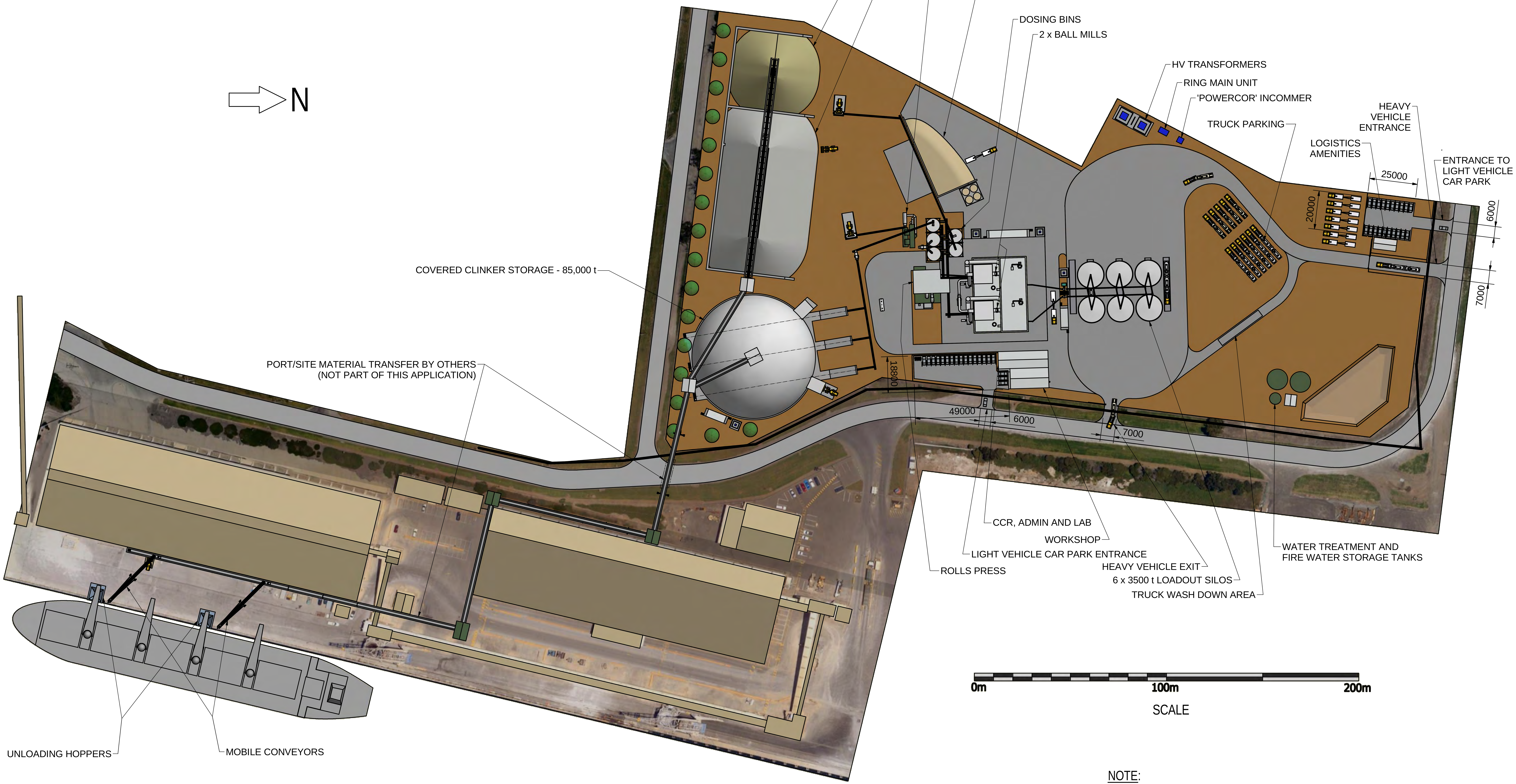
Planning Zone

WORKS APPROVAL APPLICATION
37-65 WALCHS ROAD, NORTH SHORE
BORAL CEMENT LIMITED
FIGURE 2

Cardno

Map Produced by Cardno Geoscience and Environment
Date: 2016-08-19
Coordinate System: GDA 1994 MGA Zone 55
Project: CLP215412
Map: CLP215412-GS-002-Planning.mxd 01
Aerial imagery supplied by nearmap (April 2016)

REFERENCE DRAWINGS	
DRAWING NUMBER	DESCRIPTION
GEL-G-SLT-0001-02	RAW MATERIALS STORAGE LAYOUT
GEL-G-SLT-0001-03	CEMENT GRINDING LAYOUT
GEL-G-SLT-0001-04	PORT CONVEYORS LAYOUT
GEL-G-SLT-0001-05	ANCILLARY BUILDINGS LAYOUT



NOTE:
ALL DIMENSIONS AND RL's ARE APPROXIMATE.

PLAN VIEW

NO JOB IS SO IMPORTANT THAT IT CAN'T BE DONE SAFELY!

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
D	30/05/2017	M. Smith		STATUS WAS 'FOR INFORMATION'.
C	9/01/2017	M. Smith		NOTE REGARDING PORT CONVEYORS AMMENDED
B	16/12/2016	M. Smith		REFERENCE DRAWING LIST UPDATED
A	3/08/2016	M. Smith		DRAWING ISSUED

REVISION HISTORY

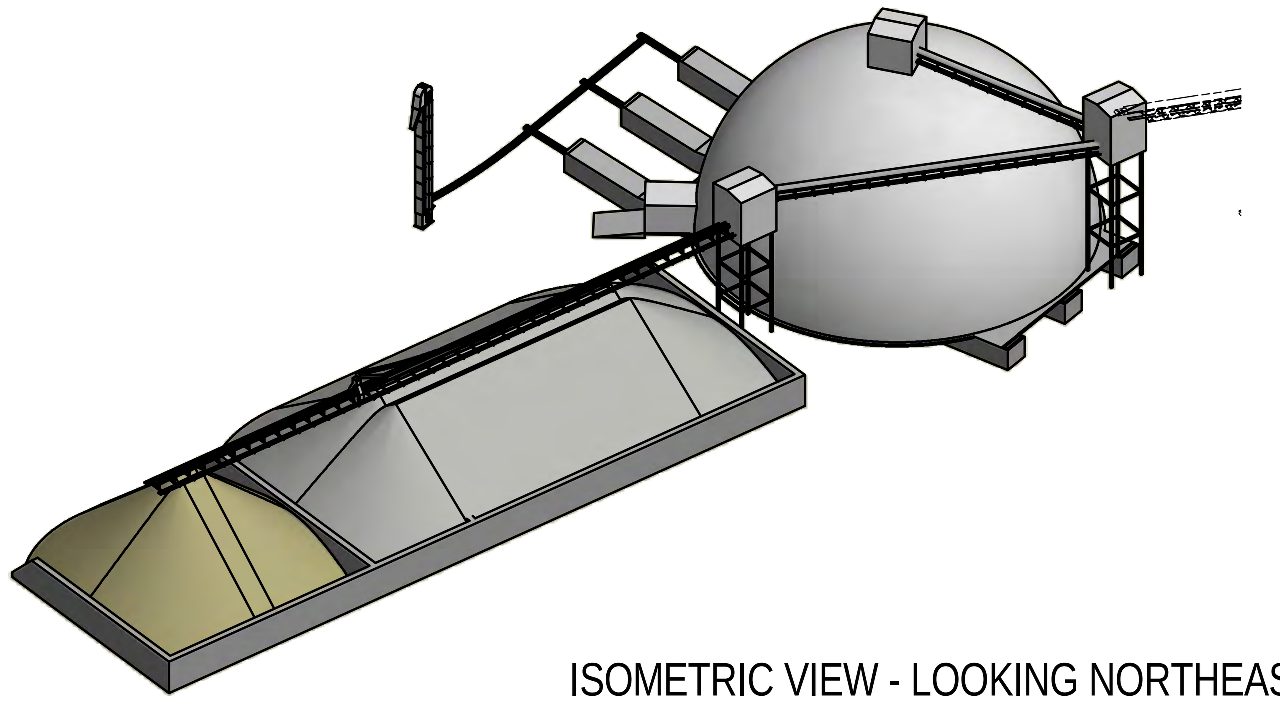
DRAWN: M. Smith	DATE: 5/07/2016		
CHECKED:	DATE:		
ENGINEER:	DATE:		
APPROVED:	DATE:		

Boral Cement
ABN 62 008 528 523
Engineering Services
Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimille - 02-48 602399
Email - drawing.office@boral.com.au

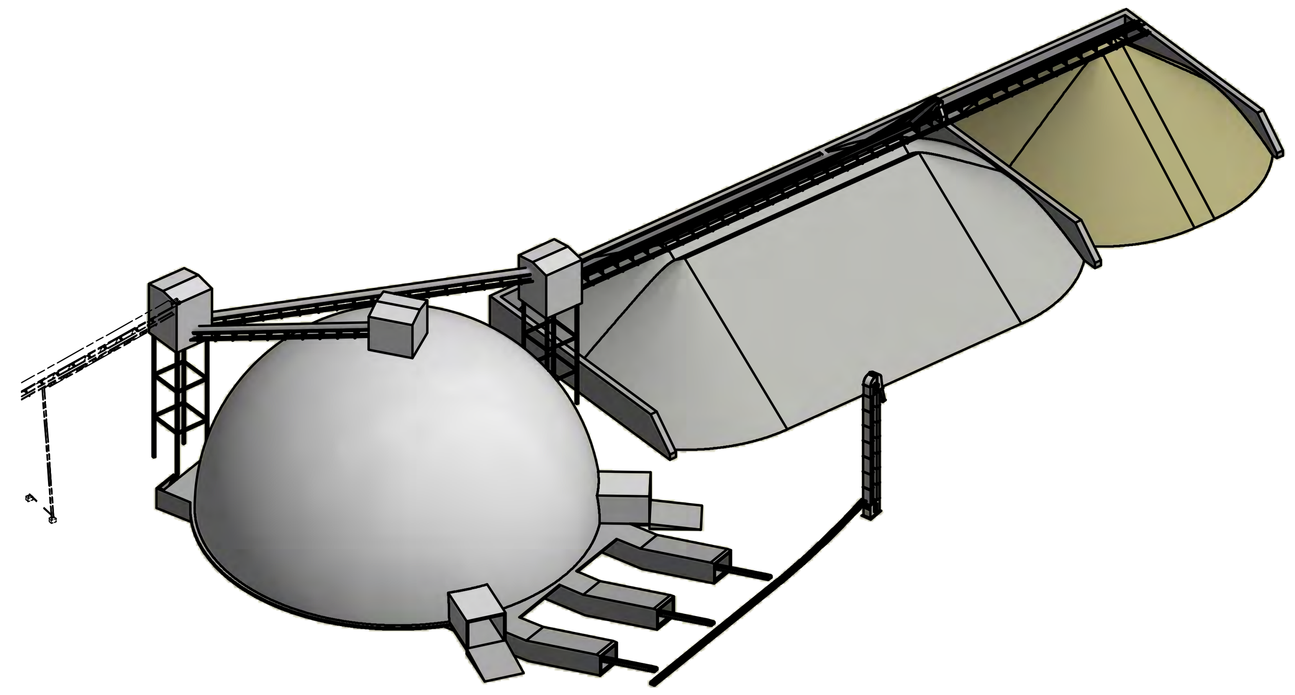
STATUS: PRELIMINARY
ALPHA NUMERIC:
BCES JOB No: GEE001
STOCK NUMBER:
SHEET: A1
SCALE: 1:1000

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY
SECTION: SITE
SUB SECTION:
TITLE: PORT AND SITE PLAN
CLASSIFICATION: SITE LAYOUT

DRAWING No: GEL-G-SLT-0002-01
WORKS No:
REV. D



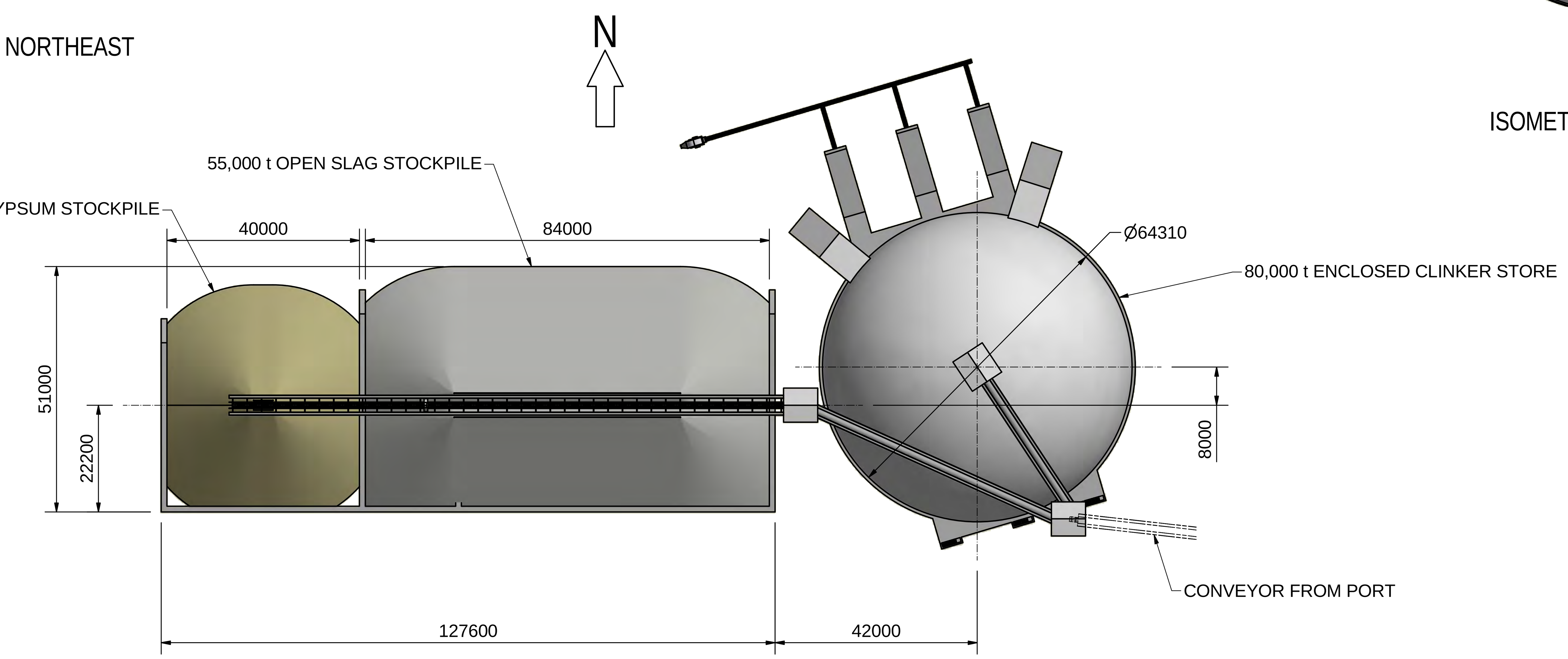
ISOMETRIC VIEW - LOOKING NORTHEAST



ISOMETRIC VIEW - LOOKING SOUTHWEST

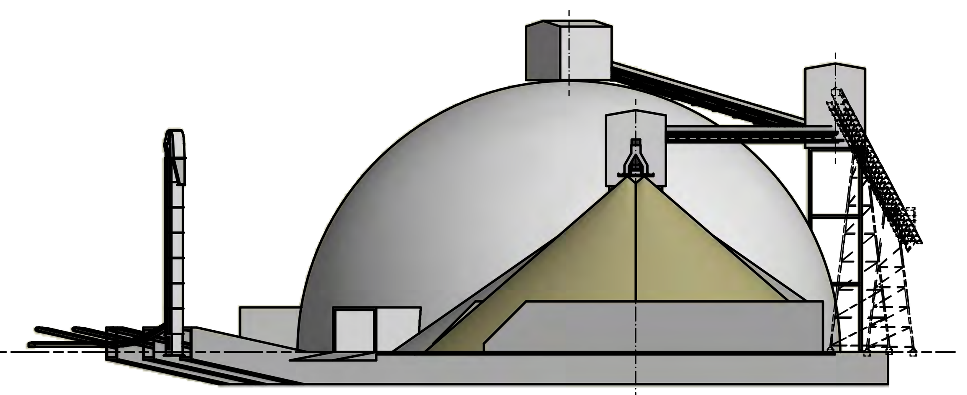
COLOUR LEGEND

- MANGROVE (48C 36M 54Y 32K) - SITE BUILDINGS AND OFFICES
- SURFMIST (4C 3M 3Y 0K) - ROOFING
- LIGHT GREY (0C 0M 0Y 30K) - STEELWORK
- WHITE - RAISED STRUCTURES, SILOS.

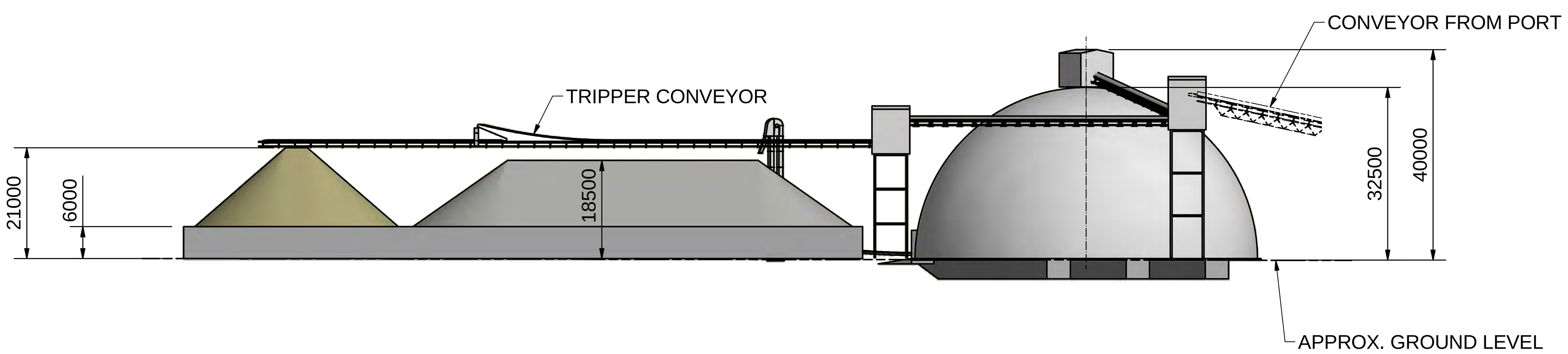


PLAN VIEW

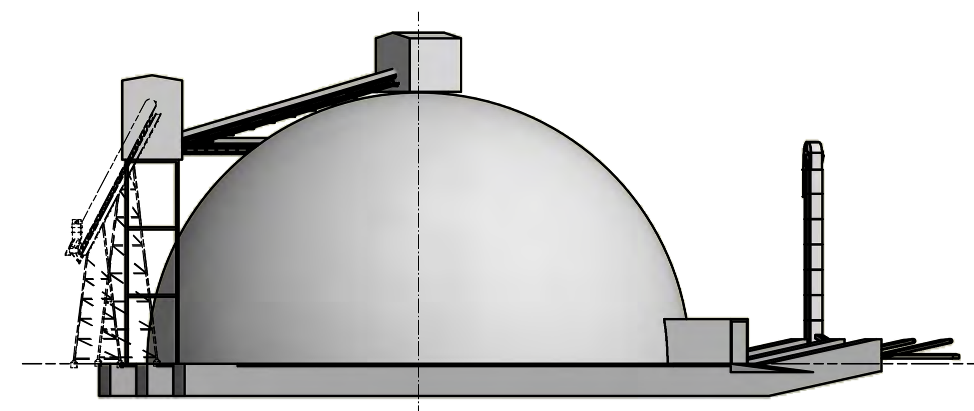
NOTE:
ALL DIMENSIONS AND RL's ARE APPROXIMATE.



ELEVATION - LOOKING EAST



ELEVATION - LOOKING NORTH



ELEVATION - LOOKING WEST

SAFETY COMES BEFORE PRODUCTION!

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
C	30/05/2017	M. Smith		STATUS WAS 'FOR INFORMATION'.
B	22/08/2016	M. Smith		
A	22/08/2016	M. Smith		DRAWING ISSUED

REVISION HISTORY

DRAWN: M. Smith	DATE: 22/08/2016	CHECKED:	DATE:
ENGINEER:	DATE:	APPROVED:	DATE:

BORAL
Boral Cement
ABN 62 008 528 523
Engineering Services

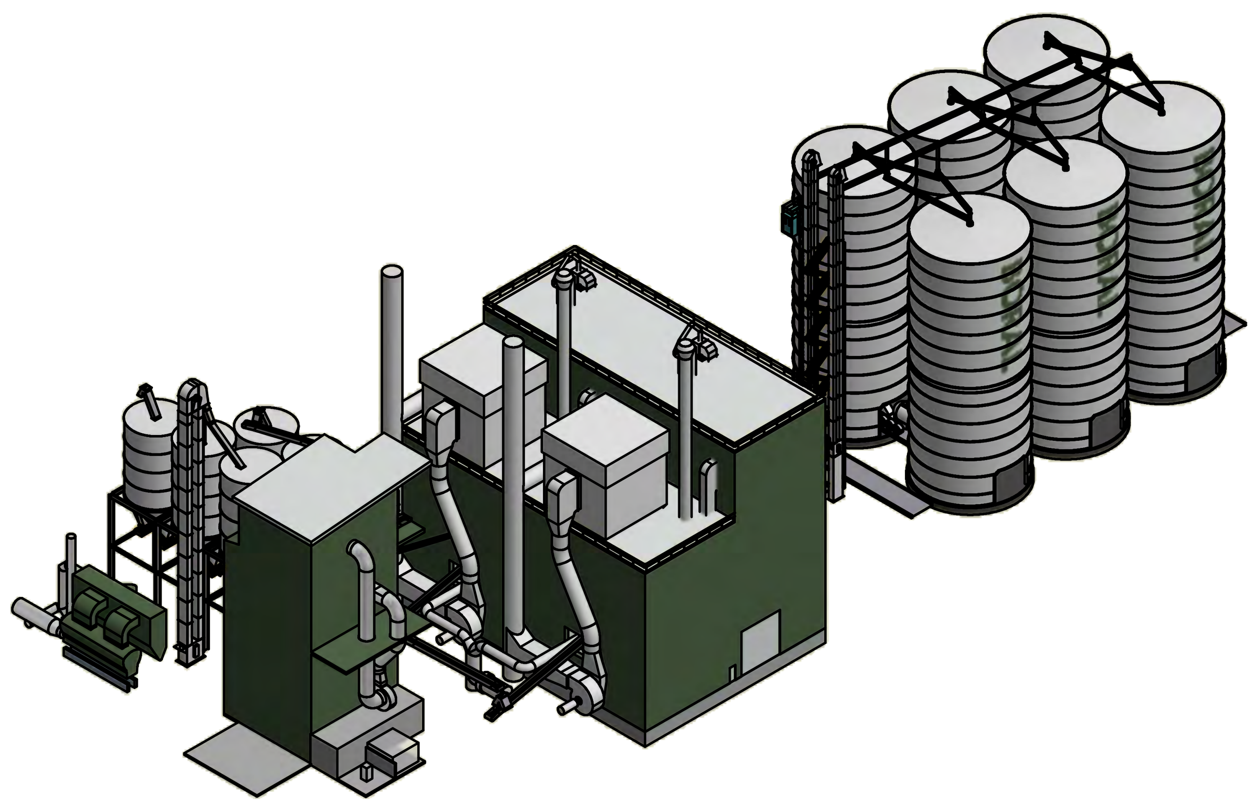
Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimille - 02-48 602399
Email - drawing.office@boral.com.au

STATUS: PRELIMINARY

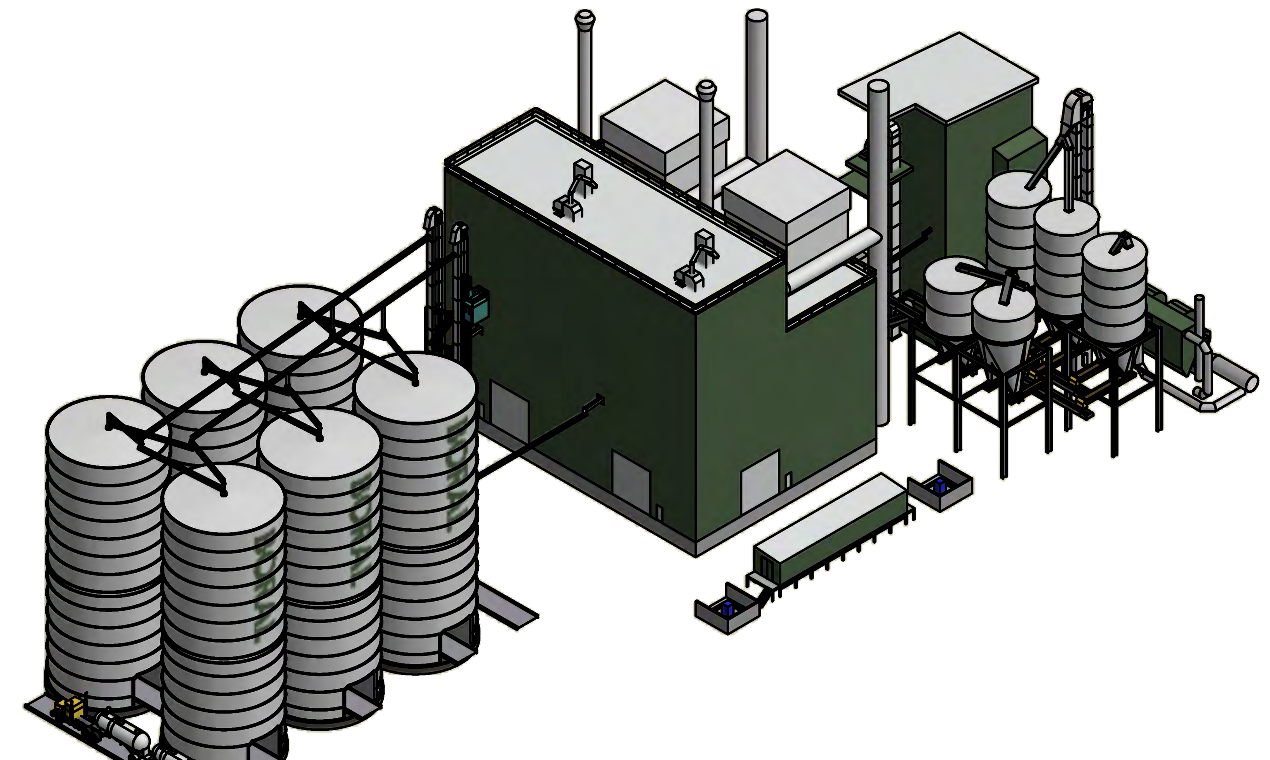
ALPHA NUMERIC:
BCES JOB No: GEE001
STOCK NUMBER:
SHEET: A1
SCALE: 1:500

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY
SECTION: SITE
SUB SECTION:
TITLE: RAW MATERIALS STORAGE
CLASSIFICATION: SITE LAYOUT

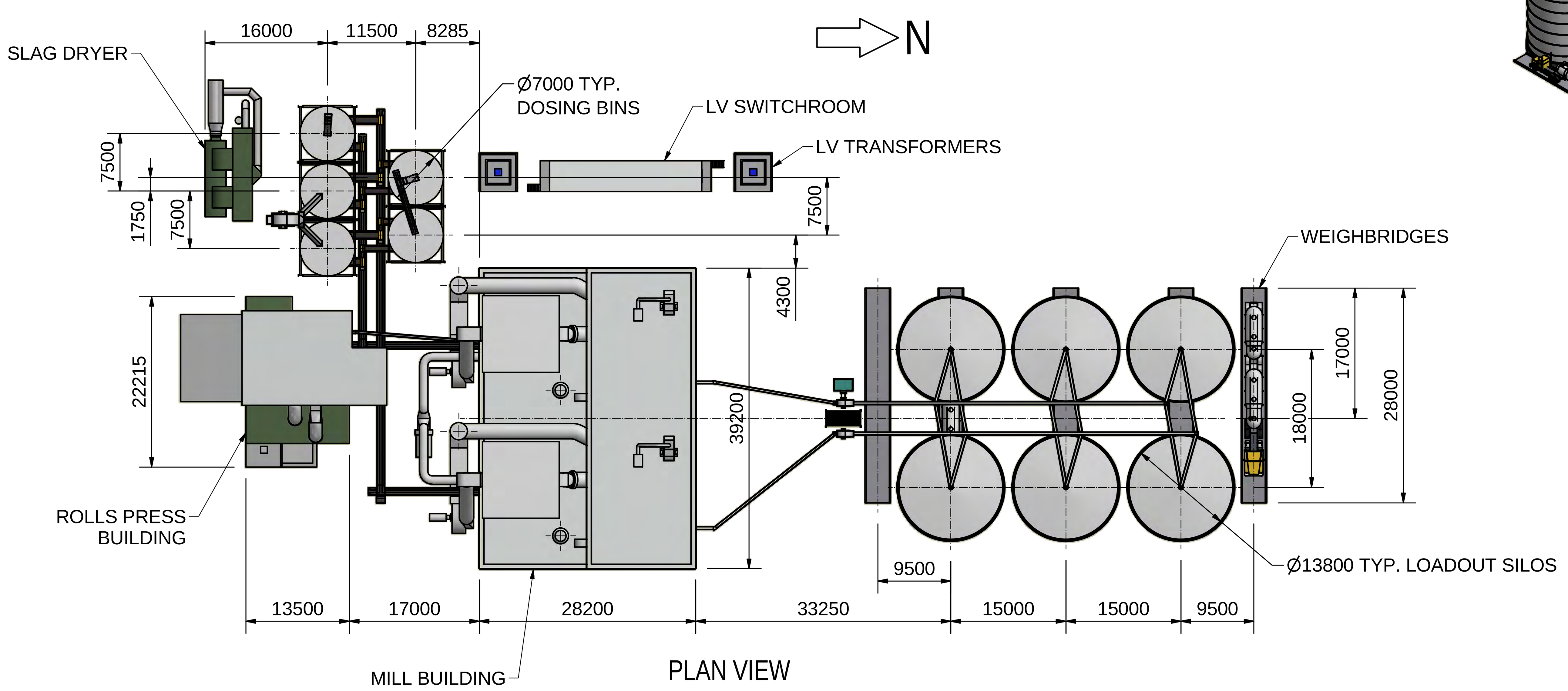
DRAWING No: GEL-G-SLT-0002-02
WORKS No:
REV. C



ISOMETRIC VIEW - LOOKING NORTHWEST



ISOMETRIC VIEW - LOOKING SOUTHEAST

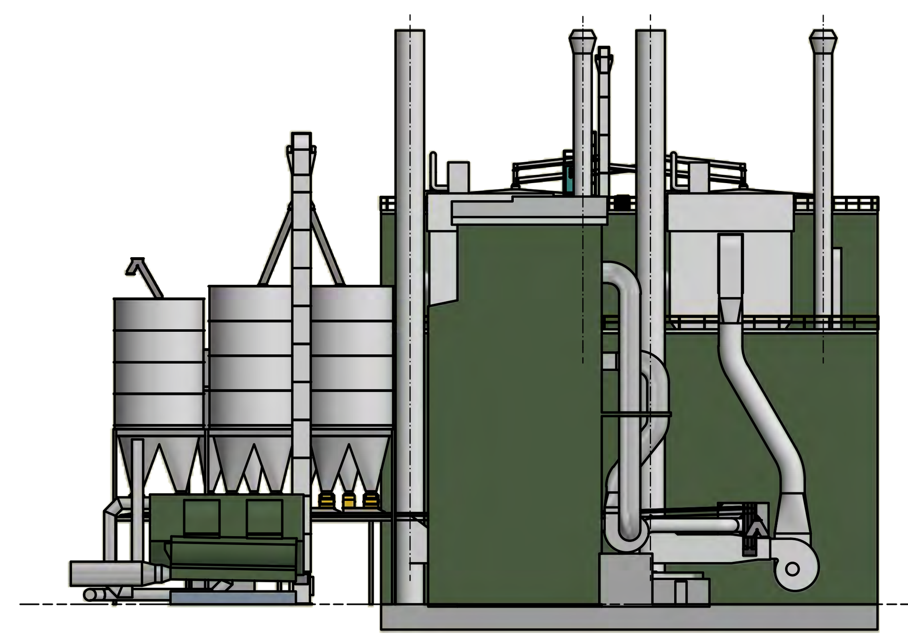


PLAN VIEW

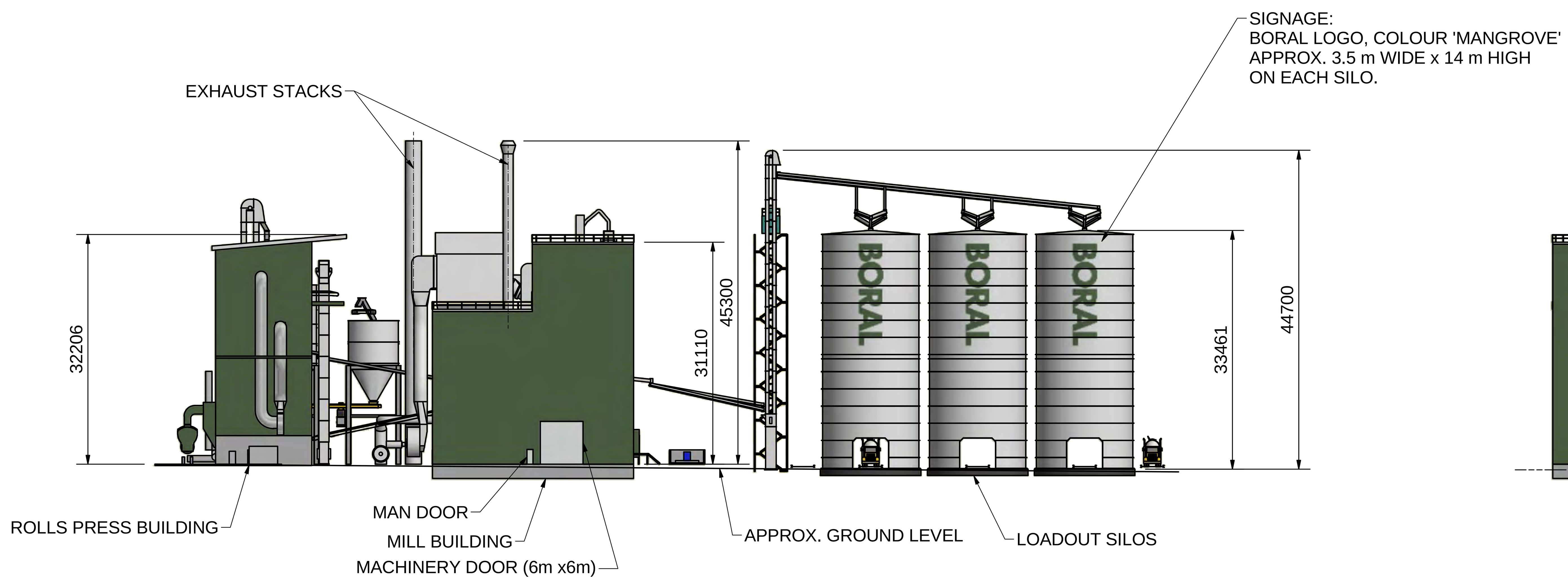
COLOUR LEGEND

- MANGROVE (48C 36M 54Y 32K) - SITE BUILDINGS AND OFFICES
- SURFMIST (4C 3M 3Y 0K) - ROOFING
- LIGHT GREY (0C 0M 0Y 30K) - STEELWORK
- WHITE - RAISED STRUCTURES, SILOS.

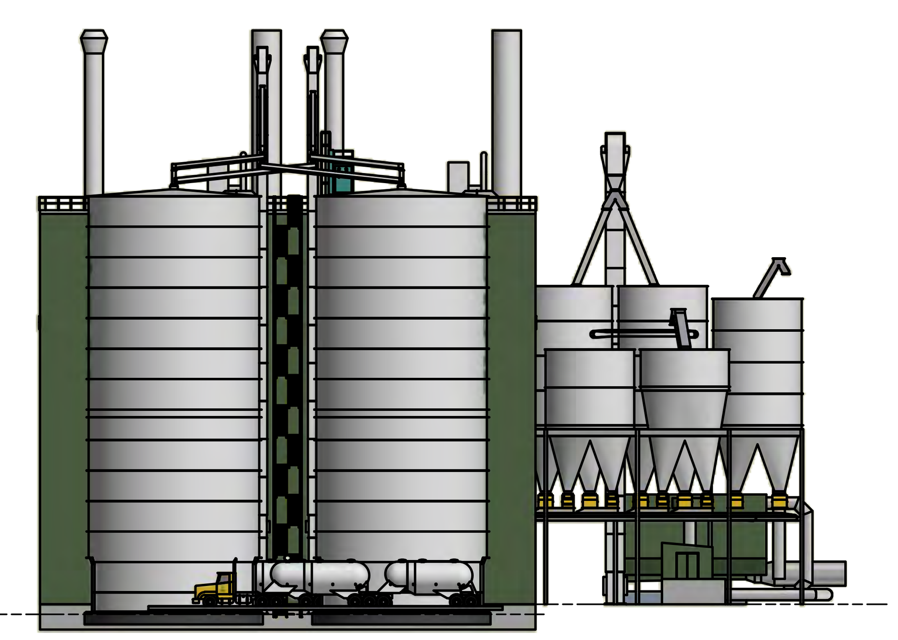
NOTE:
ALL DIMENSIONS AND RL's ARE APPROXIMATE.



ELEVATION - LOOKING NORTH



ELEVATION - LOOKING WEST



ELEVATION - LOOKING SOUTH

DON'T WALK PAST AN UNSAFE ACT!

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
C	30/05/2017	M. Smith	I. Johnson	STATUS WAS 'FOR INFORMATION'.
B	16/12/2016	M. Smith	I. Johnson	SIGNAGE NOTE ADDED
A	22/08/2016	M. Smith	I. Johnson	DRAWING ISSUED

REVISION HISTORY

DRAWN: M. Smith	DATE: 22/08/2016		
CHECKED: L. McIntosh	DATE: 25/08/2016		
ENGINEER: I. Johnson	DATE: 25/08/2016		
APPROVED: I. Johnson	DATE: 25/08/2016		

BORAL

Boral Cement
ABN 62 008 528 523
Engineering Services

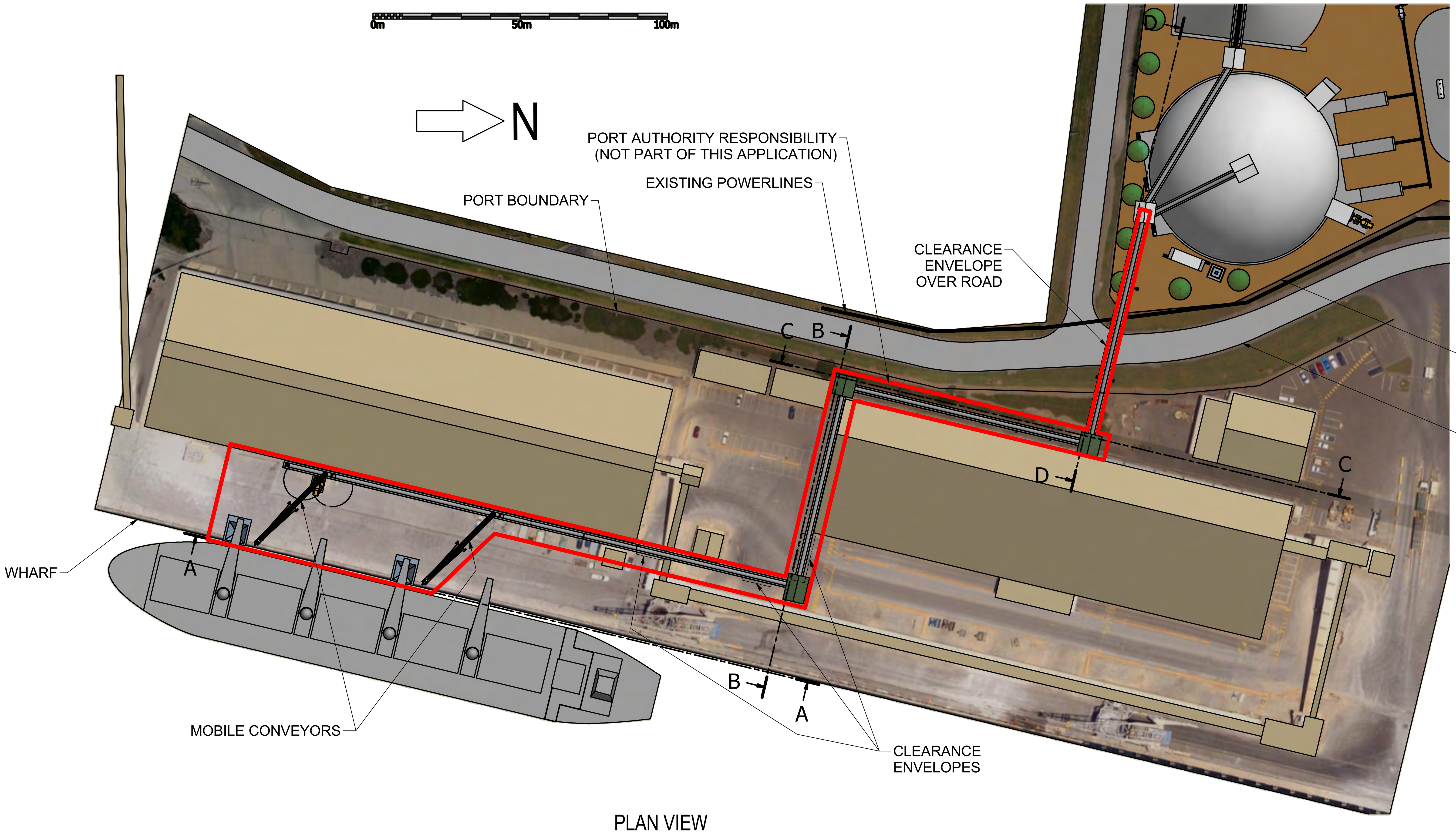
Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimile - 02-48 602399
Email - drawing.office@boral.com.au

STATUS: PRELIMINARY

ALPHA NUMERIC:
BCES JOB No: GEE001
STOCK NUMBER:
SHEET: A1
SCALE: 1:500

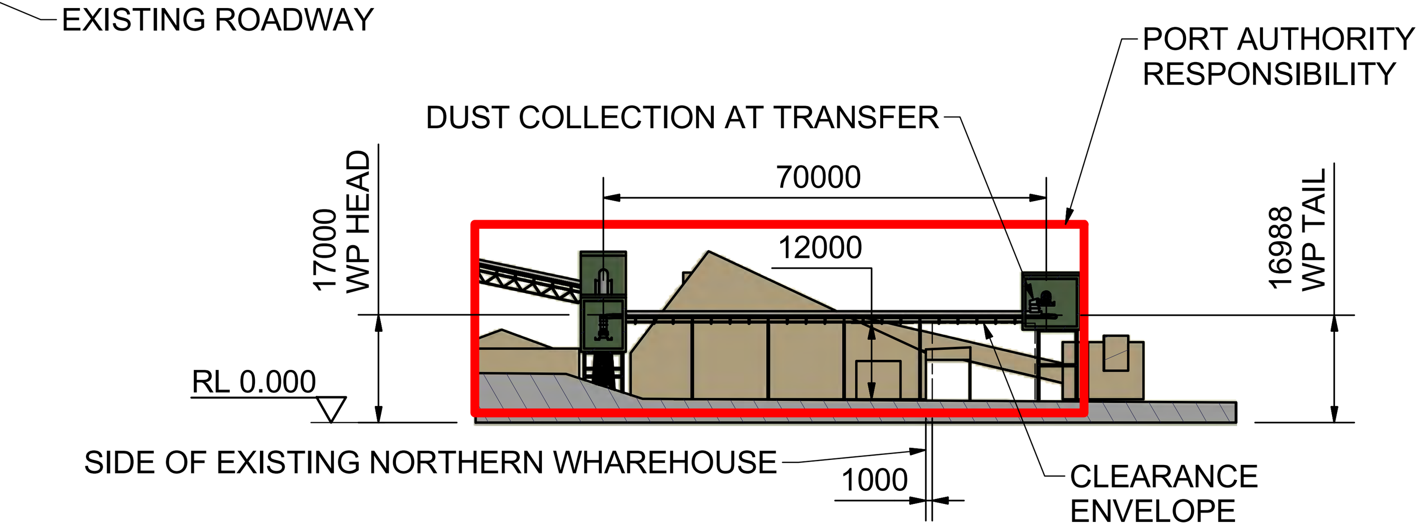
PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY
SECTION: SITE
SUB SECTION:
TITLE: CEMENT GRINDING SITE LAYOUT
CLASSIFICATION:

DRAWING No: GEL-G-SLT-0002-03
WORKS No:
REV. C

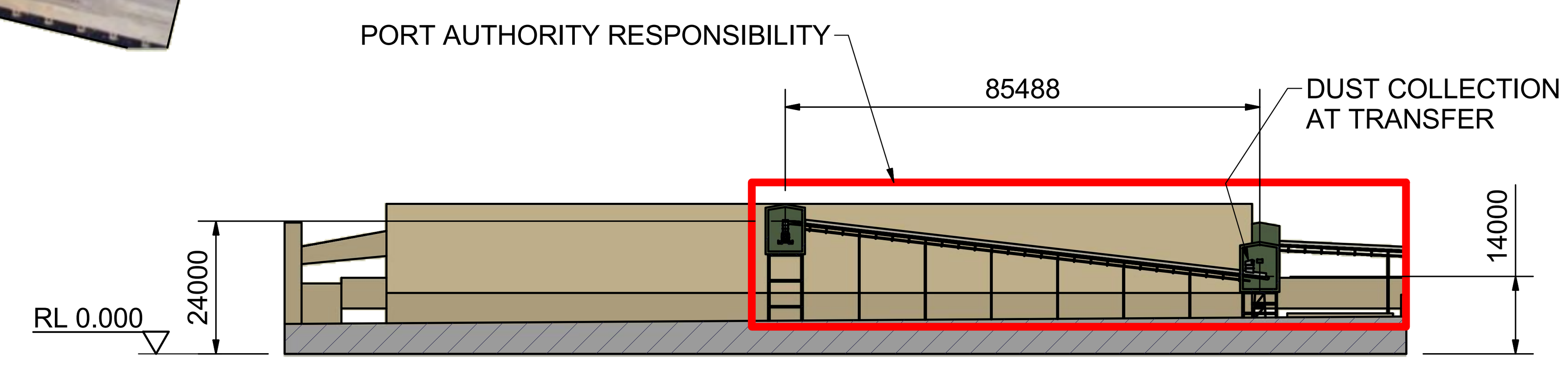


PLAN VIEW

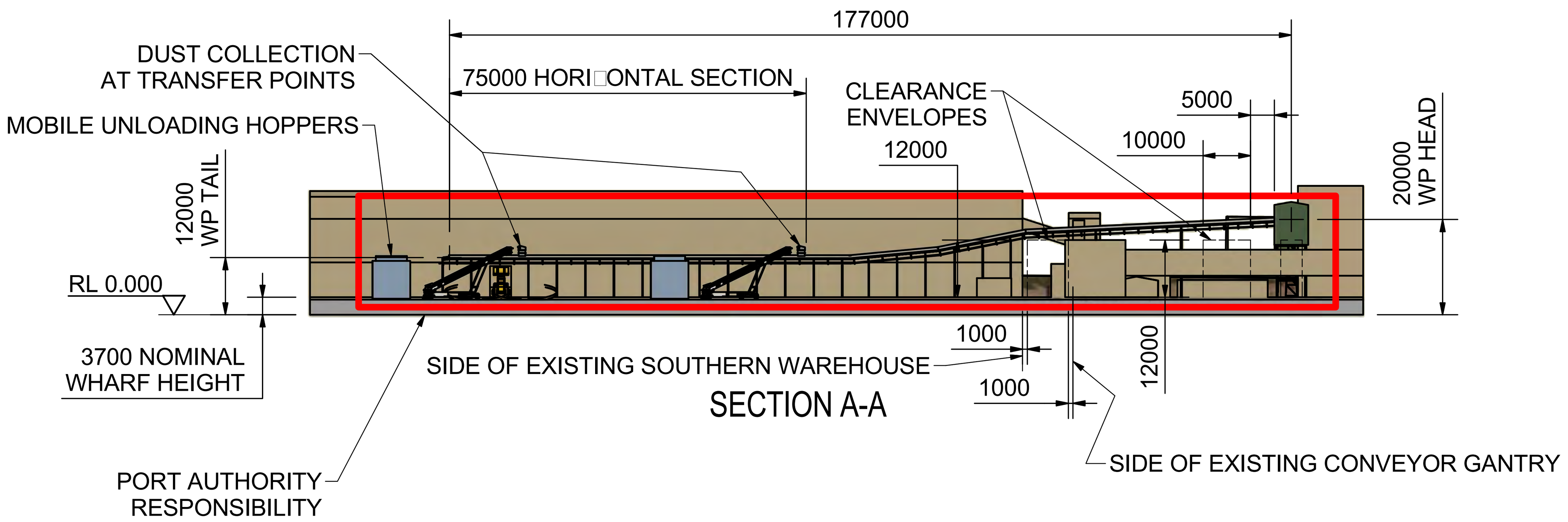
NOTE:
ALL DIMENSIONS AND RL's ARE APPROXIMATE.



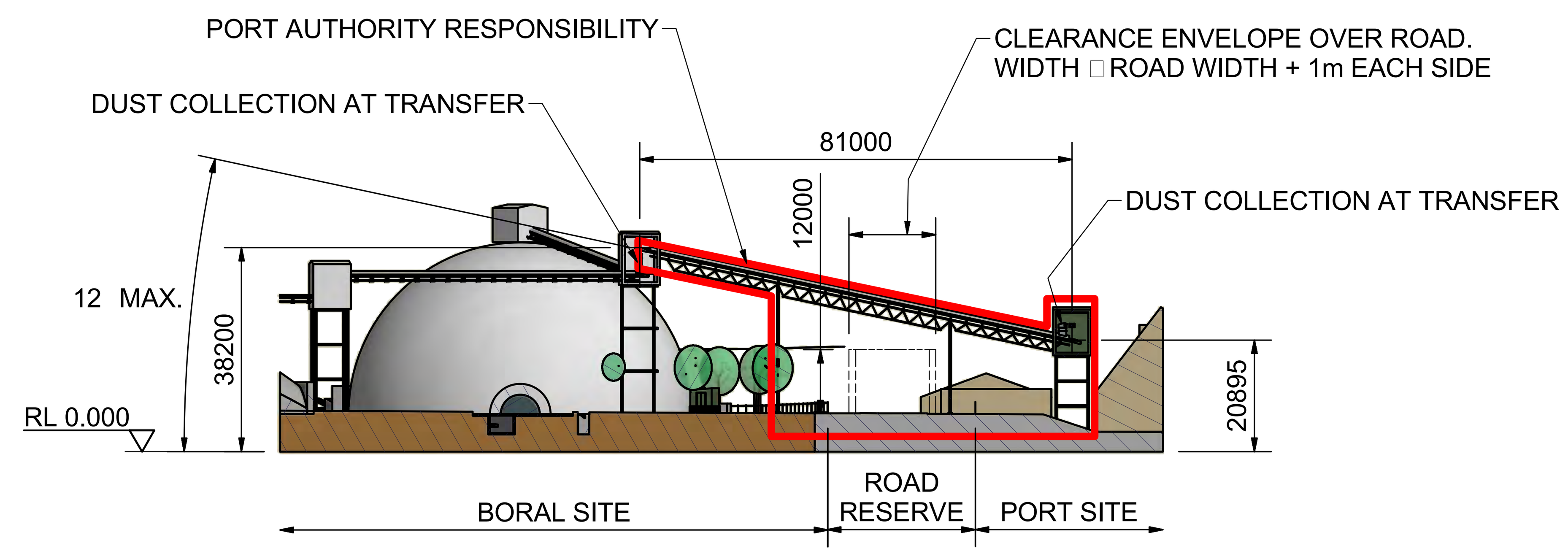
SECTION B-B



SECTION C-C



SECTION A-A



SECTION D-D

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
B	9/01/2017	M. Smith		PORT CONVEYOR NOTE AMMENDED.
A	15/12/2016	M. Smith		DRAWING ISSUED

REVISION HISTORY

DRAWN: M. Smith	DATE: 15/12/2016		
CHECKED:	DATE:		
ENGINEER:	DATE:		
APPROVED:	DATE:		

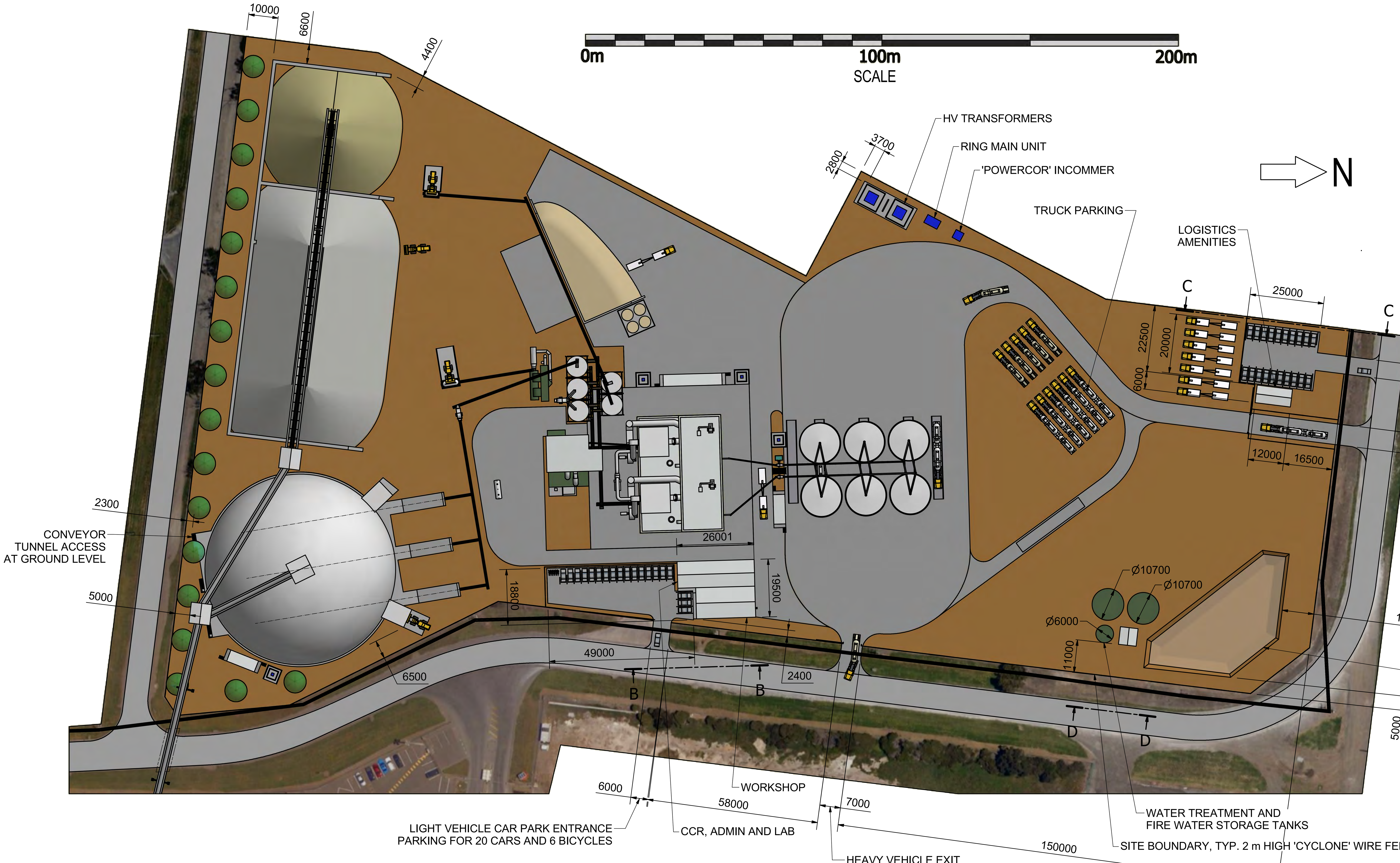
BORAL
Boral Cement
ABN 62 008 528 523
Engineering Services
Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimile - 02-48 602399
Email - drawing.office@boral.com.au

STATUS: PRELIMINARY

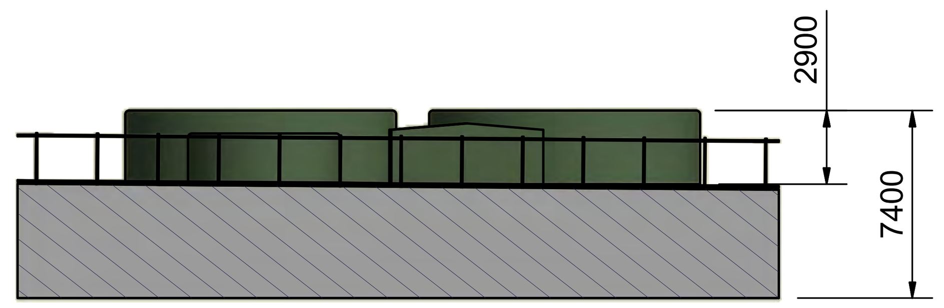
ALPHA NUMERIC:	BCES JOB No: GEE001	
STOCK NUMBER:	SHEET: A1	SCALE: 1:500

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY SITE
SECTION:
SUB SECTION:
TITLE: PORT CONVEYORS TO CLINKER STORE GENERAL ARRANGEMENT
CLASSIFICATION:

DRAWING No: GEL-G-SLT-0002-04
WORKS No:
REV. B

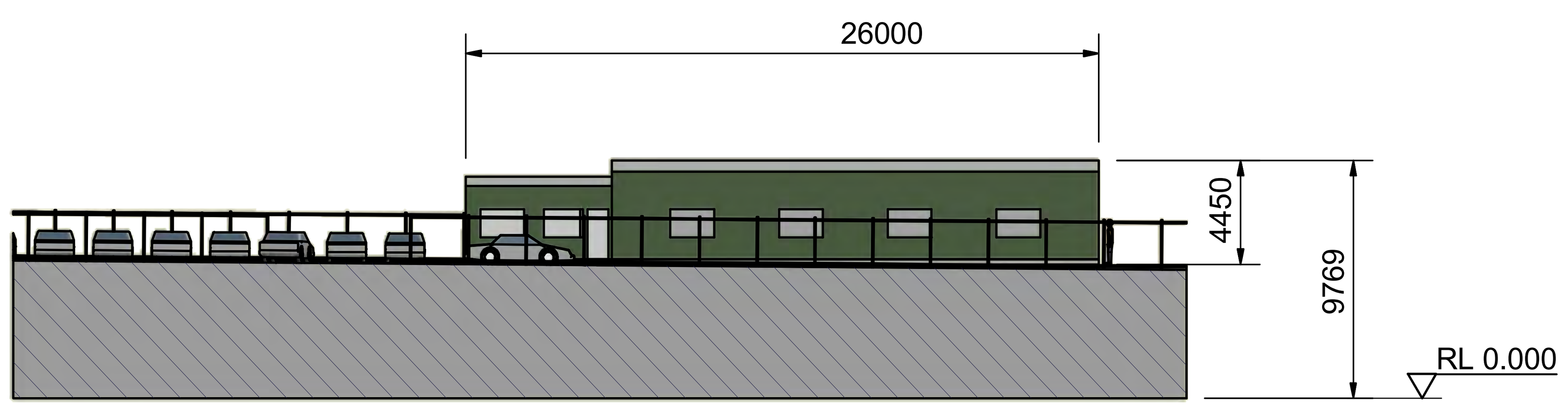


PLAN VIEW

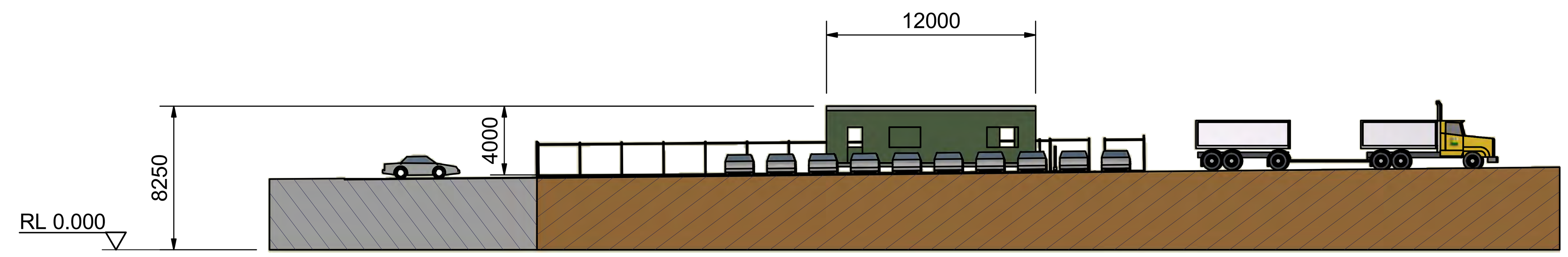


SECTION D-D
WATER TANKS

NOTE:
1. ALL DIMENSIONS AND RL's ARE APPROXIMATE.
2. SIGNAGE AT ENTRANCE GATES WILL BE APPROX. 2 m HIGH x 1.5 m WIDE. SEE EXAMPLE BELOW:



SECTION B-B
CCR AND WORKSHOP BUILDINGS
SEE GEL-G-SLT-0002-06 & -07 FOR DETAILS



SECTION C-C
LOGISTICS AMENITIES BUILDING

NO JOB IS SO IMPORTANT THAT IT CAN'T BE DONE SAFELY!

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
D	30/05/2017	M. Smith		STATUS WAS 'FOR INFORMATION'.
C	16/01/2017	M. Smith		CCR AND WORSHOP BUILDINGS MODIFIED
B	9/01/2017	M. Smith		SETBACK ADDED FOR CONVEYOR TUNNEL ACCESS
A	3/08/2016	M. Smith		DRAWING ISSUED

REVISION HISTORY

DRAWN: M. Smith	DATE: 5/07/2016	STATUS: PRELIMINARY	PLANT: GEELONG
CHECKED:	DATE:	ALPHA NUMERIC:	PROJECT: VICTORIA CEMENT SUPPLY SITE
ENGINEER:	DATE:	BCES JOB No: GEE001	SECTION:
APPROVED:	DATE:	STOCK NUMBER: / SHEET: A1 / SCALE: 1:1000	SUB SECTION: / TITLE: ANCILLARY BUILDINGS AND SETBACKS SITE LAYOUT / CLASSIFICATION:

BORAL
Boral Cement
ABN 62 008 528 523
Engineering Services

Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimile - 02-48 602399
Email - drawing.office@boral.com.au

GROUP ENGINEERING No: PLANT DRAWING SHEET
GEL-G-SLT-0002-05
WORKS No:
REV. D

SAFETY COMES BEFORE PRODUCTION!

REV.	DATE	REV-BY	APPROVED	REVISION
B	16/01/17	MJS		GENERAL REVISION
A	12/01/17	MJS		DRAWING ISSUED

REVISIONS

DRAWN:	M. SMITH	DATE:	12/01/17
CHECKED:		DATE:	
ENGINEER:		DATE:	
APPROVED:		DATE:	

Boral Cement
ABN 62 008 528 523
Engineering Services
Ta lor A enue New Berrima NSW 2577
Locked Bag 4 New Berrima NSW 2577
Email: drawing.office@boral.com.au
Phone: +61 2 4860 2325
Fax: +61 2 4860 2399

STATUS: PRELIMINARY

ALPHA NUMERIC:

BCSC-GES JOB No: GEE001

STOCK NUMBER

SHEET: A1

SCALE: 1:50

PLANT: GEELONG

PROJECT: VICTORIA CEMENT SUPPLY

SECTION: SITE

SUB SECTION:

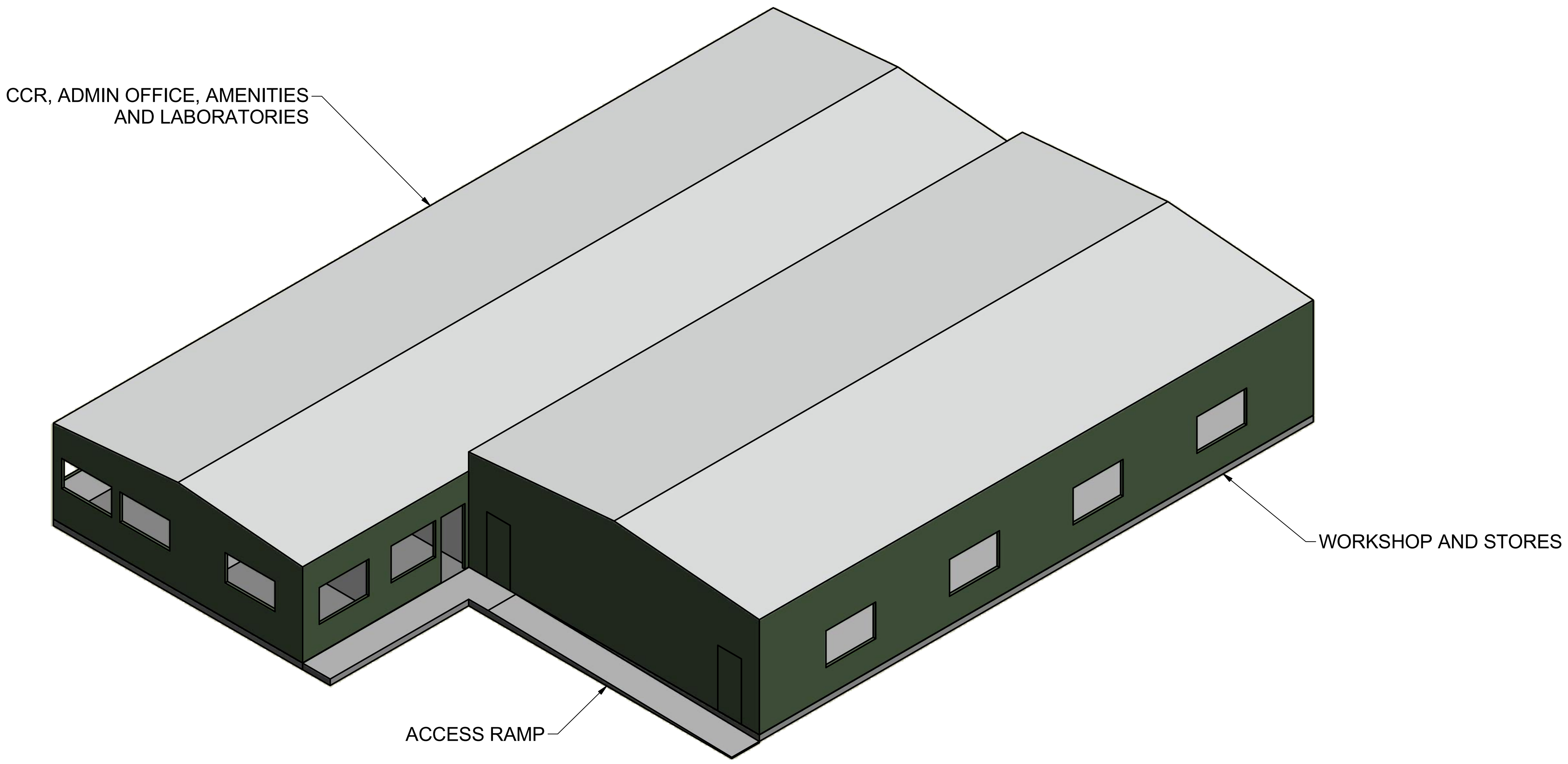
TITLE: OFFICE AND WORKSHOP FLOOR PLAN

CLASSIFICATION: SITE LAYOUT

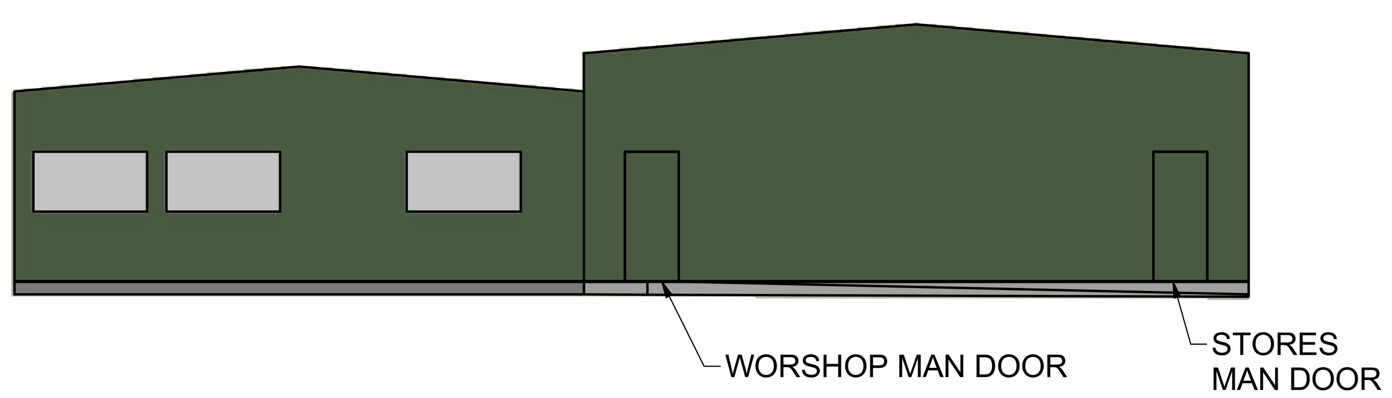
DRAWING No: GEL-G-SLT-0002-06

WORKS No:

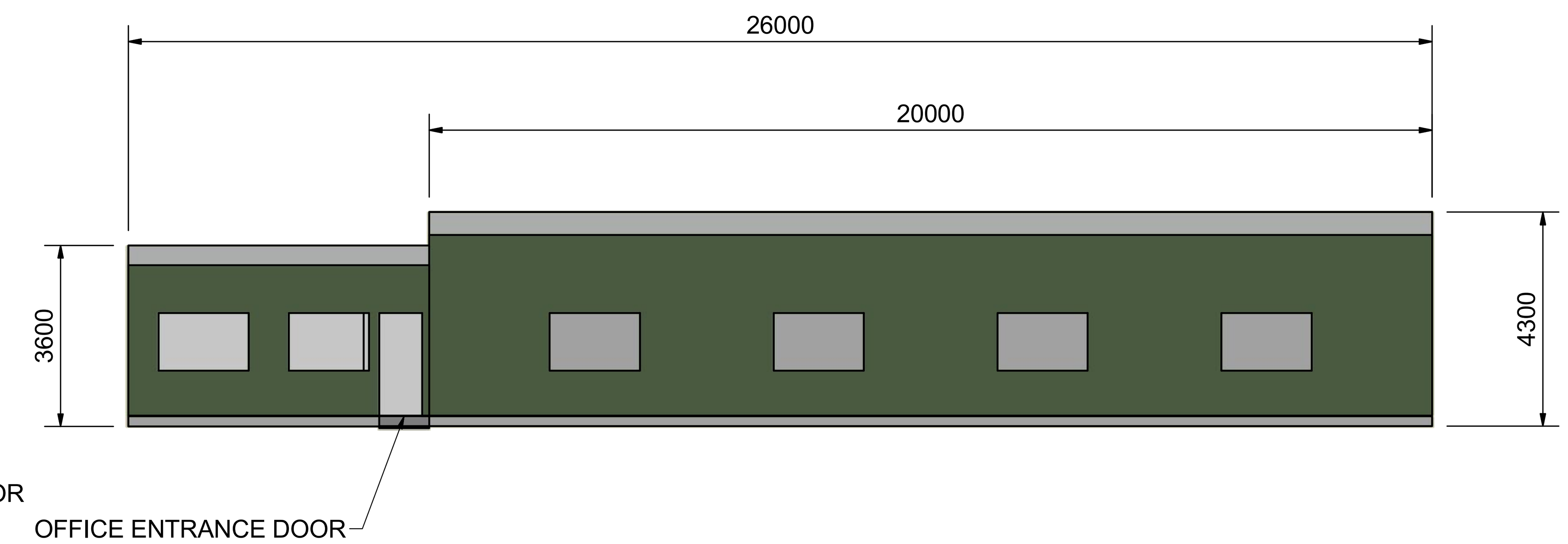
REV. B



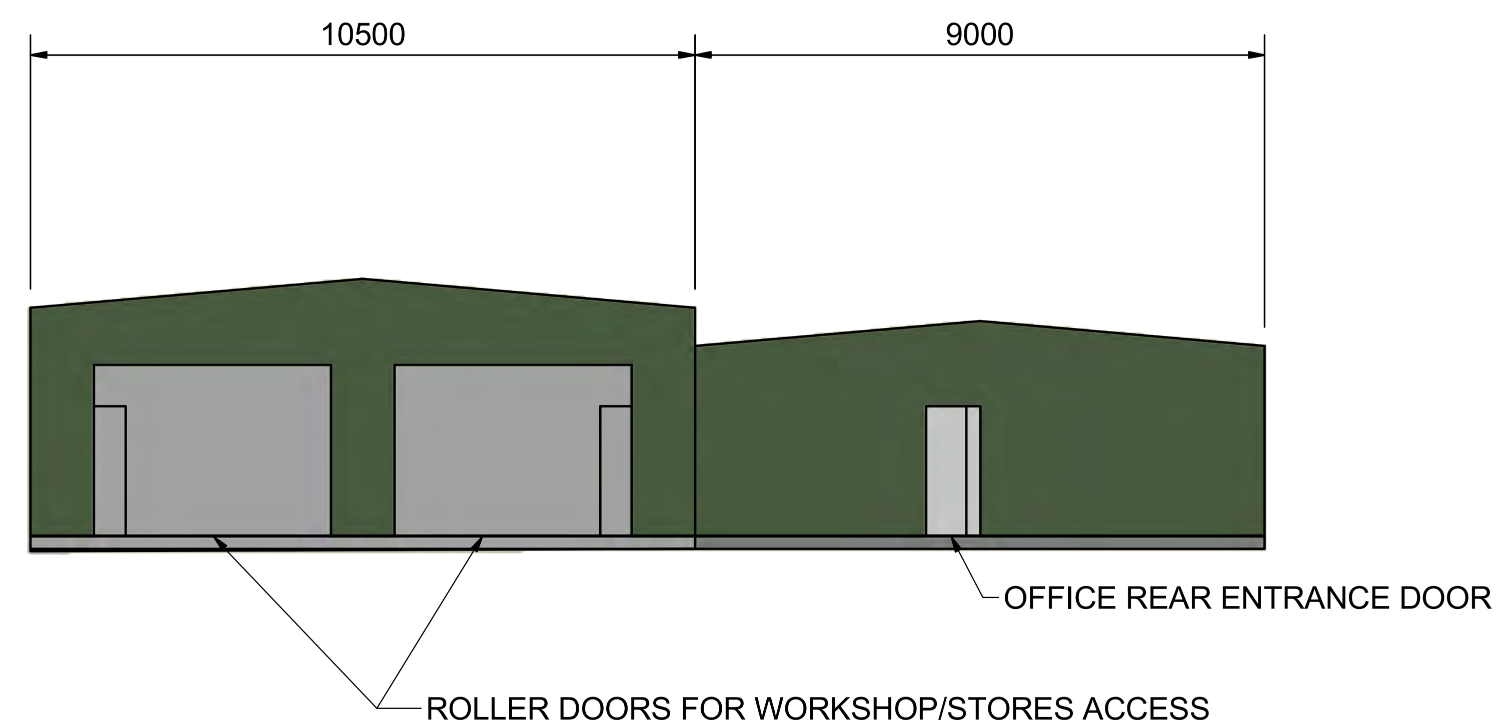
ISOMETRIC VIEW LOOKING NORTH WEST



ELEVATION LOOKING NORTH



ELEVATION LOOKING WEST



ELEAVTION LOOKING SOUTH

NOTE: REFER TO GEL-G-SLT-0002-09 FOR FLOOR PLAN

YOU HAVE THE RIGHT TO STOP THE JOB IF IT IS UNSAFE TO CONTINUE.

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
A	16/01/2017	M. Smith		

REVISION HISTORY

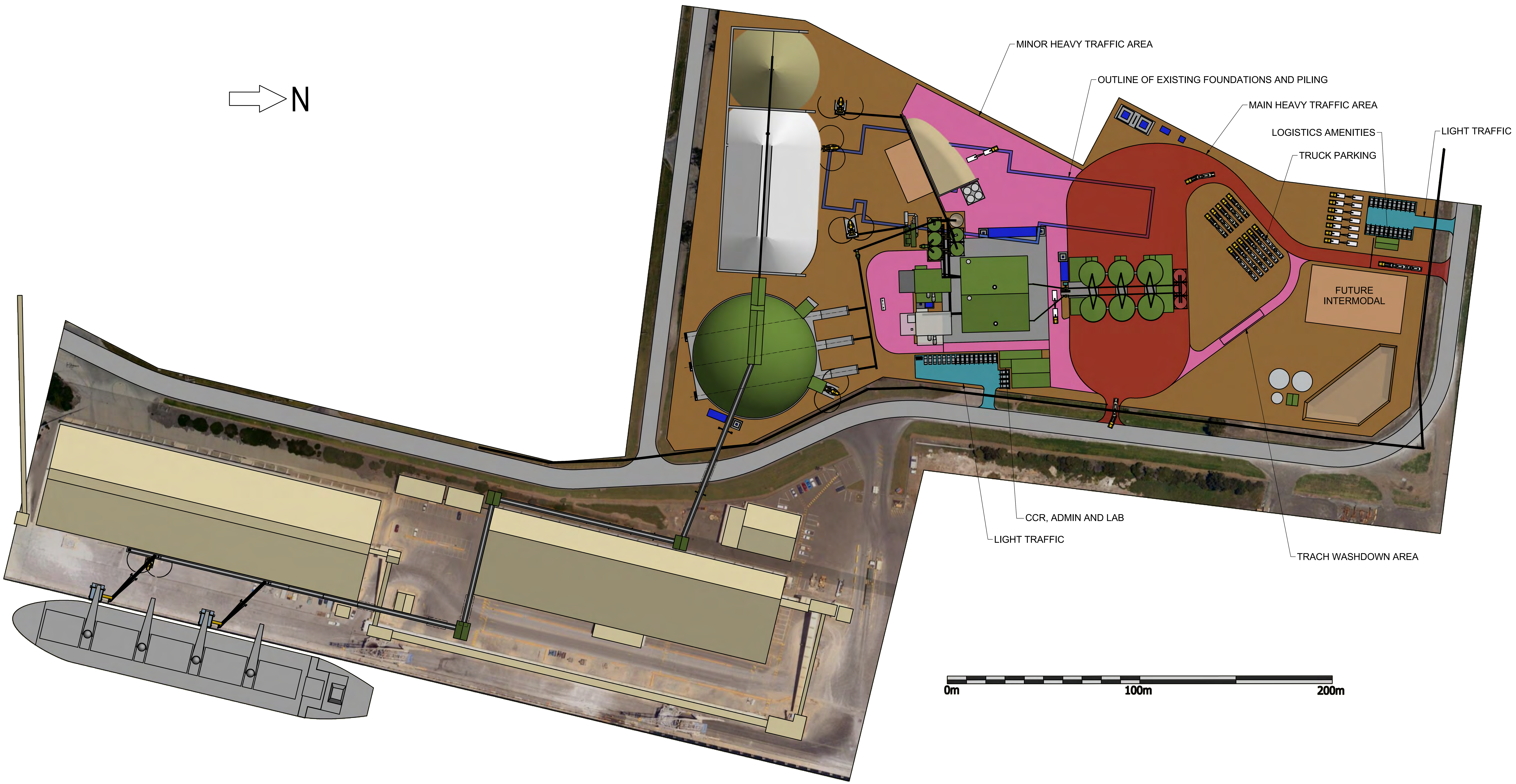
DRAWN: M. Smith DATE: 16/01/2017
CHECKED: DATE:
ENGINEER: DATE:
APPROVED: DATE:

BORAL
Boral Cement
ABN 62 008 528 523
Engineering Services
Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimille - 02-48 602399
Email - drawing.office@boral.com.au

STATUS: PRELIMINARY
ALPHA NUMERIC:
BCES JOB No: GEE001
STOCK NUMBER:
SHEET: A1
SCALE: 1:100

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY
SECTION: SITE
SUB SECTION:
TITLE: OFFICE AND WORKSHO ELEVATIONS
CLASSIFICATION: SITE LAYOUT

DRAWING No: GEL-G-SLT-0002-07
WORKS No:
REV: A



PLAN VIEW

NO JOB IS SO IMPORTANT THAT IT CAN'T BE DONE SAFELY!

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
A	1/08/2016	M. Smith		DRAWING ISSUED

REVISION HISTORY

DRAWN: M. Smith	DATE: 1/08/2016
CHECKED:	DATE:
ENGINEER:	DATE:
APPROVED:	DATE:

BORAL

Boral Cement
ABN 62 008 528 523
Engineering Services

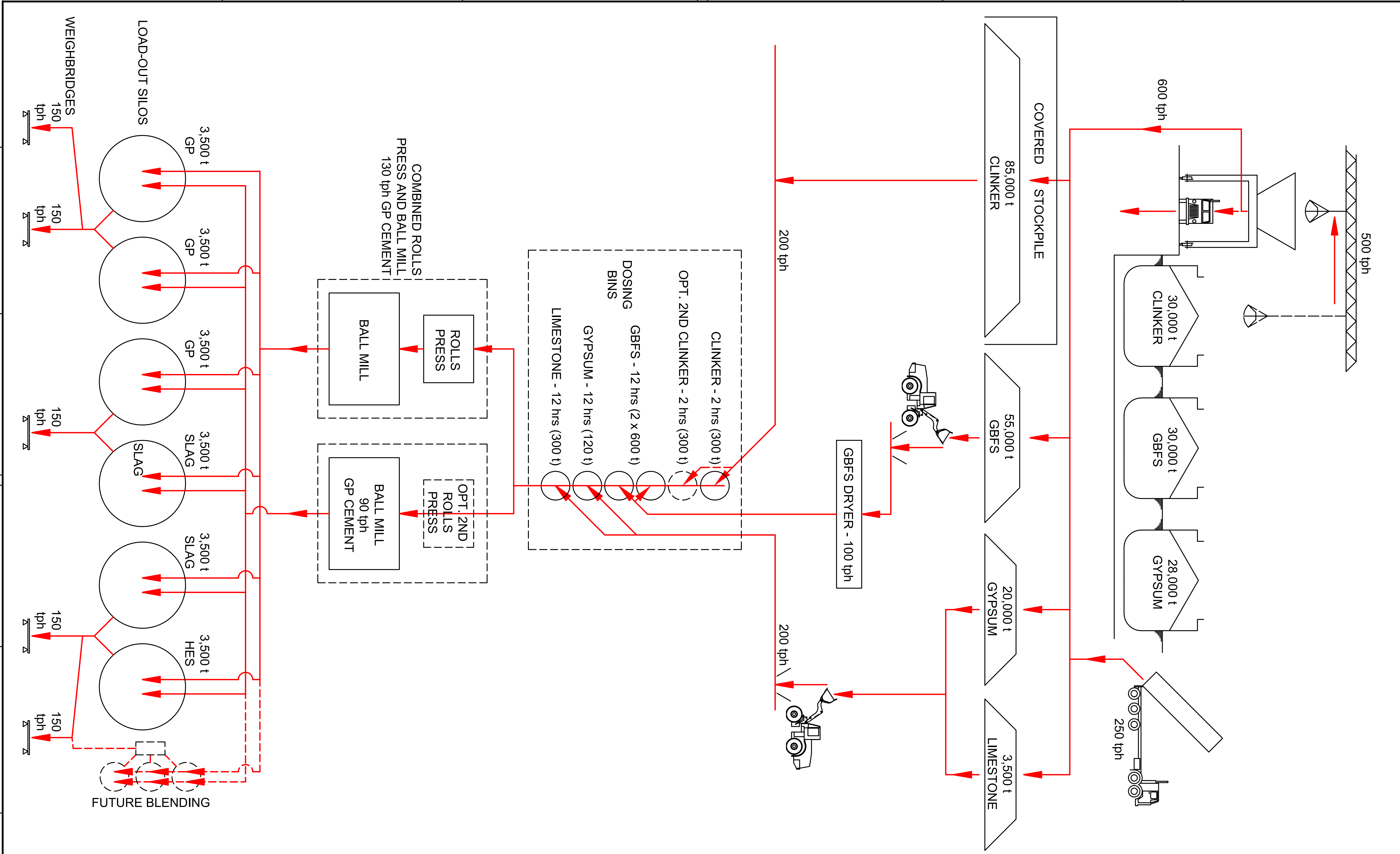
Locked Bag No. 4 New Berrima N.S.W. 2577 Australia
Telephone - 02-48 602325
Facsimile - 02-48 602399
Email - drawing.office@boral.com.au

STATUS: PRELIMINARY

ALPHA NUMERIC:
BCES JOB No: GEE001
STOCK NUMBER:
SHEET: A1
SCALE: 1:1000

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY SITE
SECTION:
SUB SECTION:
TITLE: TRAFFIC FLOW SITE LAYOUT
CLASSIFICATION:

GROUP ENGINEERING No: PLANT DRAWING SHEET
GEL-C-SLT- 0008-01
WORKS No:
REV. A



REV.	DATE	BY	APP	REVISION
B	26/07/16	MJS		FUTURE OPTIONS ADDED, □UANTITIES REVISED
A	27/05/16	MJS		DRAWING ISSUED

STATUS: PRELIMINARY
DRAWN: M. SMITH DATE: 27/05/16
CHECKED: DATE:
ENGINEER: DATE:
APPROVED: DATE:

BORAL
Boral Cement
ABN 62 008 528 523
Engineering Services
Ta□lor A□enue New Berrima NSW 2577
Locked Bag 4 New Berrima NSW 2577
Phone: +61 2 4860 2325
Fax: +61 2 4860 2399

SCALE:
JOB No: GEE001
ALPHA NUM:
SHEET A3
PLANT:
PROJECT:
SECTION:
SUB SECTION:
TITLE: CLINKER AND SLAG GRINDING MATERIAL FLOW DIAGRAM
CLASSIFICATION:
DRAWING No: GEL-M-MFD-0002-01
WORKS No:
REV. B

Appendix C

3 Pages

Risk Assessment Matrix

Envrironmental Risk Assessment - process failure or non-routine operations												
Item	Activity	Process Failure	Environmental Element	Hazard	Initial Risk Rating			Design Actions / preventative measures / process controls / contingencies	Residual Risk Rating			Responsiblity for Managing
					Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level	
1		Conveyor failure	Air	Fugitive dust emissions impacting off-site receptors.	Probable (3)	Significant (4)	High (9-14)	Engineering controls to monitor equipment and conveyor which will stop the process in the event of equipment failure (e.g. conveyor belt tracking and underspeed detection). Conveyors covered to prevent airborne dust release Material transfer points to have dust filters Enclosed pneumatic airslides. Maintenance regimes to maintain serviceability of equipment. Dust management plan Standard operating procedures Dust monitoring program	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
2		Conveyor failure	Noise	Nuisance noise impacting off-site receptors.	Probable (3)	Significant (4)	High (9-14)	Motors attenuated or positioned as to reduce noise Conveyor maintenance Alarms focused within site regular monitoring Incident investigation and reporting	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
3	Delivery of raw materials - clinker, slag and gypsum from port and limestone (trucked).	Equipment failure causing spills (lubricants, engine oils, fuel)	Groundwater	Contamination of water	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits	Rare (1)	Negligible (1)	Low (1-5)	Site operator
4		Equipment failure causing spills (lubricants, engine oils, fuel)	Surfacewater	Contamination of water	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits Water treatment prior to offsite disposal Compliance monitoring	Rare (1)	Minor (2)	Low (1-5)	Site operator
5		Equipment failure causing spills (lubricants, engine oils, fuel)	Land	Contamination of land	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits	Rare (1)	Negligible (1)	Low (1-5)	Site operator
6		Equipment failure - overheating and causing localised fire	Air	Fire - Odour and Air Quality impacts	Not likely (2)	Severe (5)	High (9-14)	Site fire protection system. Maintenance regimes to maintain serviceability of equipment. Emergency incident response protocols to contain fire Fully trained staff	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
7		Water suppression system / equipment failure	Air	Fugitive dust emissions from clinker stockpiles and transport	Probable (3)	Significant (4)	High (9-14)	Clinker store sealed during normal operation, sized appropriately to minimise manual manipulation of material. Dust collection and filtration of clinker store and transfer points to prevent fugitive dust emissions. Entry into the store is via a sealed entrance door, for front end loader access only. Store is sized to reduce the need to enter the store (approx. 6 months). Water trucks and road sweepers to contain fugitive dusts Dust management plan Dust monitoring program	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
8		Equipment failure	Noise	Nuisance noise impacting off-site receptors.	Probable (3)	Significant (4)	High (9-14)	Motors attenuated or positioned as to reduce noise Alarms focused within site Maintenance regimes to maintain serviceability of equipment. Regular monitoring Incident investigation and reporting	Not likely (2)	Minor (2)	Low (1-5)	Site operator
9	Stockpiling of raw materials (uncovered)	Equipment failure causing spills (lubricants, engine oils, fuel)	Groundwater	Contamination of water	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits.	Not likely (2)	Minor (2)	Low (1-5)	Site operator
10		Equipment failure causing spills (lubricants, engine oils, fuel)	Surfacewater	Contamination of water	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits Water treatment prior to offsite disposal Compliance monitoring	Rare (1)	Minor (2)	Low (1-5)	Site operator
11		Equipment failure causing spills (lubricants, engine oils, fuel)	Land	Contamination of land	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Bunding of all hazardous materials Spill kits	Not likely (2)	Minor (2)	Low (1-5)	Site operator

Envrironmental Risk Assessment - process failure or non-routine operations												
Item	Activity	Process Failure	Environmental Element	Hazard	Initial Risk Rating			Design Actions / preventative measures / process controls / contingencies	Residual Risk Rating			Responsiblity for Managing
					Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level	
12		Water system failure	Air	Fugitive dust emissions from slag collection and transport	Probable (3)	Significant (4)	High (9-14)	Water trucks and road sweepers to contain fugitive dusts Dust management plan Dust monitoring program	Probable (3)	Minor (2)	Medium (6-8)	Site operator
13		Equipment failure	Air	Fugitive dust impacting off-site receptors from operation of slag dryer and operation of FEL	Probable (3)	Significant (4)	High (9-14)	Dust collection and filtration of slag dryer and feed/discharge equipment to prevent fugitive dust emissions Appropriate design of transfer points to contain spillage. Control and monitoring of equipment and process to stop the process in the event of equipment failure Collected dust shall discharge onto the following conveyor of the series or dosing bin. Dust monitoring program Dust management plan	Probable (3)	Minor (2)	Medium (6-8)	Site operator
14		Equipment failure	Noise	Nuisance noise impacting off-site receptors from operation of slag dryer and operation of FEL	Probable (3)	Significant (4)	High (9-14)	Motors attenuated or positioned as to reduce noise Alarms focused within site Maintenance regimes to maintain serviceability of equipment. Regular monitoring Incident investigation and reporting	Probable (3)	Minor (2)	Medium (6-8)	Site operator
15	Slag drying	Equipment failure causing spills (lubricants, engine oils, fuel)	Groundwater	Contamination of water from spills	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Bunding of all hazardous materials Spill kits	Not likely (2)	Negligible (1)	Low (1-5)	Site operator
16		Equipment failure causing spills (lubricants, engine oils, fuel)	Surfacewater	Contamination of water from spills	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits Water treatment prior to offsite disposal Compliance monitoring	Not likely (2)	Minor (2)	Low (1-5)	Site operator
17		Equipment failure causing spills (lubricants, engine oils, fuel)	Land	Contamination of land	Probable (3)	Minor (2)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Bunding of all hazardous materials Spill kits	Not likely (2)	Negligible (1)	Low (1-5)	Site operator
18		Equipment failure - overheating and causing localised fire	Air	Fire - Odour and Air Quality impacts	Not likely (2)	Severe (5)	High (9-14)	Site fire protection system. Maintenance regimes to maintain serviceability of equipment. Emergency incident response protocols to contain fire Fully trained staff	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
19		Equipment failure	Air	Fugitive dust emissions to off-site receptors	Probable (3)	Significant (4)	High (9-14)	Ball Mills and grinding process equipment contained within an enclosed building to reduce noise and contain fugitive dust. Dust collection and filtration systems included as part of the ball mill and grinding process. Dust collection and filtration systems for all material transfer points, systems and silos to prevent fugitive dust. Control and monitoring of equipment and process to stop the process in the event of equipment failure, e.g. burst bag detection for dust filtration system	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
20		Equipment failure	Noise	Nuisance noise impacting off-site receptors from grinding operations	Probable (3)	Significant (4)	High (9-14)	Ball Mill fully enclosec Motors attenuated or positioned as to reduce noise Alarms focused within site Conveyor maintenance regular monitoring Incident investigation and reporting	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
21	Processing of material from operation of rolls press and ball mill	Equipment failure causing spills (lubricants, engine oils, fuel) Waste from office	Groundwater	Contamination of water from spills	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Bunding of all hazardous materials Spill kits	Not likely (2)	Negligible (1)	Low (1-5)	Site operator
22		Equipment failure causing spills (lubricants, engine oils, fuel) Waste from office	Surfacewater	Contamination of water from spills	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Bunding of all hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits. Water treatment prior to offsite disposal Compliance monitoring.	Not likely (2)	Minor (2)	Low (1-5)	Site operator
23		Equipment failure causing spills (lubricants, engine oils, fuel) Waste from office	Land	Contamination of land	Not likely (2)	Medium (3)	Medium (6-8)	Clinker, slag and gypsum are non-toxic and non-hazardous materials. Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Bunding of all hazardous materials Spill kits	Not likely (2)	Negligible (1)	Low (1-5)	Site operator
24		Equipment failure - overheating and causing localised fire	Air	Fire - Odour and Air Quality impacts	Not likely (2)	Severe (5)	High (9-14)	Site fire protection system. Maintenance regimes to maintain serviceability of equipment. Emergency incident response protocols to contain fire Fully trained staff	Not likely (2)	Medium (3)	Medium (6-8)	Site operator

Envrironmental Risk Assessment - process failure or non-routine operations												
Item	Activity	Process Failure	Environmental Element	Hazard	Initial Risk Rating			Design Actions / preventative measures / process controls / contingencies	Residual Risk Rating			Responsiblity for Managing
					Likelihood	Consequence	Risk Level		Likelihood	Consequence	Risk Level	
25	Finished product storage and dispatch	Delivery truck malfunction / accident - leading to release of product	Air	Fugitive dust emissions from product stockpiles and transport	Probable (3)	Medium (3)	High (9-14)	Maintenance regimes to maintain serviceability of equipment. Truck loading spout has integrated dust collection and filtration. Spout is self-closing when raising and lowering. Loading takes place within an enclosed building to contain fugitive dust. Truck tanker is sealed prior to leaving site. Loading control system implemented to prevent damage to plant and equipment Trucks do not travel through residential areas.	Not likely (2)	Medium (3)	Medium (6-8)	Site operator
26		Equipment or truck failure causing spills (lubricants, engine oils, fuel) Waste from office	Groundwater	Contamination of water from spills	Probable (3)	Minor (2)	Medium (6-8)	Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits.	Rare (1)	Negligible (1)	Low (1-5)	Site operator
27		Equipment or truck failure causing spills (lubricants, engine oils, fuel) Waste from office	Surfacewater	Contamination of water from spills	Probable (3)	Minor (2)	Medium (6-8)	Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits. Water treatment prior to offsite disposal Compliance monitoring.	Rare (1)	Minor (2)	Low (1-5)	Site operator
28		Equipment or truck failure causing spills (lubricants, engine oils, fuel) Waste from office	Land	Contamination of land	Probable (3)	Minor (2)	Medium (6-8)	Maintenance regimes to maintain serviceability of equipment. Environmental incident response plan. Spill kits.	Rare (1)	Negligible (1)	Low (1-5)	Site operator

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Appendix D

108 Pages

GHG and Air Quality Assessment – Pacific Environment Limited (22 May 2017)

Report

Boral Cement
Geelong Clinker Grinding Facility
GHG and Air Quality Impact Assessment

Document control number: AQU-SA-017-20971

Date: 22 May 2017

Pacific Environment Limited

Technologies Consulting Monitoring

Project name:	Boral Cement Geelong Clinker Grinding Facility GHG and Air Quality Impact Assessment
Document control number:	AQU-SA-017-20971
Prepared for:	Boral Cement
Approved for release by:	Johan Meline
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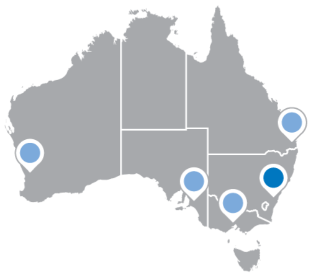
Table 1.1. *Document Control*

Version	Date	Comment	Prepared by	Reviewed by
1	11/10/2016		Johan Meline Rebecca Chalmer	Bethany Warren
2	4/11/2016		Rebecca Chalmer Sarah Colson	Johan Meline
3	21/11/2016		Rebecca Chalmer	Johan Meline
4	25/11/2016	Draft for EPA review	Rebecca Chalmer	Johan Meline
5	23/12/2016	Final	Rebecca Chalmer	Johan Meline
6	19/1/17	Final	Rebecca Chalmer	Johan Meline
7	22/5/17	Final	Rebecca Chalmer	Johan Meline



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1 Introduction

1.1 Background

Currently, Boral Cement imports clinker through the Port of Geelong and transports the material by truck 30 km to the existing manufacturing site at Waurn Ponds. The proposed development of a new clinker grinding facility at Lascelles Wharf at the Port of Geelong will move operations away from Waurn Ponds to a location closer to the port. This will deliver efficiencies in production and upgrade the current production capacity. The new facility will import clinker and slag for manufacturing into a range of cementitious products. The ship unloading for the clinker import will remain unchanged compared to the current operations with unloading at Lascelles Wharf by Port of Geelong. However, instead of unloading to trucks the material will be unloaded to a conveyer system for transport to site. The ship unloading operations are managed by Port of Geelong and are not directly included in the assessment.

The expected initial capacity of the new clinker grinding facility will be 950 Ktpa and the production rate is planned to be increased to 1.3 Mtpa by 2040.

For assessment purposes, operation based on production for 2040 was assumed in this air quality impact assessment. 2040 is assumed to be the worst case conditions for air emissions based on the planned annual production rate. The resulting dust impact assessment and greenhouse gas assessments are summarised in this report.

1.2 Purpose and Objective

The purpose of the GHG and air quality impact assessment report is to support the works approval application.

The objective with the assessment is to demonstrate compliance with relevant guidelines.

1.3 Report Layout

The report includes the following sections:

- Section 1: Introduction – Short summary on the proposed development and the scope of the air quality impact assessment.
- Section 2: Assessment Methodology – Description of the air quality study assessment and the greenhouse gas assessment methodologies.
- Section 3: Facility Description – Description of the facility materials handling and manufacturing processes.
- Section 4: Emissions Data – Summary tables presenting the estimated emissions used in the air quality and greenhouse gas assessments.
- Section 5: Results – Presentation and discussion of the dispersion modelling results.
- Section 6: Conclusions – Summary of report conclusions.
- Appendix A: Full summary details of the emissions estimation methodology for the air quality and the greenhouse gas assessments.
- Appendix B: Evaluation of the meteorological data used in the dispersion modelling.
- Appendix C: Letter from EPA on use of the CALPUFF dispersion model.
- Appendix D: Facility Dust Management Plan.
- Appendix E: Facility layouts and drawings

1.4 Air Quality Assessment Components

The air quality impact assessment was approached as a comprehensive dust impact assessment. This is ideal as the clinker grinding facility and the port air emissions are predominantly dust[1] related from materials processing and handling. The air quality assessment included the following components:

- Characterisation of the existing environment. This included requesting any available air quality data from the Port of Geelong and Environment Protection Authority Victoria (EPA) for review and determination of background PM_{10} and $PM_{2.5}$ concentrations.
- From the review of available air quality data it was concluded that PM_{10} monitoring should be performed for collection of some site specific data. Monitoring was commenced on 2 August 2016 at the site location for collection of background data.
- Site visit at current Boral Cement clinker grinding facility at Waurn Ponds.
- Consultation with EPA regarding the use of dispersion model. The use of CALPUFF for the dispersion modelling was requested and permission was provided by the EPA (Appendix C).
- Request of meteorological data from the Bureau of Meteorology.
- Review of meteorological data and selection of representative year for assessment.
- Processing of meteorological data for the dispersion modelling.
- Emissions estimation based on the proposed operations with conservative assumptions as appropriate.
- Dispersion modelling to predict ground level dust concentrations (PM_{10}, $PM_{2.5}$ and TSP).
- Evaluation of dispersion modelling results against assessment criteria. Based on the results, dust mitigation and controls for the emissions were identified to provide information for the site dust management plan.
- Preparation of written report and site dust management plan (delivered as two separate documents).

1.5 Site Location

The site for the proposed clinker grinding facility is at Lascelles Wharf at the Port of Geelong at the North Shore. The site as shown in Figure 1.1 is to the west of The Esplanade north of Walchs Road and to the south of Madden Avenue.

Clinker is currently unloaded at Lascelles Wharf and transported by truck to the Waurn Ponds

The proposed site was previously used by BHP as an industrial facility operating a steel mill. The northeast section of the site is reclaimed land and as such major plant, equipment and buildings will not be placed within this area. There are redundant concrete structures protruding above ground level from the redundant steel mill workings to the west of the site. The site also includes concrete and bitumen roadways, carparks and associated surface water drainage.

[1] Dust includes total suspended particles (TSP), particulate matter with an aerodynamic diameter less than 10 µm (PM_{10}) and particulate matter with an aerodynamic diameter less than 2.5 µm ($PM_{2.5}$).

It is envisaged that the site will be cleared of most of these structures and services, where economically viable, and the site levelled prior to construction works.

Neighbouring industries include Incitec Pivot to the south, OneSteel to the west, OMYA to the north and the Geelong Port operations to the east.

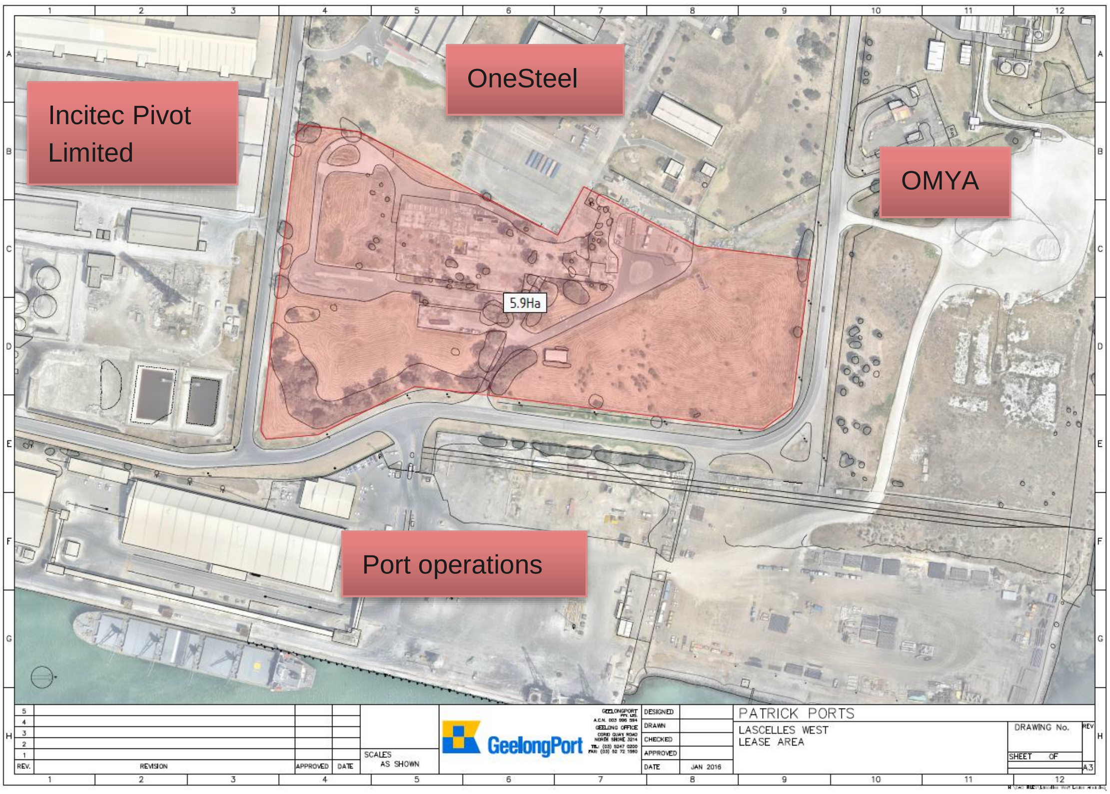

Figure 1.1: *Site location (red polygon) for the proposed clinker grinding facility*

The locations of the nearest sensitive residential receptors are shown in Figure 1.3. The distance to the closest sensitive receptor is just over 500 m from the southern boundary.

Pacific Environment visited the site several times as part of site visits and installation and calibrations for the dust monitoring. A photo of the site location looking north from Walchs Road is provided in Figure 1.2.

Figure 1.2: *Site location looking north from Walchs Road*

Figure 1.3: *Sensitive receptor locations*

1.6 Description of Facility

A site layout and 3D model of the clinker grinding facility are presented in Figure 1.4 and Figure 1.5. Detailed descriptions of the facility manufacturing process and materials handling processes are provided in Section 3.

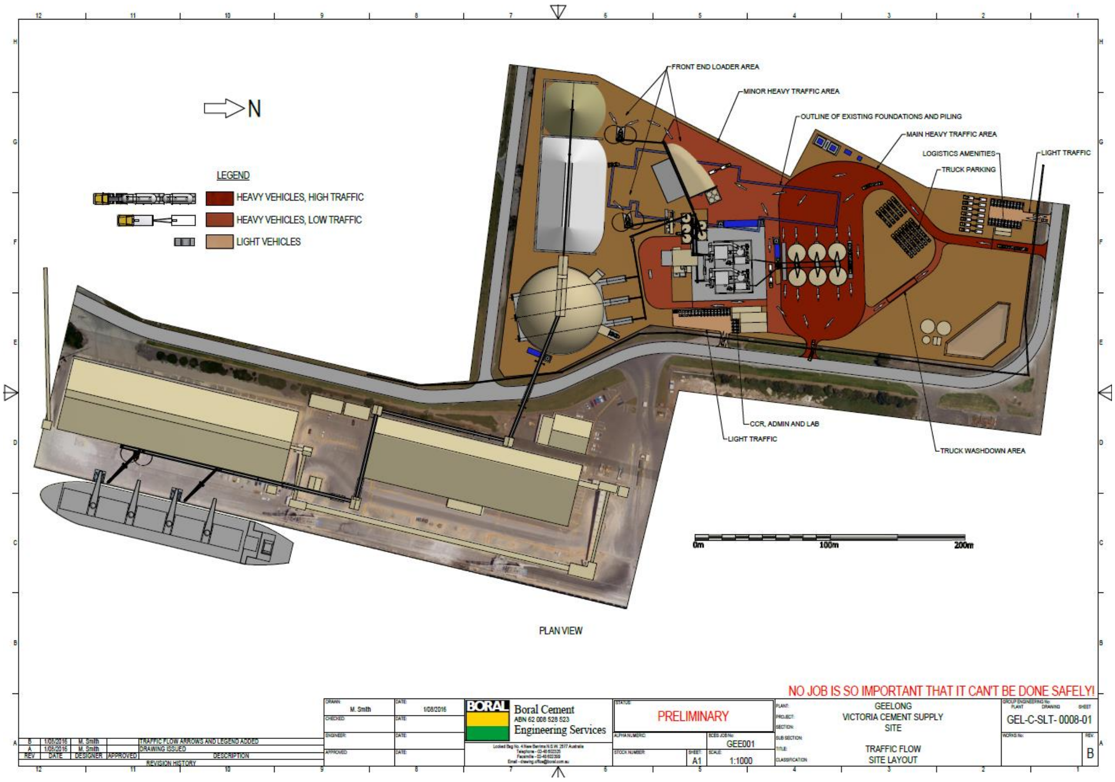

Figure 1.4: *Facility site layout also showing site traffic flows and directions*

Figure 1.5: *3D model of the proposed clinker grinding facility and site layout*

2 Assessment Methodology

The assessment methodology for the dispersion modelling and evaluation of impacts is described below.

2.1 Dispersion Modelling Methodology

2.1.1 Selection of Dispersion Model

Considering the site location at the water front at Lascelles Wharf in Port of Geelong and the nature of the emissions from the proposed facility, an application to use CALPUFF was lodged with the EPA.

CALPUFF is a suitable dispersion model considering the near coastal location of the proposed clinker grinding facility. CALPUFF overcomes many of the limitations of simpler models such as AUSPLUME and AERMOD. In particular, CALPUFF is better suited to consider land-sea interactions and to do cumulative impact modelling as it is not a steady state model.

The EPA responded that they approve the use of CALPUFF for this study. See attached letter in Appendix C.

An overview of the dispersion modelling methodology is presented in Figure 2.1.

2.1.2 Processing of Meteorological Data

The meteorological data for the dispersion modelling was processed using a two stepped process with CALMET using surface and upper air observation data. TAPM data was used to infill of upper air and cloud data gaps.

2.1.2.1 TAPM

The Air Pollution Model, or TAPM (version 4), is a three dimensional meteorological and air pollution model developed by the CSIRO Division of Atmospheric Research. Detailed description of the TAPM model is provided in the TAPM user manual (Hurley P, 2008a). The Technical Paper on TAPM (Hurley P, 2008b) describes technical details of the model equations, parameterisations, and numerical methods. A summary of some verification studies using TAPM is also available (Hurley P, 2008c).

2.1.2.2 CALMET

CALMET is the meteorological pre-processor to CALPUFF and includes a wind field generator containing objective analysis and parameterised treatments of slope flows, terrain effects and terrain blocking effects. The pre-processor uses the meteorological inputs in combination with land use and geophysical information for the modelling domain to predict a gridded three dimensional meteorological field (containing hourly data on wind components, air temperature, relative humidity, mixing height, and other micro meteorological variables) for the domain used in the CALPUFF dispersion model.

Meteorological data from four Bureau of Meteorology weather stations were included in the CALMET meteorological modelling. Data from these stations were reviewed to identify a representative year for assessment. Based on statistical analysis and observations of wind data and temperature trends it was concluded that 2014 was the most recent representative year also providing good data availability for the modelling domain.

Using observational data for the processing of the meteorological data for the dispersion modelling is a preferred approach when good quality data can be obtained. An alternative approach is to rely on simulated data (such as TAPM generated data processed from large scale synoptic data) which does not always reflect fine-scale local effects and wind speed behaviour (for low and high wind speeds) adequately.

The two step approach in CALMET with an outer and inner domain as shown in Figure 2.2 was selected for the meteorological modelling to best create representative meteorological data for the dispersion modelling. This approach is useful when there is no observation data in the vicinity of the assessment domain. The distance to the nearest observational weather station from the site is approximately 9 km.

For the first step, observational data for a larger domain of 40 km north-south by 40 km west-east (modelling area) was processed including observational data from four Bureau of Meteorology weather stations. This first step ensures best development of larger scale winds for the area and was processed with a grid point spacing of 0.5 km.

For the second step the coarse wind field (produced in the first step) was further processed for a smaller 10 km north-south by 10 km west-east fine scale domain down to a 100 m grid point resolution. This second step ensures best development of the wind field to fine scale topography, land use and other factors near the site such as land-sea interactions. This second step produces the meteorological data for the dispersion modelling with CALPUFF.

1 minute data was sourced and processed to hourly averages for the four surface stations:

- Sheoaks
- Avalon Airport
- Point Wilson
- Geelong Racecourse

Upper air and cloud data for was sourced from Avalon Airport with TAPM data used for data gap infill. No weather data could be obtained from Geelong Port to include in the assessment.

High resolution land use data was used in the processing of the meteorological data. The outer domain terrain elevations are presented in Figure 2.3.

The meteorological data used in the assessment is evaluated in Appendix B.

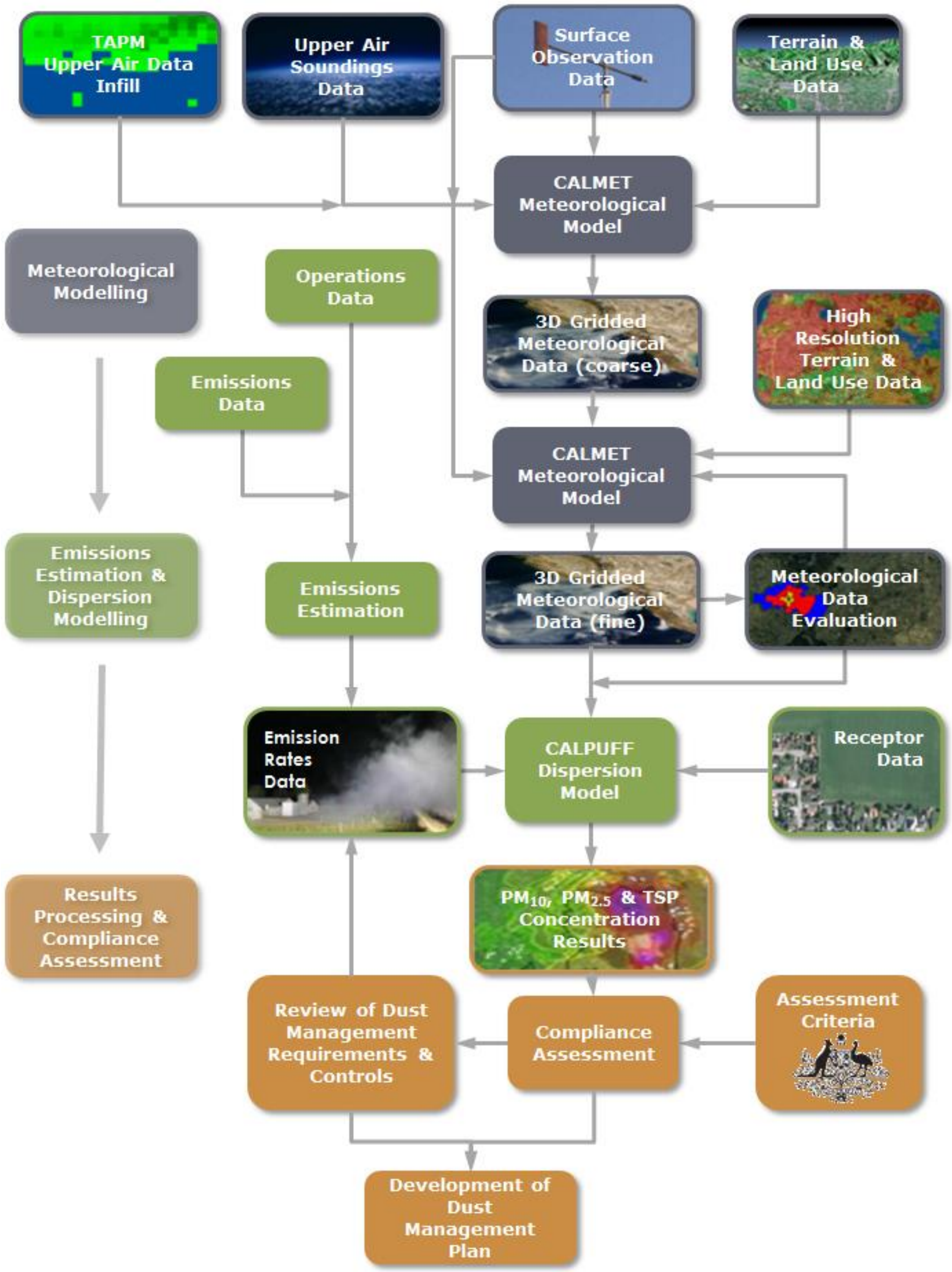

Figure 2.1: *Overview of the dispersion modelling assessment methodology*

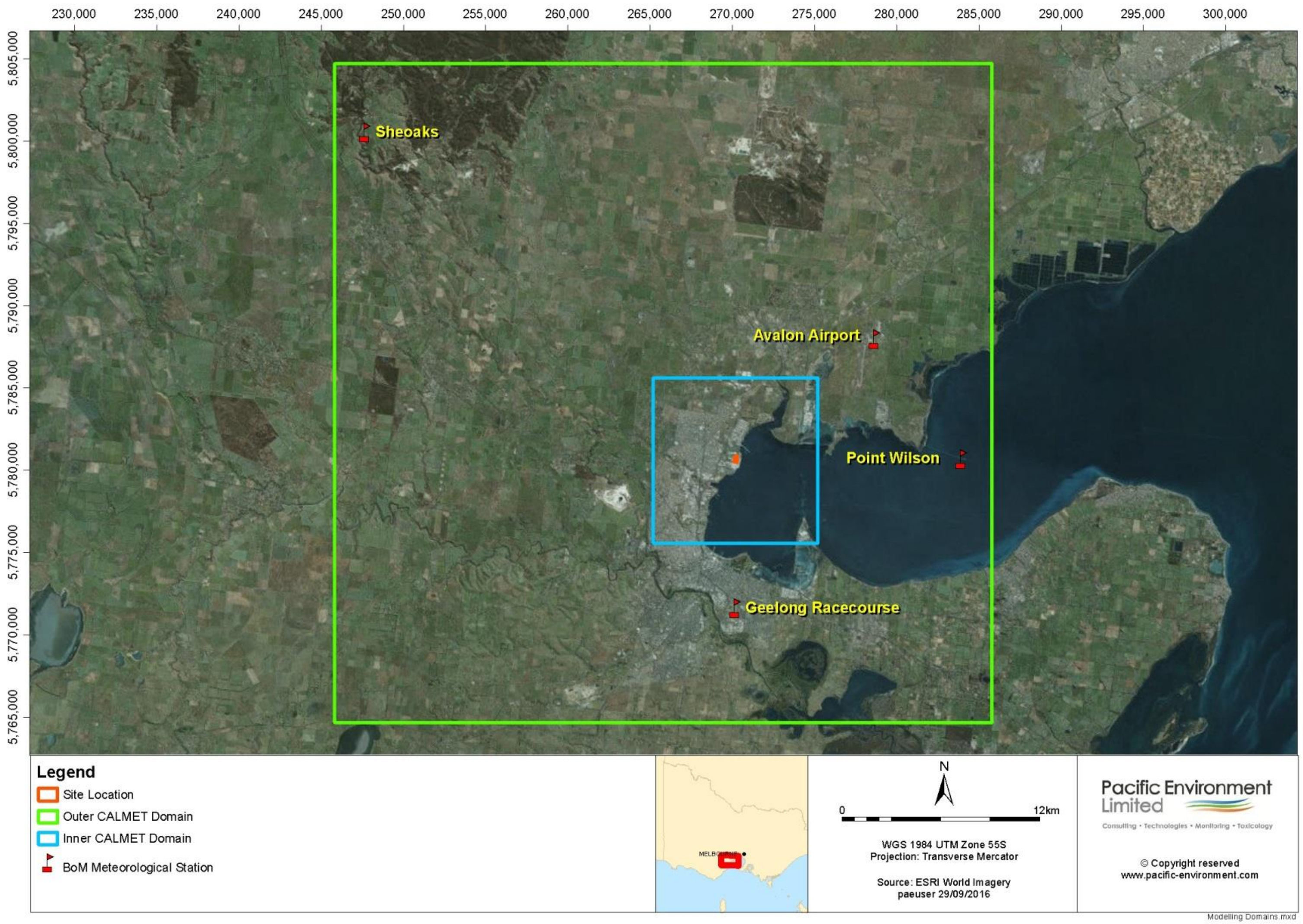

Figure 2.2: *CALMET meteorological modelling domains (outer and inner) and BoM weather station locations used in the assessment*

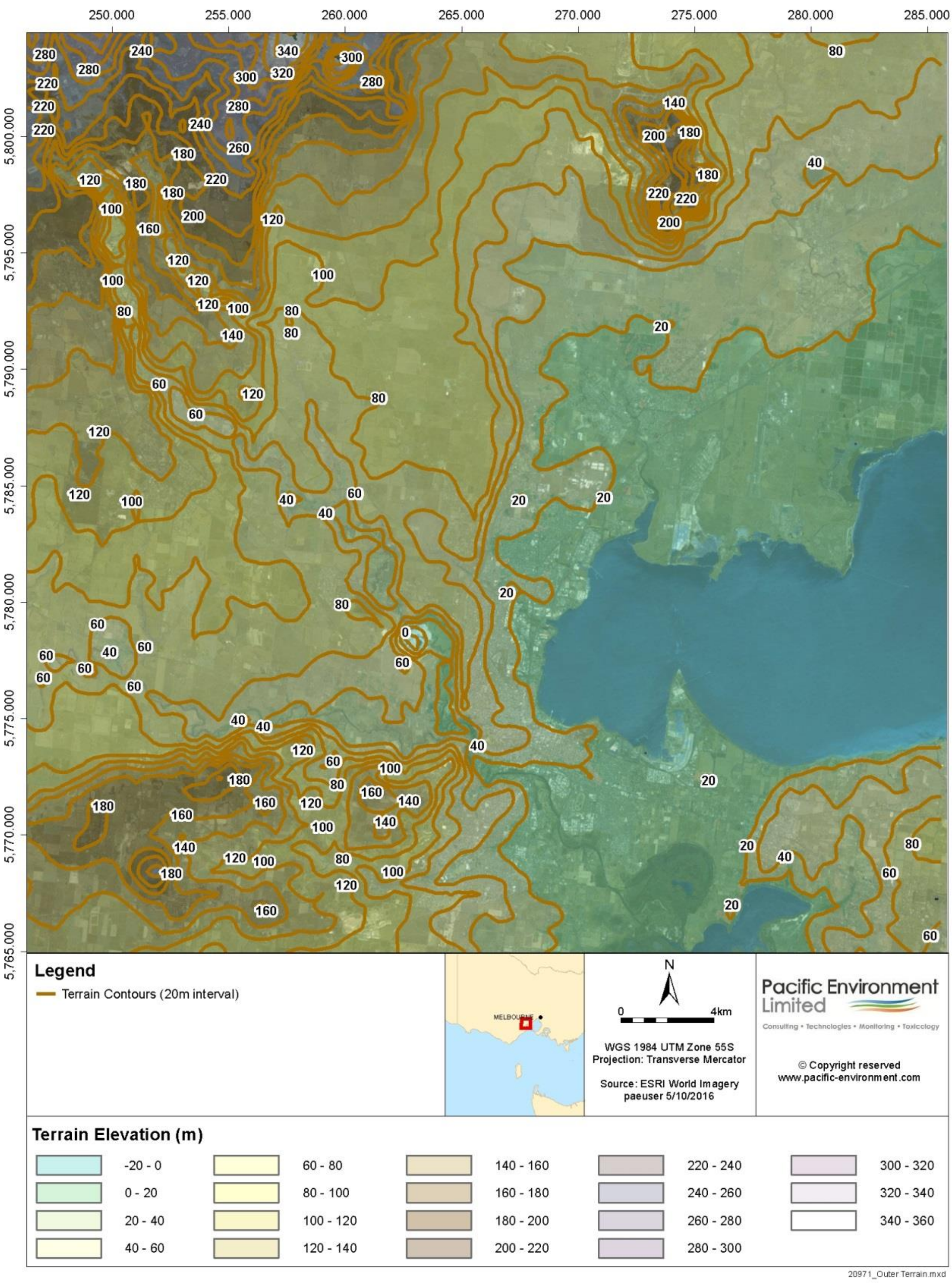

Figure 2.3: *Outer CALMET domain terrain elevations*

2.1.3 CALPUFF Dispersion Modelling

The dispersion modelling was performed with CALPUFF, which is a suitable dispersion model considering the near coastal location of the proposed clinker grinding facility. CALPUFF overcomes many of the limitations of simpler models such as AUSPLUME and AERMOD. In particular, CALPUFF is better suited to consider land-sea interactions and to do cumulative impact modelling as it is not a steady state model.

CALPUFF (Exponent, 2011) is a multi layer non-steady state puff dispersion model that can simulate the effects of time and space varying meteorological conditions on emissions transport, transformation and removal. The model contains algorithms for near source effects such as building downwash, partial plume penetration, sub-grid scale interactions as well as longer range effects such as pollutant removal, vertical wind shear and coastal interaction effects. The model employs dispersion equations based on a Gaussian distribution of pollutants across released puffs and takes into account the complex arrangement of emissions from point, area, volume and line sources. Detailed description of CALPUFF is provided in the user manual (Exponent, 2011).

The receptor grid for the dispersion modelling was, as for the meteorological modelling, at a grid spacing of 100 m with additional discrete receptors representing the surrounding nearest sensitive residential receptors. Building wakes for stack sources were included.

The dispersion modelling in CALPUFF was set up with individual source specific input files to allow for source apportionment analysis of the dispersion modelling results. This is useful for evaluation of the emissions model and dispersion model as well as for evaluation of required levels of dust control and control measures.

The locations of the nearest sensitive residential receptors included as discrete receptors in the dispersion modelling are shown in Figure 1.3.

CALPUFF input files can be provided on request.

2.2 Emissions Estimation

2.2.1 Particulate Matter Emissions

The emissions estimation of the site activities and for the proposed cerement grinding facility was based on detailed descriptions of proposed operations and material handling rates. A summary of the estimated emissions are provided in Section 4. Full details on the emissions estimation are provided in Appendix A.

The approach to the emissions estimation was to include a high level of detail in the emissions data with preparation of variable emissions files considering daily activity profiles and ship unloading frequencies in combination with conservative selections of emission estimation parameters and material handling rates. Emissions estimation factors and parameters were carefully selected based on observations made at a site visit of the current Boral operations at Waurn Ponds and supplemented with conservative assumptions. Emissions estimation factors and material parameter data were sourced from standard emissions estimation sources and industry specific sources.

24/7 continuous operations were assumed with variations in the site activities based on daily operations profiles of trucking and process loading activities. Emissions from ship unloading were estimated based the anticipated frequency of ship arrivals (based on ship capacity and annual required raw material quantities). The emissions around each ship unloading event were based on assumptions of maximum unloading rates for the duration of each unloading event[2]. Normally the unloading rate declines as the unloading progresses. With the assumption of maintained maximum unloading rates, conservativism is added to the assessments emissions and to both the resulting peak and annual average ground level concentrations.

The year for assessment for the meteorological and background data was 2014, however, to include assessment on a worst case basis, the assessed facility production was based on the planned production rate for FY 2040. FY 2040 is estimated to have an annual production rate of 1.3 Mtpa of cement products. The expected initial capacity of the plant is 950 Ktpa.

2.2.2 Greenhouse Gas Emissions

The methodology described in the *National Greenhouse Accounts (NGA) Factors* (Department of the Environment and Energy, 2016) is typically used to estimate greenhouse gas emissions for greenhouse gas assessments. Although the *NGA Factors* draw on methods outlined in the *National Greenhouse and Energy Reporting (NGER) Measurement Determination* (Commonwealth of Australia, 2016), they are intended to apply to a broader range of greenhouse gas assessments.

The greenhouse gas emissions associated with this project are methane (CH_4), nitrous oxide (N_2O) and carbon dioxide (CO_2). The emissions of these greenhouse gases are all expressed as carbon dioxide equivalents (CO_2-e).

[2] The estimation of emissions for the ship unloading included estimation of emissions from the materials handling for the new proposed conveyer system. The emissions estimation from the ship unloading to the first hopper was excluded since this is an existing activity for the Boral clinker grinding operations with trucking of clinker to the Waurn Ponds site.

For this assessment, Scope 1 and Scope 2 emissions were estimated as presented in Section 4 and are defined as follows:

- **Scope 1** - Direct greenhouse gas emissions that occur from sources owned or controlled by the reporting entity.
- **Scope 2** - Indirect greenhouse gas emissions from the generation of purchased energy products by the entity.

Scope 3 emissions (other indirect emissions) are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. Some examples of Scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels, and use of sold products and services. Scope 3 emissions tend to be optional for reporting purposes, particularly when compiling national inventories. If an organisation believes that Scope 3 emissions are a significant component of the total emissions inventory, these can be reported along with Scope 1 and Scope 2 emissions. It is however noted that reporting Scope 3 emissions can result in double counting of emissions and can also make comparisons between organisations and/or products difficult (because reporting is voluntary).

Annual greenhouse emissions for this assessment were estimated for financial year 2020 (FY2020), which represent emissions when the facility is planned to become operational, and for financial year (FY2040), which represent the worst-case emissions for this project; i.e. when the cement production is expected to be at its peak (1.3 Mtpa). These estimated emissions are presented in Section 4.

A summary of the greenhouse emission sources identified with this project are provided in Table 2.1. Further details on the emission estimation methods and emission factors used in this assessment are provided in Appendix A.

Table 2.1: *Summary of identified greenhouse gas emission sources*

Emission Source	Description	Emissions [a]	Scope
Natural gas combustion	Emissions associated with the combustion of natural gas in the dryer	CO_2, CH_4, N_2O	Scope 1
Diesel combustion	Emissions associated with the combustion of diesel in the mobile equipment (e.g. front-end loaders)	CO_2, CH_4, N_2O	Scope 1
Electricity consumption	Electricity purchased from the main grid	CO_2, CH_4, N_2O	Scope 2

2.3 Background Air Quality

Background air quality data is required for a cumulative assessment and is considered together with the dispersion modelling results for evaluation of compliance with the air quality assessment criteria (presented in Section 2.4).

PM_{10} and some $PM_{2.5}$ air quality data was provided by the EPA for the EPA Geelong South air quality monitoring station which is located approximately 9 km south of the Lascelles Wharf proposed clinker grinding facility, as shown in Figure 2.4. Longer term data from a closer location was not possible to obtain and it is understood that Port of Geelong has no relevant air quality monitoring data that could have been evaluated for the assessment.

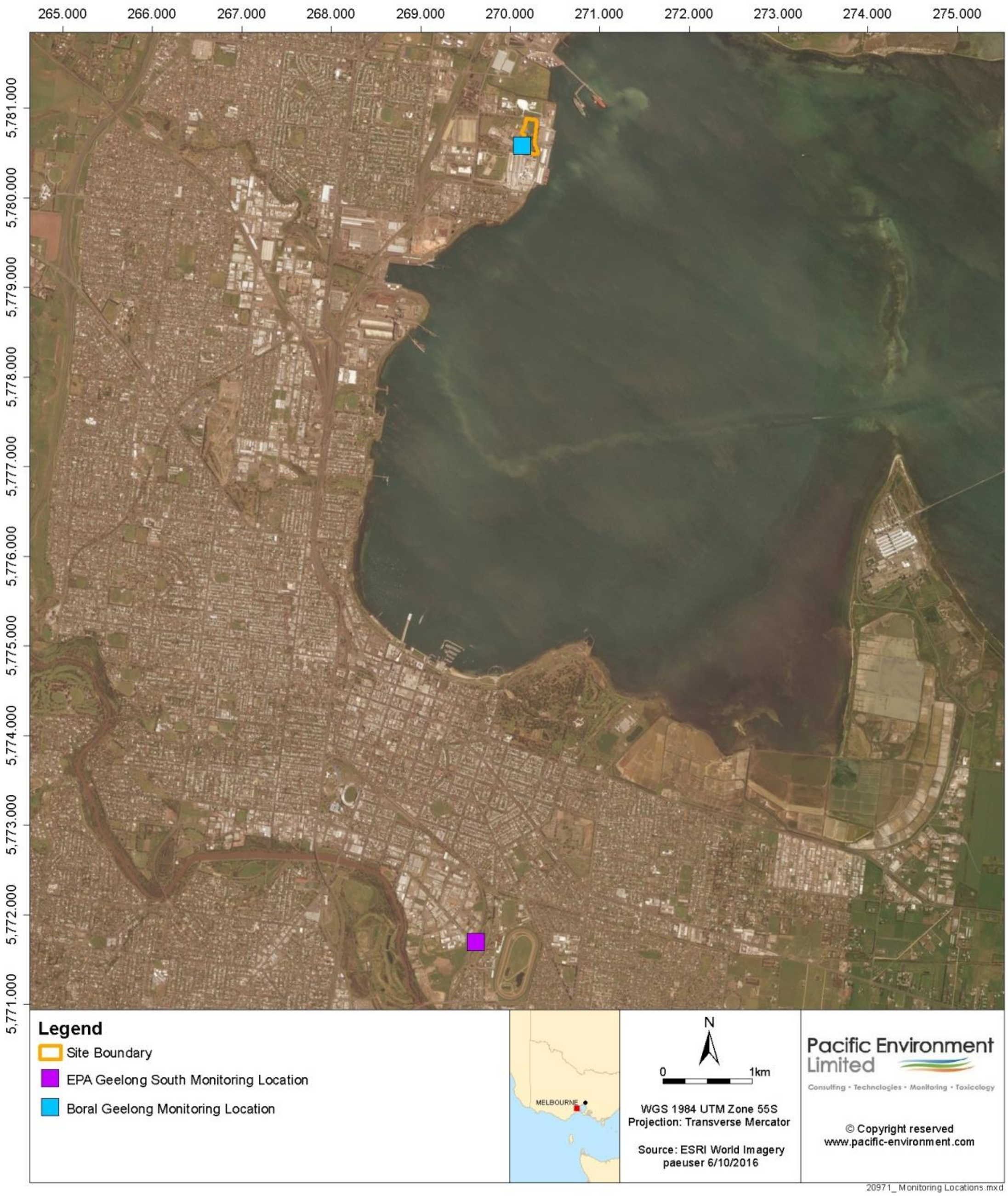

Figure 2.4: *PM_{10} monitoring locations*

To collect site specific data a four month monitoring campaign was commissioned by Boral. However, due to project timing only three and a half months of data from the monitoring campaign was available at the time of preparation of this report. Considering this short duration, the EPA Geelong South PM_{10} and $PM_{2.5}$ data was used in the assessment to determine cumulative impacts, and the site specific monitoring data was used for a general evaluation of the background PM_{10} concentrations at site.

From the analysis described below it was concluded that that the EPA Geelong South background concentration data can be considered to conservatively represent the site location at Lascelles Wharf

2.3.1 EPA Geelong South PM_{10} and $PM_{2.5}$ Data

The PM_{10} air quality data provided by EPA is summarised in Table 2.2. As can be seen the annual average and 70th percentile daily average concentration values for 2014 are close to the averages for the duration of the period data is available.

Table 2.2: *Geelong South EPA PM_{10} monitoring data annual statistics summary*

Year	Data Availability	Number of Exceedances	24 hour average Maximum (µg/m³)	Annual Average (µg/m³)	24 hour average 70th Percentile (µg/m³)
2003	98%	10	149	20.9	22.6
2004	93%	10	149	20.4	22.7
2005	96%	5	83	20.1	22.6
2006	94%	18	116	22.2	23.7
2007	100%	14	129	20.8	23.4
2008	100%	6	169	20.6	23.5
2009	87%	8	155	21.4	23.7
2010	100%	1	50	16.9	19.4
2011	99%	1	50	17.8	20.3
2012	98%	1	54	17.5	20.9
2013	100%	8	108	18.5	22.1
2014	**100%**	**9**	**76**	**19.1**	**21.8**
2015	79%	10	286	20.0	21.5
			Average	19.7	22.2

Only six months of $PM_{2.5}$ data for Geelong South was provided together with the PM_{10} data. The provided data is described in Table 2.3. The six month period is not sufficient for establishing annual average and annual one hour average 70th percentile values for use as background concentrations. Instead the average ratio of the daily $PM_{2.5}$ and PM_{10} concentrations for the period for the EPA Geelong South data was calculated and multiplied with the PM_{10} annual average and 70th percentile. The $PM_{2.5}/PM_{10}$ ratio was calculated to 0.37 which compares reasonably to data at other locations in urban settings.

Table 2.3: *Geelong South EPA $PM_{2.5}$ monitoring data statistics summary*

$PM_{2.5}$ data period	Number of Exceedances	Maximum (µg/m³)	Period Average (µg/m³)	70th Percentile (µg/m³)
5 Oct 2015 to 4 April 2016	1	26	7.0	8.3

2.3.2 Dust Monitoring at Lascelles Wharf

A four month dust monitoring campaign was included as part of the study[3]. The installed dust monitor was an E-BAM which is a Beta Attenuation Monitor. The dust monitoring was performed in line with AS/NZS 3580.9.11:2016 for PM_{10} beta attenuation monitors.

Table 2.4 shows a summary of the PM_{10} data statistics for the on-site monitoring along with the EPA monitoring data statistic for the corresponding months for each year. The on-site data shows lower maximum, period average and daily average 70th percentile values than the EPA data for 2003 to 2015. This comparison, while based on a limited amount of data, seems to indicate that the PM_{10} air quality conditions at the proposed site location would be better (i.e. lower concentrations) than at Geelong South.

The PM_{10} pollution rose in Figure 2.5 shows that the prevailing wind direction for the duration of the monitoring (that could be included in this report) is westerly and that the highest concentrations are predominantly from the south-southeast (in the direction from the Incitec Pivot site and the Port operations).

Table 2.4: *Comparison of Geelong South EPA PM_{10} monitoring data with Lascelles Wharf PM_{10} monitoring data for the same annual period 2 August to 15 November*

Year	Number of Exceedances	Maximum (µg/m³)	Period Average (µg/m³)	70th Percentile (µg/m³)
2003	1	72	17.4	18.0
2004	1	64	16.7	19.0
2005	1	54	17.4	20.1
2006	4	106	22.4	25.3
2007	5	97	18.9	20.6
2008	2	65	20.1	23.8
2009	0	46	21.4	25.4
2010	0	44	14.8	16.5
2011	0	45	18.6	21.8
2012	1	54	18.2	21.6
2013	1	57	15.1	16.8
2014	2	65	20.4	23.6
2015	4	286	23.3	22.1
Average 2003 to 2015 2 August to 15 November	-	81	18.8	21.1
Lascelles Wharf 2016 2 August to 15 November	0	49.7	16.1	18.5

[3] The monitor was installed on 2 August 2016 and at the time of preparing this report three and a half months of data were available.

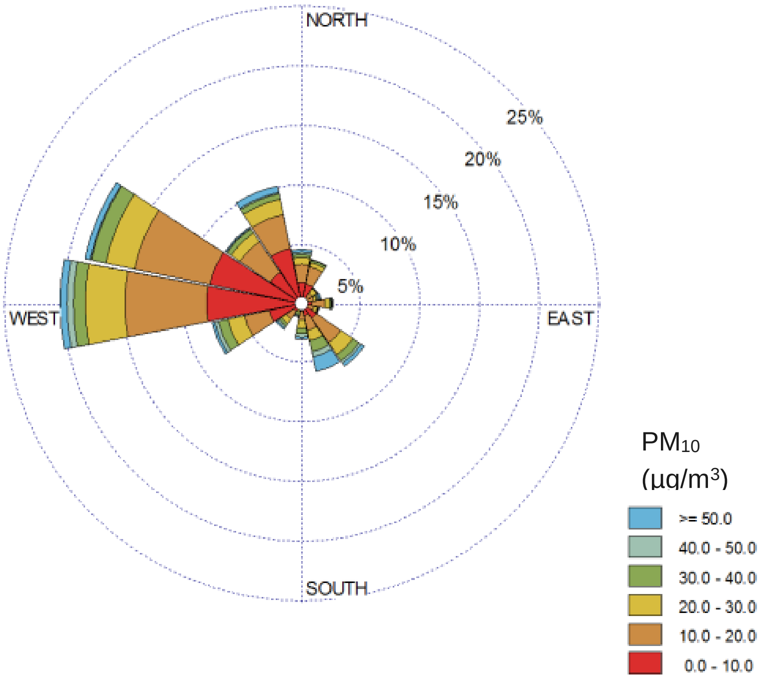

Figure 2.5: *PM_{10} pollution rose Lascelles Wharf 2 Aug to 15 Nov 2016 (from hourly PM_{10} data)*

A photo showing the E-BAM installation at the Lascelles Wharf site location in a cage trailer is shown in Figure 2.6.

Figure 2.6: *Dust monitoring installation at site at Lascelles Wharf (looking SW with IPL and the wharf in the background)*

2.3.3 Background Concentrations Applied in the Assessment

The background concentrations applied in the assessment are summarised in Table 2.5.

Table 2.5: *Air quality impact assessment criteria: design criteria and air quality standards*

Substance	Averaging time	Background concentration	Statistic	Reference
PM_{10}	1 hour	21.5 µg/m^3	70th percentile	EPA Geelong South 2014 data
	24 hour	21.8 µg/m^3	70th percentile	
	1 year	19.1 µg/m^3	Annual average	
$PM_{2.5}$	1 hour	8.0 µg/m^3	70th percentile	Calculated from EPA Geelong South 2014 data with $PM_{2.5}$/PM_{10} ratio of 0.37
	24 hour	8.1 µg/m^3	70th percentile	
	1 year	7.1 µg/m^3	Annual average	

Note: The 24 hour average 70th percentile had a higher concentration than the one hour 70th percentile concentration. It is noted that typically the situations is reversed, however on occasion the above situation occurs.

As noted the ship unloading operations from the ship to the first hopper were not included in the assessment by representation of emission sources in the dispersion modelling since the ship unloading operations are managed by Port of Geelong. However, the ship unloading operations are considered captured in the background data applied in the study since the applied background concentrations at Geelong South can be considered conservative compared to the conditions at the site at Lascelles Wharf.

2.4 Assessment of Air Quality Impacts

In Victoria the results from air quality dispersion modelling in air quality impact assessments are assessed against design and assessment criteria specified in a number of documents.

The main document is the State Environment Protection Policy (Air Quality Management) (SEPP AQM) (Victoria Government Gazette, 2001) which contains design criteria concentrations for pollutants. For particulate matter relevant for dust impacts (PM_{10}, $PM_{2.5}$ and TSP) the SEPP AQM only includes design criteria which apply to point (stack) sources.

Dust impacts from area and fugitive sources are assessed against industry specific protocols for environmental management (PEM). However, there is only one PEM, the PEM for mining and extractive industries (EPA Victoria, 2007), that contains assessment criteria for assessment of fugitive and area dust sources. It is noted that this PEM formally only applies to extractive industries, which is not the classification of the assessment site. However, on request from the EPA the PEM criteria were included in the assessment.

There is also the National Environment Protection Measure for Ambient Air Quality (NEPM AAQ) (Department of Environment, 2016) which contains Australian air quality standards for PM_{10} and $PM_{2.5}$. These air quality standards are also included in the State Environment Protection Policy (Ambient Air Quality) (Victoria Governement Gazette, 1999) as environmental quality objectives as updated in a variation (Victoria Government Gazette, 2016).

A summary of the assessment criteria is provided in Table 2.6.

Table 2.6: *Air quality impact assessment criteria: design criteria and air quality standards*

Substance	Averaging time	Design criteria/ Air quality standard	Percentile	Reference
PM_{10}[1,2]	1 hour	80 µg/m^3	99.9th	SEPP AQM
$PM_{2.5}$[1,2]	1 hour	50 µg/m^3	99.9th	SEPP AQM
TSP [1,3]	3 minute	330 µg/m^3	99.9th	SEPP AQM
PM_{10}	24 hour	60 µg/m^3	Maximum	PEM extractive industries
$PM_{2.5}$	24 hour	36 µg/m^3	Maximum	PEM extractive industries
PM_{10}	24 hour	50 µg/m^3	Maximum	NEPM AAQ/SEPP AAQ
PM_{10}	1 year	25 µg/m^3	Annual average	NEPM AAQ
PM_{10}	1 year	20 µg/m^3	Annual average	SEPP AAQ
$PM_{2.5}$	24 hour	25 µg/m^3	Maximum	NEPM AAQ/SEPP AAQ
$PM_{2.5}$	1 Year	8 µg/m^3	Annual average	NEPM AAQ/SEPP AAQ

[1] Applies to point sources only. For area-based sources and roads, applicable criteria are specified in the relevant industry PEM.

[2] Reason for classification: Toxicity

[3] Reason for classification: Amenity (nuisance)

In relation to air quality impacts and required separation distances between industries and sensitive receptors, the EPA provides recommended separation distances (EPA Victoria, 2013). The separation distance for cement/clinker grinding facilities is presented in Table 2.7.

The distance between the facility southern site boundary and the nearest sensitive receptor (Receptor 9 as shown in Figure 1.3) is approximately 500 m.

Table 2.7: *EPA Recommended separation distance for cement/clinker grinding facilities* (EPA Victoria, 2013)

Industry type	Industry activity	Scale of operations	Recommended separation distance
Cement clinker grinding	Grinding of cement clinker, clays or limestone materials	<150,000 tpa >150,000 tpa	250 m 500 m

2.5 Review of Dust Management Strategies

The results from the dispersion modelling were analysed in order to identify dust control measures across the site required for the operations to demonstrate compliance with the air quality assessment criteria.

The proposed draft dust management plan (DMP) is provided in Appendix D.

3 Facility Description

The facility process description is a summary of the different facility activities relevant for the dust impact assessment. The section is included to provide background information to the site and facility activities relevant for the emissions estimation and the impacts assessment and is sourced from (BORAL, 2016). Process flow diagrams, plant drawings and site layouts are provided in Appendix E.

Descriptions are provided for the following processes:

- Port unloading & raw material transfer to storage
- Raw material storage - clinker store
- Raw material storage - slag storage
- Raw material storage - gypsum storage
- Raw material storage - limestone storage
- Clinker reclaim and transport
- Slag reclaim and transport
- Slag drying
- Gypsum and limestone reclaim and transport
- Clinker dosing bin and feed
- Slag dosing bin and feed
- Gypsum dosing bin and feed
- Limestone dosing bin and feed
- Cement/clinker grinding
- Finished product storage and dispatch

3.1 Port Unloading & Raw Material Transfer to Storage

The ship unloading and transfer of the material to the clinker grinding facility site boundary is managed by Port of Geelong. The ship unloading operations of clinker is an existing activity since the clinker for the Waurm Ponds facility is imported via Lascelles Wharf. For the assessment the new dust sources such as the conveyer transfer point dust sources were included in the assessment. The ship unloading was excluded as dust sources in the modelling since this is an existing activity and managed by Port of Geelong. Dust impacts from the ship unloading were considered included in the applied background concentrations.

The unloading of materials at Geelong Port necessitates that the berth be available for other ships to unload cargo unrelated to Boral operations. This requires the reception hoppers and initial conveying equipment to be of a portable type that can be easily mobilised, de-mobilised and stored within the port complex.

The clinker, slag and gypsum will arrive into the port via ship with an estimated nominal capacity of 33 kt or 44 kt for clinker and slag and 30 kt for Gypsum. These materials are to be unloaded with the ships crane into two mobile reception hoppers. These hoppers will be capable of a combined throughput of ~650 tph for clinker, slag and gypsum.

Each hopper will have an intermediate conveyor from the outlet feeding onto a portable transfer conveyor. In turn the portable conveyors will feed onto the fixed system of conveyors which will deliver the raw materials into the site.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from designed transfer points. All conveyors including the portable type will have some form of weather protection to prevent wind-blown fugitive dusts and rain impairment of the materials.

The conveyor system will discharge clinker into the covered clinker storage. Slag and gypsum will be directed via a two-way diverter chute onto a series of tripper conveyors to the respective storage areas.

As a minimum, all transfer points will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will be discharged onto the following conveyor of the series.

3.2 Raw Material Storage - Clinker Store

A covered Clinker Store will be provided for the clinker storage. This store will have a nominal capacity of 85 kt and is proposed to be of concrete construction with a dome profile to minimise physical footprint and maximise live capacity. The store will have a top apex section with a diverter chute for clinker and slag/gypsum feed and a five or six leg chute to distribute the clinker. The diverter chute and clinker distribution chutes will have appropriate isolation arrangements.

The store will have a dust filtration system capable of maintaining a 20 mg/Nm^3 clean air discharge for clinker/air displacement to suit the 650 tph feed rate and the volumetric capacity of the store. Collected clinker dust will be fed back into the clinker transport system.

Entry into the store will be via two doors suitable for front end loader to safely access. The doors shall be manually operated with a mechanical slide arrangement sealed from dust ingress. These doors shall only be opened 1 to 2 times per year unless a shipment of material is missed.

3.3 Raw Material Storage - Slag Storage

Slag will be stored in an open stockpile. Concrete retaining walls on three sides will segregate the material. Water mist spraying or other approved dust suppression system will be required around the slag storage area and the discharge chute. The combined storage capacity of slag and gypsum is a maximum of 75 kt.

3.4 Raw Material Storage - Gypsum Storage

Gypsum will be stored in an open stockpile. Concrete retaining walls on three sides will segregate the material. The combined storage capacity of slag and gypsum is a maximum of 75 kt.

3.5 Raw Material Storage - Limestone Storage

Limestone will be stored in an open stockpile of 3.5 kt capacity. Concrete retaining walls on three sides will segregate the material. Limestone is to be delivered into site via truck on a daily basis.

3.6 Clinker Reclaim and Transport

The Clinker Store will have sufficient outlets to achieve 75% live clinker loading. Clinker discharge will be via clam shell or similar arrangement with rod gates for isolation.

Each outlet shall have a local filtration system attached capable of achieving 20 mg/Nm^3 clean air discharge with collected dust deposited directly onto the local conveyor belt.

Three conveyor belts will be located below the clinker store and will feed material into a fourth belt that will emerge from below to above ground and discharge into a bucket elevator. The elevator will be positioned at ground level and will feed to a further belt conveyor that will transport the clinker into the dosing bin.

The bucket elevator will be designed to suit the temperature and abrasive profile of the material conveyed and will incorporate guarding and safety mechanisms to latest Australian Standards and statutory requirements.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust shall discharge onto the following conveyor of the series.

3.7 Slag Reclaim and Transport

Slag will be collected with a front end loader and fed into the slag dryer reception hopper. The hopper will have sufficient capacity to store 40 t of material.

3.8 Slag Drying

Slag will be dried to the required specification through the dryer system. The dryer will be capable of an output of 100 tph dry slag with an input of raw slag at bulk density 1,400 kg/m^3 with a typical moisture content in the range of 8% to 10% (maximum 12%) moisture content. The dryer will be a natural gas type unit and will have dust collection facilities incorporated capable of 10 mg/Nm^3 clean air discharge and filter media capable of normal operation at the elevated operating temperatures.

The slag dryer will feed dry slag into a screw conveyor or similar approved steel conveying system into a bucket elevator. The elevator will convey material to a height suitable of transfer via a further screw conveyor or similar approved steel conveyor. The bucket elevator will be designed to suit the temperature and abrasive profile of the material conveyed and will incorporate guarding and safety mechanisms to latest Australian Standards and statutory requirements.

It is envisaged that the slag will be at a temperature of 100-110 ˚C at the outlet of the dryer.

The fixed conveyor systems will be designed for the temperature and abrasive profile of the conveyed material, prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge and filter media capable of normal operation at the elevated operating temperatures. Collected dust will discharge onto the following conveyor of the series or dosing bin.

3.9 Gypsum and Limestone Reclaim and Transport

Gypsum and Limestone will be collected with a front end loader typically 1 to 2 times a day for 1 to 2 hours and fed into a strategically located reception hopper. The hopper shall have sufficient capacity to 10 t of gypsum and 10 t of limestone without discharge onto the transfer conveyor.

The hopper will feed gypsum or limestone onto a belt conveyor that will transport the material into either the gypsum or limestone dosing bins via a diverter chute.

The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms to latest Australian Standards and statutory requirements.

As a minimum all transfer points shall have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge and filter media capable of normal operation at the elevated operating temperatures. Collected dust shall discharge onto the following conveyor of the series or dosing bin.

3.10 Clinker Dosing Bin and Feed

Clinker will be stored in a single dosing bin of 300 t capacity to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure clinker onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bin or onto the following conveyor of the series.

3.11 Slag Dosing Bin and Feed

Slag will be stored in two dosing bins of 600 t capacity to feed the ball mills within the grinding circuit. The dosing bins will have an automatic feed system at the outlet which will measure slag onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bins or onto the following conveyor of the series.

3.12 Gypsum Dosing Bin and Feed

Gypsum will be stored in a single dosing bin of 120 t capacity to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure gypsum onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms to latest Australian Standards and statutory requirements.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bin or onto the following conveyor of the series.

3.13 Limestone Dosing Bin and Feed

Limestone will be stored in a single dosing bin of 300 t capacity to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure limestone onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from designed transfer points.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bin or onto the following conveyor of the series.

3.14 Cement/Clinker Grinding

The grinding circuit will primarily consist of two ball mills capable of achieving 95-105 tph [4] throughput for GP Cement; the facility will include dynamic, high efficiency separation within a closed circuit.

The circuit will require hot gas generation and a recirculation duct and damper arrangement will be required from the mill outlet back to the inlet to enable the mill outlet temperature to be controlled. An emergency cold air bleed arrangement will be required at the inlet to the main dust collector to provide protection from overheating. The discharge from the main dust collector will be ducted to an exhaust fan which will in turn discharge the gas to the main stack for discharge to the atmosphere. The main dust collector will be capable of maintaining 30 mg/Nm^3 clean air discharge.

Finished product will leave the circuit via a bucket elevator and feed airslides into the finished product silos.

[4] Mill capacity for FY 2040 150 tph.

The bucket elevator will be designed to suit the temperature and abrasive profile of the material conveyed and will incorporate guarding and safety mechanisms to latest Australian Standards and statutory requirements.

Airslides will be designed to convey product efficiently, they will have access walkways as specified and guarding and safety mechanisms to latest Australian Standards and statutory requirements.

Strategically located filters are required to ensure that the circuit operates in a completely dust free manner. As a minimum, transfer points into will have adequate dust collection capable of maintaining 30 mg/Nm^3 clean air discharge.

3.15 Finished Product Storage and Dispatch

It is proposed that six finished product silos will be erected; three silos for GP Cement; two silos allocated to slag and a single silo for HES Cement.

The feed rate into the silos will be designed to 150 tph and they shall have a combined capacity of 20.5 kt of live product; the discharge rate shall be 28 t in 10 minutes per truck. The silos will be of steel construction with inlet and outlet dust collection facilities. The product will be fed from the silo via airslides to a loading spout. Weighbridge facilities will be located below the loading spouts. The silos will include an integral aeration and discharge facility at the outlet. Dust collectors will be installed at the truck loading point.

3.16 Annual Production and Raw Materials

The estimated annual raw material handling quantities for the facility production rate as assessed for FY 2040 at 1.3 Mtpa of produced cement products are presented in Table 3.1.

Table 3.1: *Annual raw material handling rates 2020 and 2040 as assessed*

Raw material	GP Cement product ratio	HES Cement product ratio	Slag product ratio	Annual material handling rate 2020	Annual material handling rate 2040
Clinker	87.5%	90%	-	678,000 t	922,000 t
Raw slag	-	-	95%	146,000 t	198,000 t
Limestone	7,5%	5%	-	79,000 t	108,000 t
Gypsum	5%	5%	5%	47,000 t	64,000 t

4 Emissions Data

4.1 Particulate Matter

The estimated clinker grinding facility dust emissions for all sources as presented in Figure 4.1 are summarised in Table 4.1. Full details on the emissions estimation are provided in Appendix A.

A summary of the dust emission percentages of total site emissions is provided Table 4.2.

Table 4.1: *Summary clinker grinding facility dust emissions*

	PM_{10} Emissions (kg/year)	$PM_{2.5}$ Emissions (kg/year)	Total Particulate Emissions [1] (kg/year)
Materials Handling & Transfer Points	12,858	4,065	-
Product Truck Loading	5,022	1,507	-
Stack Sources	83,738	46,047	117,234
Wind Erosion	8,350	835	-
Wheel Generated Dust (Paved roads)	16,424	3,948	-
TOTAL Emissions	**126,391**	**56,401**	**117,234**

[1] TSP emissions only assessed for point sources

Table 4.2: *Source contribution of total dust emissions*

	PM_{10} Emissions	$PM_{2.5}$ Emissions	Total Particulate Emissions [1]
Materials Handling & Transfer Points	10%	7%	-
Product Truck Loading	4%	3%	-
Stack Sources	66%	82%	100%
Wind Erosion	7%	1%	-
Wheel Generated Dust (Paved roads)	13%	7%	-

[1] TSP emissions only assessed for point sources

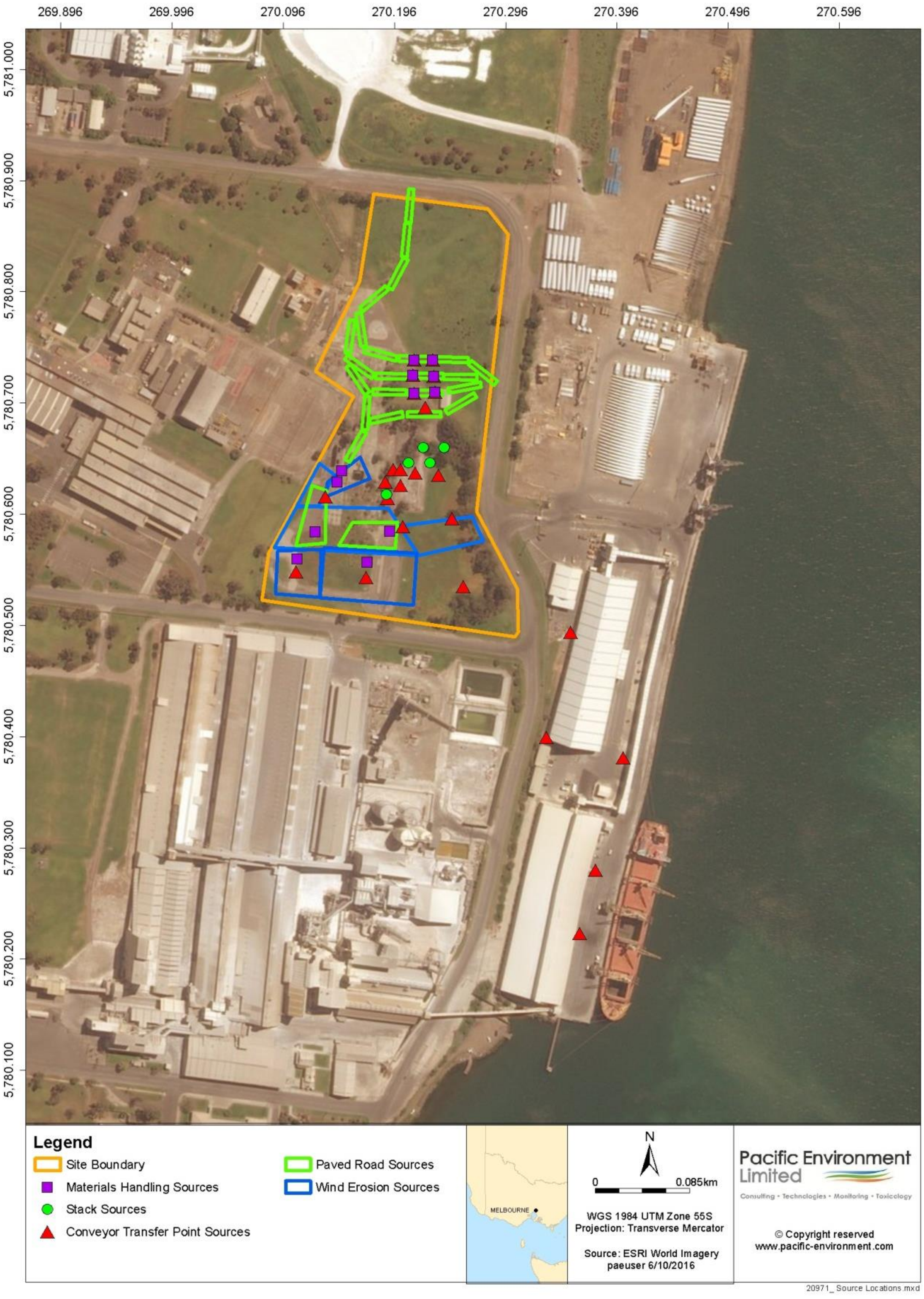

Figure 4.1: *Clinker grinding facility source locations*

4.2 Greenhouse Gases

The projected annual greenhouse gas emissions for FY2020 (i.e. when the facility is planned to become operational) and FY2040 (i.e. anticipated peak in cement production) are presented in Table 4.3 and are also shown in a graphical format in Figure 4.2.

Table 4.3 and Figure 4.2 show that the majority of the greenhouse emissions associated with this project are anticipated to be from the consumption of purchased electricity from the grid. Projected emissions are estimated to be approximately 53% higher in FY2040 than in FY2020 based on the projected data provided by Boral, due to an anticipated increase of 37% in cement production by FY2040. The emission intensity (expressed as t CO_2-e/t cement produced) is therefore anticipated to be higher for FY2040, as shown in Table 4.3.

It is noted that Scope 2 emissions were estimated based on the current methodology provided in the *NGA Factors*, which has shown that historically, the Scope 2 emission factors have decreased over time; e.g. from 1.24 kg CO_2-e/kWh for FY1990 to 1.09 kg CO_2-e/kWh for FY2016 in accordance with Table 41 of the *NGA Factors* (Department of the Environment and Energy, 2016). This trend is due to a shift to cleaner sources of energy used to generate electricity over time; e.g. via gas combustion and wind generation rather than coal combustion. As such, it is anticipated that Scope 2 emission factors will continue to decrease in the future; however, projected factors are not currently available from reliable published sources.

Table 4.3: *Summary of projected greenhouse gas emissions associated with the project*

Emission Source	Emissions (tonnes CO2-e/yr)	
	FY2020	FY2040
Scope 1 - Natural gas combustion in the dryer	3,619	4,908
Scope 1 - Diesel combustion in mobile equipment (e.g. FELs)	171	205
Scope 2 - Electricity consumption from the grid	8,271	13,356
Total Scope 1 emissions	**3,789**	**5,112**
Total Scope 2 emissions	**8,271**	**13,356**
Total Scope 1 and Scope 2 emissions	**12,060**	**18,468**
Cement production (tonnes/year)	950,000	1,300,000
Emission intensity (t CO_2-e/t cement produced)	0.0127	0.0142

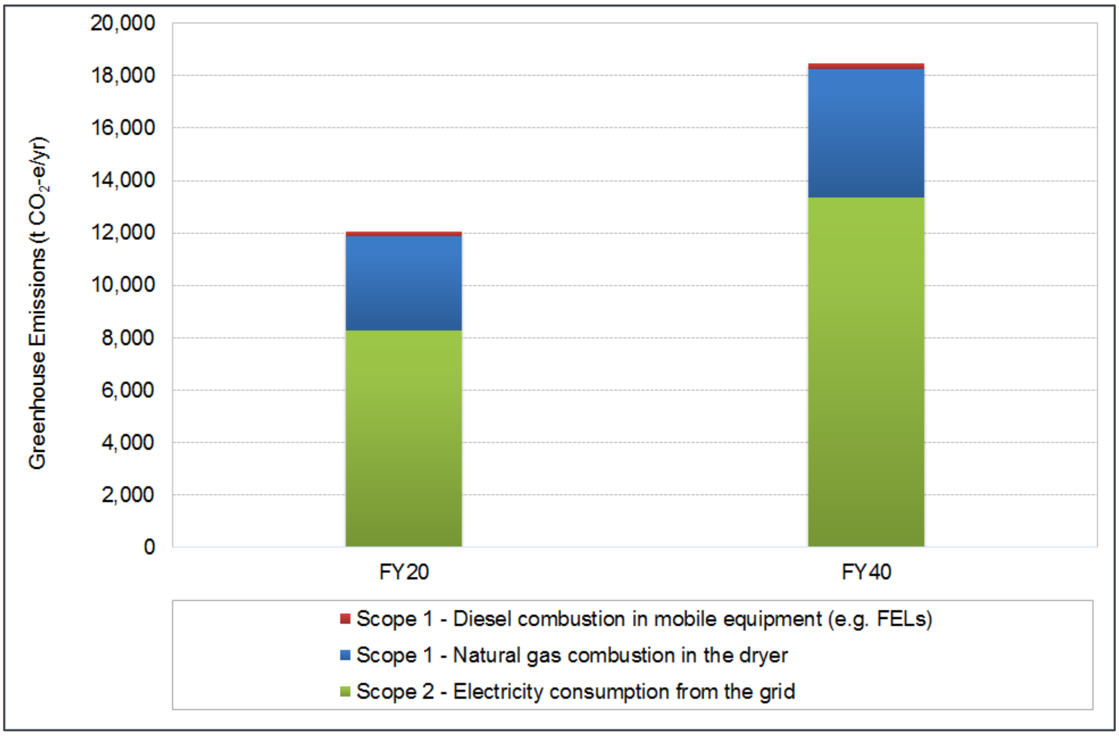

Figure 4.2: *Projected greenhouse emissions for FY2020 versus FY2040*

A comparison of the project's greenhouse gas emissions to published greenhouse gas emissions inventories for Scope 1 and Scope 2 emissions is provided in Table 4.4. The maximum projected greenhouse gas emissions associated with the project for FY2040 correspond to approximately 0.015% of Victoria's total emissions inventory for 2014, as published by the Department of the Environment and Energy (Department of the Environment and Energy, 2016c).

Table 4.4: *Comparison of the project's Scope 1 and Scope 2 greenhouse gas emissions to published greenhouse inventories*

Geographic Coverage	Description	Period	Emissions (Mt CO2-e) [a]
Australia [b]	All sectors including Land Use, Land Use Change and Forestry (LULUCF) activities	2015	535.7
	Industrial processes and product use	2015	33.7
Victoria [c]	All sectors including Land Use, Land Use Change and Forestry (LULUCF) activities	2014	118.97
Victoria	**Project**	**FY2020**	**0.012**
		FY2040 (worst-case)	**0.018**

a. Mt CO_2-e = Mega tonnes CO_2-e = 1,000,000 tonnes CO_2-e.
b. Table 2 (Department of the Environment, 2015).
c. (Department of the Environment and Energy, 2016c). The State and Territory Greenhouse Gas Inventory available in this database has been updated since the May 2016 publication of the State and Territory Greenhouse Gas Inventories 2014. This database supersedes the data in that publication.

The project's greenhouse gas emissions were also compared to published greenhouse emissions for a number of cement manufacturers operating in Australia that were required to report their greenhouse gas emissions under the NGER scheme for FY2015 (Clean Energy Regulators, 2016), as presented in Table 4.5. It is noted that Table 4.5 does not show data for all cement manufacturers in Australia as the data are published by controlling corporation and not by ANZSIC code and as such, it is not always possible to identify the controlling corporations that are associated with cement manufacturing.

The maximum projected greenhouse gas emissions associated with the project for FY2040 are anticipated to be lower than the emissions associated with the three selected controlling corporations shown in Table 4.5, representing 0.65% to 28.82% of the total Scope 1 and Scope 2 emissions for each controlling corporation. It is however noted that the emissions reported for NGER for these three controlling corporations may not be solely associated with cement manufacturing activities and may be associated with multiple facilities under the operational control of the same controlling corporation. Unfortunately, the published NGER data are very high level and no breakdown is available other than the split between Scope 1 and Scope 2 emissions. As such, this comparison should only be used as an indicator.

Table 4.5: *Comparison of the project's greenhouse gas emission intensities to published emissions for the cement industry in Australia for FY2015*

Controlling Corporation	Greenhouse Emissions (tonnes CO2-e/yr)		
	Scope 1	Scope 2	Total
BGC (Australia) Pty Ltd [a]	125,823	84,996	210,819
Cement Australia Holdings Pty Ltd [a]	2,632,110	206,137	2,838,247
Cement Australia Pty Limited [a]	37,434	26,652	64,086
Total for all 3 controlling corporations	**2,795,367**	**317,785**	**3,113,152**
Project – FY2020	**3,789**	**8,271**	**12,060**
Project – FY2040 (worst-case)	**5,112**	**13,356**	**18,468**

a. (Clean Energy Regulators, 2016).

5 Results

The results for the dispersion modelling are presented in contour plots as follows:

- Figure 5.1 – Predicted maximum daily PM_{10} concentrations including background.
- Figure 5.2 – Predicted annual average PM_{10} concentrations including background.
- Figure 5.3 – Predicted maximum daily $PM_{2.5}$ concentrations including background.
- Figure 5.4 – Predicted annual average $PM_{2.5}$ concentrations including background.
- Figure 5.5 – Predicted 99.9th percentile 1 hour PM_{10} concentrations from point sources only including background.
- Figure 5.6 – Predicted 99.9th percentile 1 hour $PM_{2.5}$ concentrations from point sources only including background.
- Figure 5.7 – Predicted 99.9th percentile 3 minute TSP concentrations from point sources only excluding background.

The results from the dispersion modelling as predicted concentrations at the sensitive receptor locations are also presented in Table 5.2 with background concentrations included and in Table 5.3 without background concentrations.

The results show compliance with all assessment and design criteria at the nearest sensitive receptors except for the:

- SEPP AAQ PM_{10} annual average of 20 µg/m^3
- NEPM AAQ and SEPP AAQ $PM_{2.5}$ annual average of 8 µg/m^3.

In relation to these annual average exceedances it is noted that the proposed clinker grinding facility impacts are conservatively assessed and low (as presented in Table 5.3) compared to the background concentrations applied in the cumulative assessment.

A plot of the ranked predicted daily PM_{10} concentrations is also provided in Figure 5.8.

The modelling and the presented results assume the following additional dust control measures:

- Water sprays for material unloading from the conveyer from the ship unloading at the slag and gypsum stock piles.
- Improved surface silt loading in the bulk materials handling area. No specific sweeping regime was proposed for this area. However, wheel generated dust emissions from this area has a significant potential for offsite dust emissions and regular sweeping to reduce the surface silt loading will be important in reducing site emissions.

Figure 5.1: *Results: PM_{10} maximum daily concentrations (incl background)*

The results for the predicted daily maximum PM_{10} concentration impacts including background are presented in Figure 5.1. As can be seen both the NEPM AAQ air quality standard and PEM assessment criteria are predicted to be contained within the industrial area.

Figure 5.2: *Results: PM_{10} annual average concentrations (incl background)*

The results for the predicted annual average PM_{10} concentration impacts including background are presented in Figure 5.2. As can be seen the NEPM AAQ air quality standard contour is predicted to be well contained within the industrial area. The SEPP AAQ environmental quality objective is predicted to extend over the North Shore residential area to the south the North Shore industrial area.

In relation to the exceedance of the SEPP AAQ PM_{10} annual average environmental objective of 20 µg/m^3 it is noted that the annual average as applied in the assessment was 19.1 µg/m^3 and that the incremental annual average increases are low as presented in Table 5.3.

Figure 5.3: *Results: $PM_{2.5}$ daily maximum concentrations (incl background)*

The results for the predicted daily maximum $PM_{2.5}$ concentration impacts including background are presented in Figure 5.3. As can be seen both the NEPM AAQ air quality standard and PEM assessment criteria are predicted to be well contained within the industrial area.

Figure 5.4: *Results: $PM_{2.5}$ annual average concentrations (incl background)*

The results for the predicted annual average $PM_{2.5}$ concentration impacts including background are presented in Figure 5.4. As can be seen the NEPM AAQ air quality standard and SEPP AAQ environmental objective contour is predicted to be generally well contained within the industrial area, except at the north-eastern corner of the North Shore residential area where the closest sensitive receptor (Receptor 9) falls just within the air quality standard contour.

In relation to the exceedance of the annual average assessment criteria for $PM_{2.5}$ of 8 µg/m³ it is noted that the annual average background concentration as applied in the assessment was 7.1 µg/m³ and that the incremental annual average increase in concentration is low as presented in Table 5.3

Figure 5.5: *Results: PM_{10} 99.9th percentile 1 hour concentrations from point sources only concentrations (incl background)*

The results for assessment against the PM_{10} SEPP AQM design criteria for point/stack sources as presented in Figure 5.5 show good margins of compliance with the highest modelling domain grid point concentration predicted to be 50.7 µg/m³.

Figure 5.6: *Results: $PM_{2.5}$ 99.9th percentile 1 hour concentrations from point sources only concentrations (incl background)*

The results for assessment against the $PM_{2.5}$ SEPP AQM design criteria for point/stack sources as presented in Figure 5.6 show good margins of compliance with the highest modelling domain grid point concentration predicted to be 24.0 µg/m³.

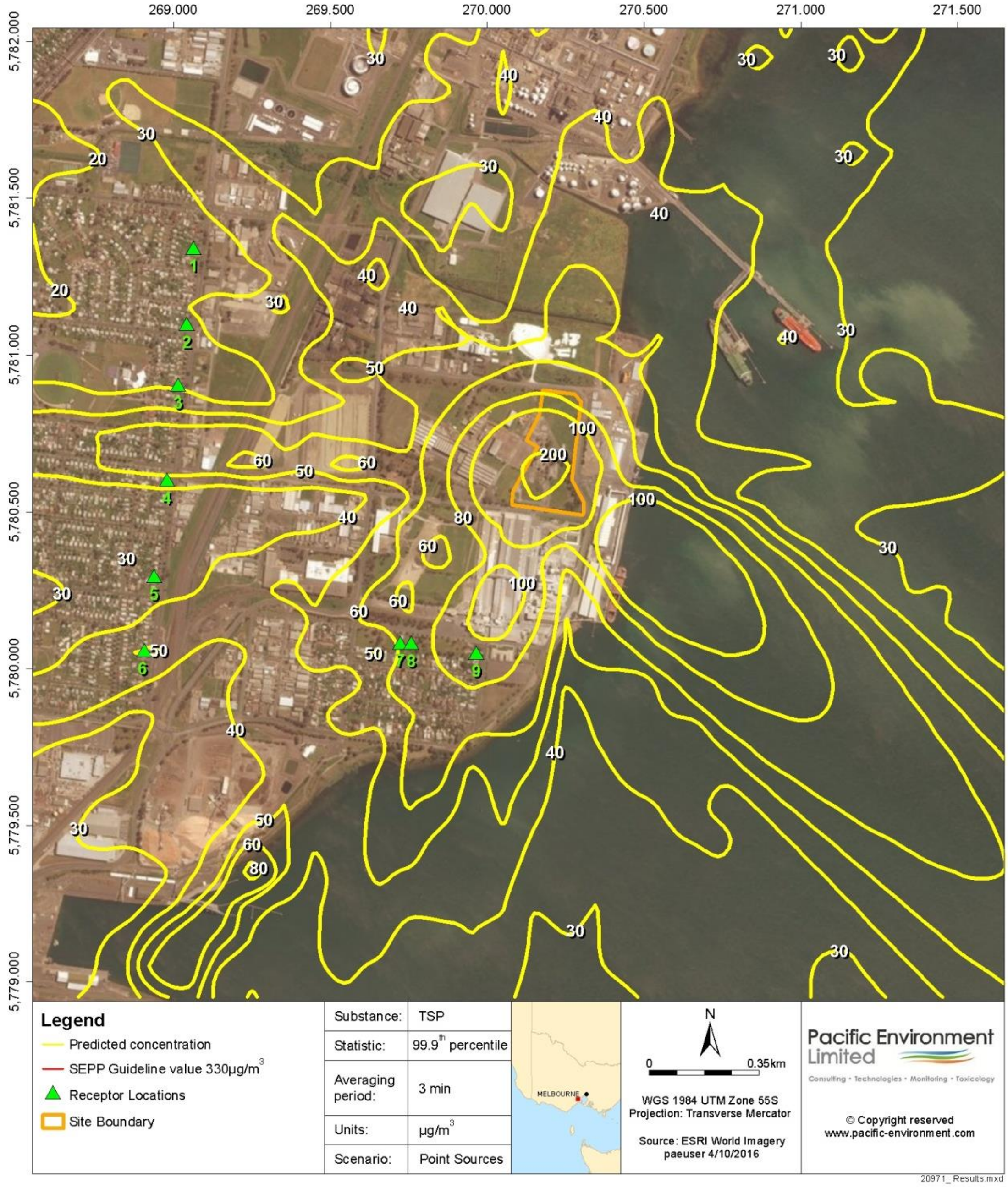

Figure 5.7: *Results: TSP 99.9th percentile 3 minute concentrations from point sources only concentrations (excl background)*

The results for assessment against the TSP SEPP AQM design criteria for point/stack sources as presented in Figure 5.7 show good margins of compliance with the highest modelling domain grid point concentration predicted to be 227 µg/m^3. While this predicted concentrations does not include a TSP background concentration it is very unlikely, considering what is known about the PM_{10} background concentration, that there would also be good compliance margin to this SEPP AQM point source assessment design criterion similar to the situation for PM_{10} and $PM_{2.5}$.

Table 5.1: *Summary background concentrations for PM_{10} and $PM_{2.5}$ applied in the assessment*

Substance	Averaging time	Background concentration	Statistic	Reference
PM_{10}	24 hour	21.8 µg/m^3	70th percentile	EPA Geelong South 2014 data
PM_{10}	1 year	19.1 µg/m^3	Annual average	
$PM_{2.5}$	24 hour	8.1 µg/m^3	70th percentile	Calculated from EPA Geelong South 2014
$PM_{2.5}$	1 year	7.1 µg/m^3	Annual average	data with $PM_{2.5}/PM_{10}$ ratio of 0.37

Table 5.2: *Sensitive receptor location results (including background concentrations) for PM_{10} and $PM_{2.5}$ with predicted concentration percentage of assessment criteria within brackets*

Sensitive Receptor	1	2	3	4	5	6	7	8	9
X (km):	269.064	269.042	269.015	268.981	268.938	268.907	269.723	269.759	269.966
y(km):	5,781.343	5,781.100	5,780.906	5,780.603	5,780.295	5,780.058	5,780.083	5,780.082	5,780.051
PM_{10} (µg/m^3) Daily Maximum	35.5 (71%)	37.7 (75%)	38.2 (76%)	35.2 (70%)	32.9 (66%)	31.9 (64%)	36.3 (73%)	37.3 (75%)	48.9 (98%)
$PM_{2.5}$ (µg/m^3) Daily Maximum	12.1 (49%)	12.7 (51%)	12.8 (51%)	12 (48%)	11.2 (45%)	11 (44%)	12.8 (51%)	13.6 (54%)	16.8 (67%)
PM_{10} (µg/m^3) Annual Average	19.6 (79%) [a] (98%) [b]	19.7 (79%) [a] (98%) [b]	19.7 (79%) [a] (99%) [b]	19.7 (79%) [a] (99%) [b]	19.6 (79%) [a] (98%) [b]	19.6 (78%) [a] (98%) [b]	20.7 (83%) [a] (104%) [b]	20.9 (83%) [a] (105%) [b]	21.8 (87%) [a] (109%) [b]
$PM_{2.5}$ (µg/m^3) Annual Average	7.2 (91%)	7.2 (91%)	7.3 (91%)	7.3 (91%)	7.2 (91%)	7.2 (90%)	7.6 (95%)	7.7 (96%)	8.0 (100%)

a. NEPM AAQ: 25 µg/m^3

b. SEPP AAQ: 20 µg/m^3

Table 5.3: *Sensitive receptor location results as incremental increases in impacts (excluding background concentrations) for PM_{10} and $PM_{2.5}$*

Receptor Number	1	2	3	4	5	6	7	8	9
x(km):	269.064	269.042	269.015	268.981	268.938	268.907	269.723	269.759	269.966
y(km):	5,781.343	5,781.100	5,780.906	5,780.603	5,780.295	5,780.058	5,780.083	5,780.082	5,780.051
PM_{10} (µg/m^3) Daily Maximum	13.68	15.94	16.41	13.40	11.06	10.12	14.51	15.46	27.06
$PM_{2.5}$ (µg/m^3) Daily Maximum	4.08	4.66	4.74	3.90	3.17	2.90	4.73	5.55	8.72
PM_{10} (µg/m^3) Annual Average	0.53	0.56	0.58	0.59	0.53	0.50	1.63	1.77	2.73
$PM_{2.5}$ (µg/m^3) Annual Average	0.18	0.18	0.19	0.19	0.18	0.17	0.55	0.60	0.94

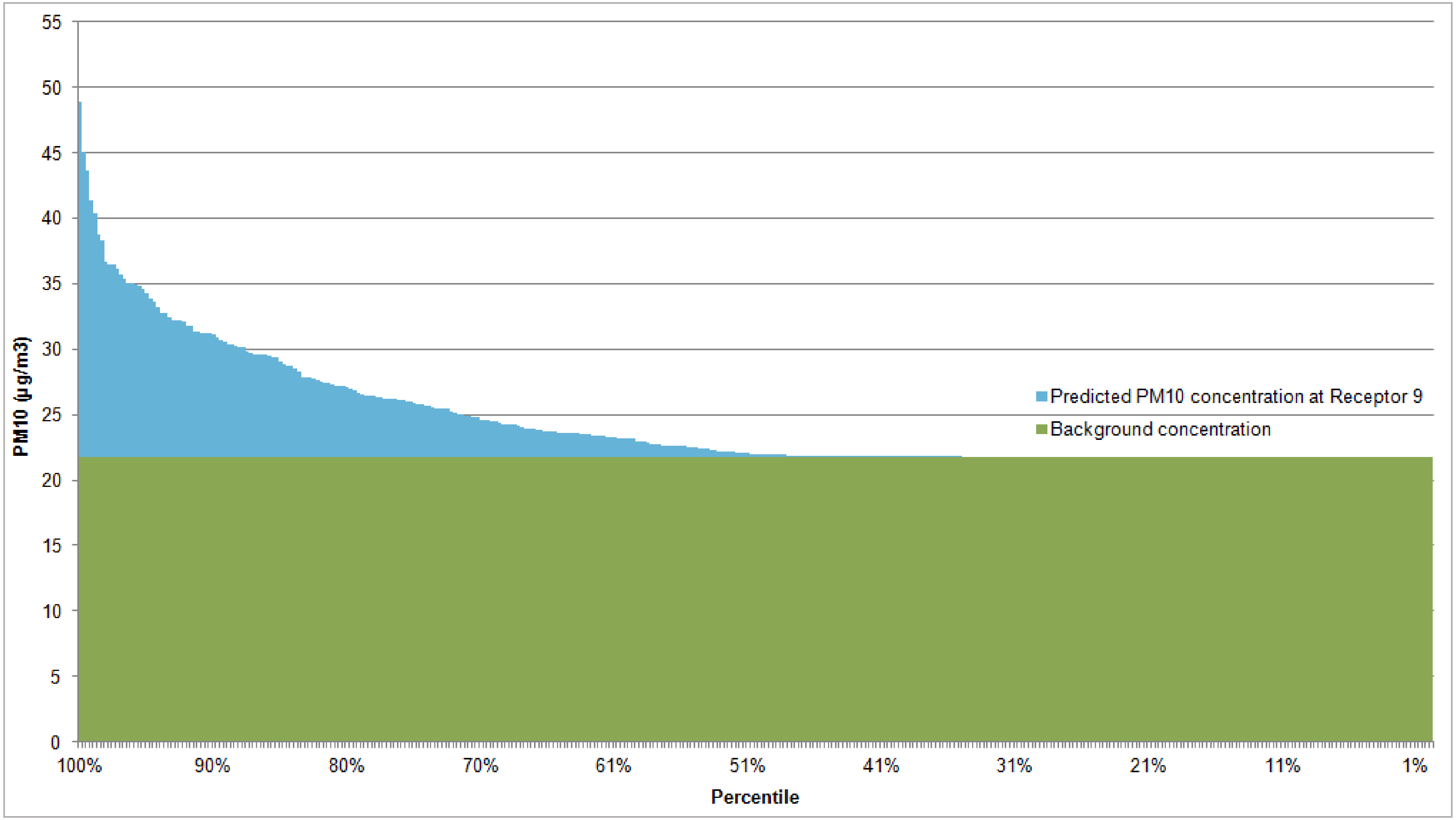

Figure 5.8: *Ranked predicted daily PM_{10} concentrations for Receptor 9 with background concentration*

6 Conclusions

This dust impact assessment of the proposed clinker grinding facility at Lascelles wharf was assessed for the FY2040 projected production capacity of 1.3 Mtpa. The initial production capacity is planned to be 950 Ktpa. Assuming the maximum projected production capacity for the facility in the assessment is conservative considering the initial planned production capacity.

The assessment was performed with detailed emissions estimation and variable emissions for the proposed site activities for continuous 24/7 operations.

To better inform the assessment for the selection of suitable background concentrations, onsite dust monitoring has been performed. Due to the project timeline only a limited amount of data (three and a half months) was available for this assessment.

The assessment demonstrates compliance with peak impact assessment criteria with additional facility dust control measures consisting of:

- Water sprays for material unloading from the conveyer from the ship unloading at the slag and gypsum stock piles.
- Improved surface silt loading in the bulk materials handling area. No specific sweeping regime was proposed for this area. However, wheel generated dust emissions from this area has a significant potential for offsite dust emissions and regular sweeping to reduce the surface silt loading will be important in reducing site emissions.

These measures are incorporated in the dust management plan as provided in Appendix D.

A couple of small exceedances in a limited area were predicted for the PM_{10} SEPP AAQ and NEPM AAQ $PM_{2.5}$ annual average assessment criteria. In relation to these predictions for the annual average concentrations it is noted that the proposed clinker grinding facility impacts are conservatively assessed and low compared to the background concentrations applied in the cumulative assessment.

Overall, the dust impact assessment for the proposed clinker grinding facility, which is proposed to be located at the EPA recommended separation distance of 500 m from the nearest sensitive receptors, shows that risks associated with air quality impacts from the proposed clinker grinding facility can be managed.

To provide details of the site dust management a dust management plan has been prepared and is provided in Appendix D.

The greenhouse assessment shows that the projected Scope 1 and Scope 2 emissions for the worst-case scenario (i.e. FY2040) are not anticipated to significantly contribute to Victoria’s greenhouse emission inventory based on published historical data for 2014. Additionally, the project’s emissions appear reasonable in comparison to published greenhouse emissions reported under the NGER scheme for FY2015 for existing clinker production operations in Australia.

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Appendix A

Emissions Estimation

A1 Emissions Estimation Methodology

A1.1 Particulate Matter

Total emissions for PM_{10} and $PM_{2.5}$ were calculated using the equation presented below.

$$E_i = EF_i \times M \times \left(\frac{100 - CE_i}{100}\right)$$

where:

E_i	Emission rate for substance i	(kg/h or kg/day)
EF_i	Uncontrolled emission factor for substance i	(kg/tonne)
M	Total amount of grain handled	(tonnes/h or tonnes/day)
CE_i	Overall control efficiency for substance i	(%)

$PM_{2.5}$ emission factors were not included for the emission factors sourced from the US EPA AP-42 or NPI EET Manuals (excluding wheel-generated and wind erosion dust emissions). For these sources a $PM_{2.5}/PM_{10}$ ratio of 30% was assumed based on the Aggregate, Unprocessed Ores presented in AP-42 Appendix B.2 Generalised Particle Size Distributions (US EPA, 1996).

A1.1.1 Materials Handling

Emissions from the materials handling operations were estimated using methodologies outlined in the AP-42 Chapter 11.19.2 Crushed Stone and Pulverised Mineral Processing (US EPA, 2004), AP-42 Chapter 11.12 Concrete Batching (US EPA, 2006A) and the NPI EET Manual for Cement Manufacturing (DEWHA, 2008). The emission factors used to estimate PM_{10} and $PM_{2.5}$ emissions provided in Table A.1.

Table A.1: *Emission factors for material handling operations*

AP-42 Emission Source	Applied Emission Source Activity	Emission Factor for PM_{10} (kg/tonne)	Emission Factor for $PM_{2.5}$ (kg/tonne)
Truck Unloading – Fragmented Stone	Limestone Truck Unloading	8.0×10^{-6} [a]	2.4×10^{-6}
Unenclosed Materials Handling (equation shown below)	FEL Loading Gypsum from Stockpile	0.00050 [b]	0.00015
	FEL Loading Limestone from Stockpile	0.00030 [b]	0.000089
	FEL Loading Slag from Stockpile	0.00057 [b]	0.00017
Weight Hopper Loading (uncontrolled)	FEL Unloading into Weight Hoppers	0.0013[c]	0.00039
Truck Loading (uncontrolled)	Truck Product Loading	0.16 [c]	0.047

a. Source: (US EPA, 2004)

b. Source: (DEWHA, 2008)

c. Source: (US EPA, 2006A)

The equation used for unenclosed material handling is shown below, with the activity data provided in Table A.2.

$$EF_{PM_{10}} = 0.75 \times 0.001184 \times \left(\frac{\left(U/_{2.2}\right)^{1.3}}{\left(M/_{2}\right)^{1.4}} \right)$$

where:

$EF_{PM_{10}}$	Emission factor for PM_{10}	(kg/tonne)
U	Mean wind speed	(m/s)
M	Mean moisture content of the materials	(%)

Table A.2: *Emission factor equation inputs for unenclosed materials handling*

Activity Data	Material	Data
Mean wind speed	-	4.22 m/s [a]
Mean moisture content [b]	Gypsum	8%
	Limestone	5%
	Slag	6% [c]

a. Average Annual Wind Speed from CALMET extract at site

b. Source: (Boral, 2016A)

c. Average of wet and dry GBFS (Slag) moisture content

The activity data and control efficiencies for the materials handling emissions are presented in Table A.3 and Table A.4.

Table A.3: *Activity data for materials handling operations*

Applied Emission Source Activity	Materials Handled	Operational Hours	Materials Handling rate	Units
Limestone Truck Unloading	Limestone	2,871 [a]	108,000	Tonnes/year
FEL Loading from Stockpile	Gypsum	8,760	120 [b]	tonnes/hour
	Limestone	8,760	300 [b]	tonnes/hour
	Slag	8,760	1,200 [b]	tonnes/hour
FEL Unloading into Weight Hoppers	Gypsum	8,760	120 [b]	tonnes/hour
	Limestone	8,760	300 [b]	tonnes/hour
	Slag	8,760	1,200 [b]	tonnes/hour
Truck Product Loading	GP Cement	8,760 [c]	1,010,000	tonnes/year
	Slag Cement	8,760 [c]	218,000	tonnes/year
	HE Cement	8,760 [c]	68,000	tonnes/year

a. Operational hours based on truck unloading for 10 hours a day per week day

b. Based on dosing bin capacities.

c. Continuous operations but based on weekly and hourly dispatch pattern.

Table A.4: *Control efficiencies for material handling operations*

Applied Emission Source Activity	Materials Handled	Control Efficiency Description	Control Efficiency Reduction
Limestone Truck Unloading	Limestone	No Control	0%
FEL Loading from Stockpile	Gypsum		
	Limestone		
	Slag		
FEL Unloading into Weight Hoppers	Gypsum		
	Limestone		
	Slag		
Truck Product Loading	GP Cement	Enclosure (2 or 3 walls) and Telescopic Chute [a]	97.5%
	Slag Cement		
	HE Cement		

a. Source: (AWMA, 2000; DEWHA, 2008)

The truck unloading data was varied in the dispersion model based on the hourly and weekly dispatch pattern provided by Boral (2016B). It was assumed that the hourly pattern was the same for each day. The dispatch pattern is presented in Table A.5 and Table A.6.

Table A.5: *Weekly dispatch pattern for product loadout operations*

Day of the Week	Dispatch Percent
Monday	18%
Tuesday	18%
Wednesday	18%
Thursday	18%
Friday	18%
Saturday	7%
Sunday	3%

Table A.6: *Hourly dispatch pattern for product loadout operations*

Hour of the Day	Dispatch Percent	Hour of the Day	Dispatch Percent
0	0.10%	12	9.53%
1	0.10%	13	9.53%
2	0.40%	14	2.00%
3	0.40%	15	2.00%
4	8.53%	16	8.53%
5	9.53%	17	9.53%
6	8.53%	18	8.53%
7	2.00%	19	1.43%
8	2.00%	20	2.00%
9	3.00%	21	0.50%
10	3.00%	22	0.20%
11	8.53%	23	0.10%

A1.2.1 Conveyor Transfer Points

Emissions from the conveyor transfer points onsite were estimated using methodologies outlined in the AP-42 Chapter 11.12 Concrete Batching (US EPA, 2006A). The emission factors for the conveyor transfer points are presented in Table A.7.

Table A.7: *Emission factors for transfer points and conveyors*

AP-42 Emission Source	Applied Emission Source Activity	Emission Factor for PM_{10} (kg/tonne)	Emission Factor for $PM_{2.5}$ (kg/tonne)
Aggregate Transfer (uncontrolled)	All conveyor transfer points and drop off points from ship unloading to ball mill operations	0.0017	0.00051
Cement unloading to elevated storage silo (pneumatic) (controlled)	All conveyor transfer points from ball mill to product silos	0.00017	0.000051

Source: (US EPA, 2006A; US EPA, 1996)

The activity data and dust control efficiencies for the conveyor transfer points are presented in Table A.8 and Table A.9. Dust collection devices are proposed to be included at most conveyor transfer points on site, this has been reflected within the control efficiencies used.

Table A.8: *Activity data for conveyor transfer points*

Applied Emission Source Activity	Materials Handled	Number of Transfer points	Operational Hours	Materials Handling rate	Units
Transfer points from ship unloading conveyor circuit	Clinker	4	4,162	850[a]	tonnes/hour
	Gypsum	4	333	850[a]	tonnes/hour
	Slag	4	1,332	850[a]	tonnes/hour
Drop off points at stockpiles	Clinker	1	4,162	850[a]	tonnes/hour
	Gypsum	1	333	850[a]	tonnes/hour
	Slag	1	1,332	850[a]	tonnes/hour
Transfer point into Slag Dryer	Slag	1	8,760	1,200[b]	tonnes/day
Transfer points from hoppers to Dosing Bins	Clinker	3	8,760	3,600[c]	tonnes/day
	Gypsum	2	8,760	120[b]	tonnes/day
	Limestone	2	8,760	300[b]	tonnes/day
Transfer point from Slag Dryer to Dosing Bins	Slag	1	8,760	1,200[b]	tonnes/day
Transfer point from Dosing Bin to Ball Mill	Clinker	1	8,760	3,600[c]	tonnes/day
	Gypsum	1	8,760	120[b]	tonnes/day
	Limestone	1	8,760	300[b]	tonnes/day
	Slag	1	8,760	1,200[b]	tonnes/day
Transfer point from Ball Mill to Product Silos	GP Cement	1	8,760	150[d]	tonnes/hour
	Slag Cement	1	8,760	150[d]	tonnes/hour
	HE Cement	1	8,760	150[d]	tonnes/hour
Loading Product Silos	GP Cement	1	8,760	150[d]	tonnes/hour
	Slag Cement	1	8,760	150[d]	tonnes/hour
	HE Cement	1	8,760	150[d]	tonnes/hour

a. Based on the maximum ship unloading capacity, for each ship unloading event

b. Based on dosing bin capacities.

c. Based a 300t capacity for 2 hours

d. Based on Ball mill throughput

Table A.9: *Control efficiencies for conveyor transfer points*

Applied Emission Source Activity	Materials Handled	Control Efficiency Description	Control Efficiency Reduction
Transfer points from ship unloading conveyor circuit	Clinker	Enclosure of Transfer Point [a]	70%
	Gypsum		
	Slag		
Drop off points at stockpiles	Clinker	Enclosure (2 or 3 walls) [b]	90%
	Gypsum	Water Sprays [b]	50%
	Slag		
Transfer point into Slag Dryer	Slag	Enclosure of Transfer Point [a]	70%
Transfer points from hoppers to Dosing Bins	Clinker		
	Gypsum		
	Limestone		
Transfer point from Slag Dryer to Dosing Bins	Slag		
Transfer point from Dosing Bin to Ball Mill	Clinker		
	Gypsum		
	Limestone		
	Slag		
Transfer point from Ball Mill to Product Silos	GP Cement	Controlled emission factor used	-
	Slag Cement		
	HE Cement		
Loading Product Silos	GP Cement		
	Slag Cement		
	HE Cement		

a. Source: (AWMA, 2000)

b. Source: (DEWHA, 2008)

The transfer points from the ship unloading to the stockpiles were varied using the information presented in Table A.10. It was assumed the ship would take 4 days to unload. As a conservative assessment, the maximum unloading capacity was used for the total unloading time. It was also assumed that only one ship was unloaded at a time.

Table A.10: *Ship unloading information*

Materials Handled	Number of Ships Unloaded per year
Clinker	25
Gypsum	8
Slag	2

A1.3.1 Wheel-Generated Dust (Paved Roads)

Emissions from wheel-generated dust from paved roads were estimated using the method outlined in AP-42 Chapter 13.2.1 Paved Roads (US EPA, 2011). The general equation for the emission factor is shown below. The particle size multiplier, k, is dependent of the particle size range and are shown in Table A.11. The paved road emissions were split into 3 separate areas to better characterise the operations occurring in those areas, as shown in Figure A.1. The emission factor equation inputs and calculated emission factors are summarised in Table A.12 and Table A.13.

$$EF_i = k \times (sL)^{0.91} \times (1.10231 \times W)^{1.02}$$

where:

EF_i	Emission factor for substance i	(g/VKT)
k	Particle size multiplied	(g/VKT)
sL	Silt Loading	(g/m^2)
W	Average weight of the vehicle travelling the road	(tonnes)

Table A.11: *Constants for wheel-generated dust from paved roads*

Constant	PM_{10}	$PM_{2.5}$
Particle size multiplier, k (g/VKT)	0.62	0.15

Source: (US EPA, 2011)

Table A.12: *Emission factor equation inputs for wheel-generated dust (paved roads)*

	Data Input	Value	Units
Zone A	Silt Loading	12 [a]	g/m^2
	Average Weight	50 [b]	tonnes
Zone B	Silt Loading	70 [c]	g/m^2
	Average Weight	50 [b]	tonnes
Zone C	Silt Loading	70 [c]	g/m^2
	Average Weight	31 [d]	tonnes

a. Mean silt loading for Concrete Batching from AP-42 Chapter 13.2.1 Paved Roads (US EPA, 2011)

b. (VicRoads, 2007; ATA, 2015)

c. Mean silt loading for Sand and Gravel Processing from AP-42 Chapter 13.2.1 Paved Roads (US EPA, 2011)

d. Operating weight of CAT980 Front End Loader (CAT, 2008)

Note: It is noted that the applied methodology with zone specific silt loadings deviates from the intended application of the wheel generated dust emission factor emissions estimation which is intended for use with site average silt loadings. The reason for the use of the zone specific silt loading factors was to better characterise the site which typically has a significant difference in silt loadings between product loadout and bulk material handling areas.

Table A.13: *Emission factors for wheel-generated dust (paved roads)*

Activity Area	PM_{10} Emission Factor (kg/VKT)	$PM_{2.5}$ Emission Factor (kg/VKT)
Zone A	0.36	0.086
Zone B	1.77	0.43
Zone C	1.07	0.26

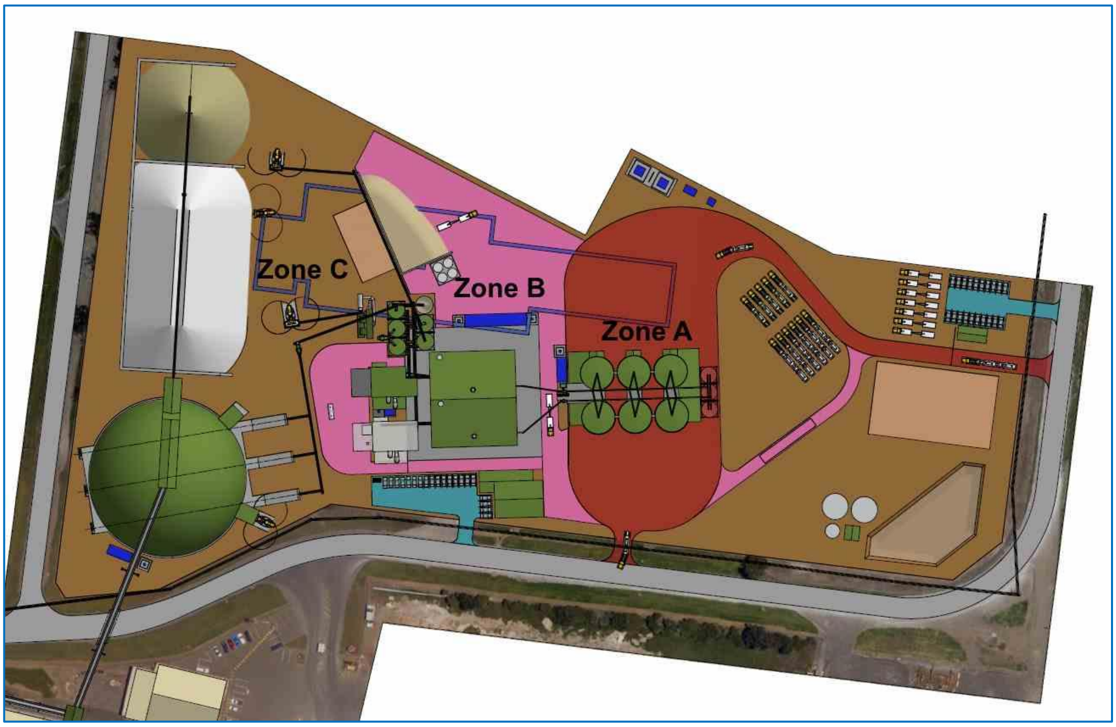


Figure A.1: *Zone A, B and C for assumptions regarding parameters for wheel generated dust*

Total emissions for PM_{10} and $PM_{2.5}$ from wheel-generated dust (paved roads) were estimated using the equation below. The total distance travelled were estimated using the average paved road length, the truck or wheel loader capacity or the operating hours per year and the total amount of material loaded. The activity data for wheel-generated dust (paved road) are summarised in

Table A.14. Dust controls were not applied for dust emissions from wheel-generated dust.

$$E_i = EF_i \times TD \times \left(\frac{100 - CE_i}{100}\right)$$

where:

E_i	=	Emission rate of substance *i*	(kg/annum)
EF_i	=	Uncontrolled emission factor for substance *i*	(kg/km)
TD	=	Total distance travelled on unpaved roads by the vehicle	(km/annum)

$$TD = L \times \frac{M}{C_T}$$

where:

TD	=	Total distance travelled on paved roads by the vehicle	(km/annum)
L	=	Paved road length (return)	(km)
M	=	Total amount of material loaded	(tonnes/annum)
C_T	=	Truck capacity	(tonnes)

Table A.14: *Activity data for wheel-generated dust (paved roads)*

Description	Data Input	Value	Units
Trucking of Product	Type of truck	Cement tanker	-
	Total Cement Handled	1,296,000	tonnes
	Return Road Length	320	m
	Truck Capacity	30 [a]	tonnes
Trucking of Limestone	Type of truck	Truck and Dog trailer	-
	Total Limestone Handled	108,000	tonnes
	Return Road Length	450	m
	Truck Capacity	28 [a]	tonnes
Wheel dozer Activity – Slag handling	Type of truck	CAT980	-
	Total Slag Handled	1200	tonnes/day
	Return Road Length	130	m
	Truck Capacity	8.3 [b]	tonnes
Wheel dozer Activity – Limestone handling	Type of truck	CAT980	-
	Total Limestone Handled	300	tonnes/day
	Return Road Length	150	m
	Truck Capacity	9.0 [b]	tonnes
Wheel dozer Activity – Gypsum handling	Type of truck	CAT980	-
	Total Gypsum Handled	120	tonnes
	Return Road Length	100	m
	Truck Capacity	9.0 [b]	tonnes

a. Source: (Boral, 2016B; Boral , 2016E)

c. Calculated based on the Wheel loading capacity and the density of the material – provided by Boral (2016A)

A1.4.1 Wind Erosion

PM_{10} and $PM_{2.5}$ emissions associated with wind erosion were estimated using the equation below. The area of wind erosion sources from stockpiles were calculated based on total surface area of that stockpile. A general wind erosion area around the stockpiles was also included. The data inputs used to estimate emissions associated with wind erosion are listed in Table A.15.

.

$$E_i = EF_i \times A \times \left(\frac{100 - CE_i}{100}\right)$$

where:

E_i	=	Emission rate for substance *i*	(kg/a)
A	=	Total exposed areas	(ha)
EF_i	=	Uncontrolled emission factor for substance *i*	(kg/ha/a)
CE_i	=	Overall control efficiency for substance *i*	(%)

Table A.15: *Activity data for wind erosion*

Material	Activity Area	Data Input	Value (ha) [a]
Gypsum	Storage Stockpile	Total Surface Area	0.23
Limestone	Storage Stockpile	Total Surface Area	0.07
Slag	Storage Stockpile	Total Surface Area	0.60
General Plant Area	-	Total Surface Area	0.68

[a.] Calculated based on 3D Plant view provided by Boral (2016C)

Wind erosion emission factors were calculated using two methods. The emissions associated with the storage stockpiles were estimated using a technique from AP-42 Chapter 13.2.5 Industrial Wind Erosion (US EPA, 2006B). The emissions associated with wind erosion from the general plant area were estimated using the default emission factor presented in the NPI EET Manual for Concrete Batching and Concrete Product Manufacturing (Environment Australia, 1999). Both methods are outlined below.

A proportionality factor was included in the wind erosion dust emissions based on the strength of the wind speed, as shown below. This allowed for a more accurate representation of the windblown dust, as at higher wind speeds there is a greater emission from stockpiles. It is assumed that the rate of wind erosion is linearly proportional to wind power (energy per unit time). Wind power has a cubic relationship to wind speed:

$$Wind\ Erosion\ \propto\ Wind\ Speed^3$$

A1.4.1.1 Wind Erosion from Storage Stockpiles

Emissions associated with wind erosion from the storage stockpiles were estimated using a technique from the AP-42 Chapter 13.2.5 Industrial Wind Erosion (US EPA, 2006B). It was assumed that half of the active face of the stockpile was disturbed hourly with the rest of the surface area disturbed weekly.

The threshold velocities for each stockpile were assumed based on studies undertaken by Gillette et al. (1980, 1982). The material properties provided and site observations provided a starting point for assuming the threshold velocities for each stockpile.

Hourly wind speed data was extracted at the site from CALMET. The NPI EET for Fugitive Emissions states that the fastest mile wind speed has been found to be approximately 1.27 times the hourly wind speed (SEWPaC, 2012). This gust relationship was used to calculate the fastest mile wind speed for the hourly data extracted from CALMET.

The equations used to calculate the emission factors for PM_{10} are given below. The emissions for $PM_{2.5}$ were assumed to be 10% of PM_{10} emissions for windblown dust (Pace, 2005). Emission factor equation inputs are provided in Table A.16 and the resulting emission factors are listed in Table A.17.

.

$$EF_{PM10} = 0.5 \sum_{i=1}^{N} P_i$$

Where:

EF_i	=	Emission factor for substance *i*	(g/m²/annum)
N	=	Number of disturbances per year	(-)
P_i	=	Erosion potential corresponding to the observed (or probable) fastest mile of wind for the i^{th} period between disturbances	(g/m²)

$$P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$u^* = 0.053u_{10}^+$$

Where

u^*	=	Friction velocity	(m/s)
u_t	=	Threshold friction velocity	(m/s)
u_{10}^+	=	Fastest mile of reference anemometer for period between disturbances	(m/s)

Table A.16: *Emission factor equation inputs for wind erosion – storage stockpiles*

Material	Description	Value (m/s)
Gypsum	Threshold friction velocity (ut*) [a]	0.72
	Fastest mile of reference anemometer for period between disturbances (u10+) [b]	Multiple data values based off hourly wind speed data
Limestone	Threshold friction velocity (ut*) [c]	0.83
	Fastest mile of reference anemometer for period between disturbances (u10+) [b]	Multiple data values based off hourly wind speed data
Slag	Threshold friction velocity (ut*) [a]	0.35
	Fastest mile of reference anemometer for period between disturbances (u10+) [b]	Multiple data values based off hourly wind speed data

a. Source: (Gillette, Adams, Muha, & Kihl, 1982)

b. Derived from CALMET meteorological data, Year 2014

c. Source: (Gillette, Adams, Endo, Smith, & Kihl, 1980)

Table A.17: *Emission factors for wind erosion – storage stockpiles*

Material	Description	PM_{10} Emission Factor (kg/ha/annum)
Gypsum	Hourly Disturbance	1,070
	Weekly Disturbance	368
Limestone	Hourly Disturbance	271
	Weekly Disturbance	27
Slag	Hourly Disturbance	64,264
	Weekly Disturbance	3,949

A1.4.2.1 Wind Erosion from General Plant Area

The emissions from wind erosion from the General plant area were estimated using the default emission factor of 3.9 kg/ha/day from the NPI EET Manual for Concrete Batching and Concrete Product Manufacturing (Environment Australia, 1999). $PM_{2.5}$ emissions were estimated assuming ratio 10% of PM_{10} emissions for windblown dust (Pace, 2005).

A1.5.1 Stack Sources

Emissions from the stack sources were calculated based on the estimated particulate emission rate from the 5 stacks onsite. The particulate concentration and stack parameters are provided in Table A.18. Total Particles were also modelled for stack sources in addition to PM_{10} and $PM_{2.5}$ emissions. All stack sources were modelled with continuous emissions.

Table A.18: *Stack source parameters*

Stack Name	Stack Diameter (m)	Stack Height (m)	Exit Velocity (m/s)	Exit Temperature (K)	Particulate Emission (mg/Nm^3)
Slag Dryer	1.2	15	24.6	353	10
Mill Separator Filter 1	2	45	17.7	335	30
Mill Separator Filter 2	2	45	17.7	335	30
Mill Filter 1	2	45	5.3	349	30
Mill Filter 2	2	45	5.3	349	30

a. Source: (Boral, 2016A; Boral, 2016D; Boral , 2016E)

Based on the stack parameters the Total Particles, PM_{10} and $PM_{2.5}$ emission rates were calculated assuming a similar particle distribution to testing data provided by Boral (Ektimo, 2015). The emission rates used in the modelling are presented in Table A.19 below.

Table A.19: *Stack source emission rates*

Stack Name	Total Particulate Emission Rate (g/s)	PM_{10} Emission Rate (g/s)	$PM_{2.5}$ Emission Rate (g/s)
Slag Dryer	0.21	0.15	0.08
Mill Separator Filter 1	1.36	0.97	0.53
Mill Separator Filter 2	1.36	0.97	0.53
Mill Filter 1	0.39	0.28	0.15
Mill Filter 2	0.39	0.28	0.15

A2.1 Greenhouse Gases

A2.1.1 Natural Gas Combustion in the Dryer

Emissions of CO_2, CH_4 and N_2O from natural gas combustion were estimated using the method described in Section 2.1.2 of the *NGA Factors* (Department of the Environment and Energy, 2016) as follows:

$$E_j = \frac{Q \times EF_j}{1000}$$

where:

E_j	=	Estimated emissions of gas type (j) from natural gas combustion	(t CO_2-e/yr)
Q	=	Projected quantity of natural gas combusted	(GJ/yr)
EF_{joxec}	=	Default emission factor for each gas type (j)	(kg CO_2-e/GJ)

The default emission factors for natural gas combustion were obtained from Table 2 of the *NGA Factors* and are listed in Table A.20. Projected natural gas consumption was provided by Boral Cement (Boral Cement, 2016) for FY2020 and FY2040 as shown in Table A.21. The estimated annual greenhouse emissions are presented in Table A.22.

Table A.20: *Default emission factors associated with natural gas combustion*

Description	Emission Factor (kg CO_2-e/ GJ)
Scope 1 default CO_2 emission factor	51.4
Scope 1 default CH_4 emission factor	0.1
Scope 1 default N_2O emission factor	0.03

Reference: Table 2 (Department of the Environment and Energy, 2016).

Table A.21: *Projected activity data for natural gas combustion*

Year	Natural Gas Consumption (GJ)
FY2020	70,226
FY2040	95,238

Table A.22: *Estimated greenhouse gas emissions associated with natural gas combustion*

Year	Emissions (tonnes CO_2-e/yr)			
	Emissions of CO_2	Emissions of CH_4	Emissions of N_2O	Total Emissions
FY2020	3,610	7	2	**3,619**
FY2040	4,895	10	3	**4,908**

A2.2.1 Diesel Combustion in Mobile Equipment

Emissions of CO_2, CH_4 and N_2O were estimated using the method described in Section 2.1.3 of the *NGA Factors* (Department of the Environment and Energy, 2016) as follows:

$$E_j = \frac{Q \times EC \times EF_{joxec}}{1000}$$

where:

E_j	=	Estimated emissions of gas type (j) from diesel combustion	(t CO_2-e/yr)
Q	=	Projected quantity of diesel combusted in the year	(kL/yr)
EC	=	Energy content factor of diesel	(GJ/kL)
EF_{joxec}	=	Default emission factor for each gas type (j)	(kg CO_2-e/GJ)

Two sets of default emission factors are available from Section 2.1.3 of the *NGA Factors* for estimating greenhouse emissions from the combustion of diesel:

- Table 3: liquid fuel combustion for stationary energy purposes; i.e. purposes for which fuel is combusted that do not involve transport energy purposes.
- Table 4: liquid fuel combustion for transport energy purposes including purposes for which fuel is combusted for any of the following activities:
  - transport by vehicles registered for road use
  - rail transport
  - marine navigation
  - air transport.

It is assumed that diesel will mainly be combusted in front-end loaders, which are typically not vehicles registered for road use and as such the stationary emissions factors were used. The default energy content and emission factors for diesel were obtained from Table 3 of the *NGA Factors* and are listed in Table A.23. Projected diesel consumption was provided by Boral Cement (Boral Cement, 2016) for FY2020 and FY2040 as shown in Table A.24. The estimated annual greenhouse emissions are presented in Table A.25.

Table A.23: *Default emission factors associated with diesel combustion for stationary energy purposes*

Description	Emission Factor (kg CO_2-e/ GJ)	Units
Default energy content factor of diesel	38.6	GJ/kL
Scope 1 default CO_2 emission factor	69.9	kg CO_2-e/ GJ
Scope 1 default CH_4 emission factor	0.1	
Scope 1 default N_2O emission factor	0.2	

Reference: Table 3 (Department of the Environment and Energy, 2016).

Table A.24: *Projected activity data for diesel combustion*

Year	Diesel Consumption (L)
FY2020	63,000
FY2040	75,600

Table A.25: *Estimated greenhouse gas emissions associated with diesel combustion*

Year	Emissions (tonnes CO_2-e/yr)			
	Emissions of CO_2	Emissions of CH_4	Emissions of N_2O	Total Emissions
FY2020	170	0	0	171
FY2040	204	0	1	205

A2.3.1 Scope 2 Emissions from Electricity Consumption

Scope 2 emissions associated with purchased electricity were estimated using the method described in Appendix 4 of the *NGA Factors* (Department of the Environment and Energy, 2016) as follows:

$$Y = Q \times \frac{EF_{S2}}{1000}$$

where:

Y	=	Scope 2 greenhouse gas emissions	(t CO_2-e/yr)
Q	=	Projected quantity of electricity purchased during the year and consumed from the operation of the facility	(kWh/yr)
EF_{S2}	=	Scope 2 default emission factor	(kg CO_2-e/kWh)

The Scope 2 emission factor for Victoria, available from Table 41 of the *NGA Factors*, was used for this assessment and is presented in Table A.26. Projected electricity consumption was provided by Boral Cement (Boral Cement, 2016) for FY2020 and FY2040 as shown in Table A.27. The estimated annual greenhouse gas emissions are presented in Table A.28.

Table A.26: *Default emission factor associated with electricity consumption from the grid*

Description	Emission Factor (kg CO_2-e/ kWh)
Scope 2 default CO_2 emission factor - Victoria	1.09

Reference: Table 41 (Department of the Environment and Energy, 2016).

Table A.27: *Projected activity data for electricity consumption*

Year	Electricity Consumption (kWh)
FY2020	7,588,103
FY2040	12,252,843

Table A.28: *Estimated greenhouse gas emissions associated with electricity consumption*

Year	Emissions (tonnes CO_2-e/yr)
FY2020	8,271
FY2040	13,356

Appendix B

Evaluation of Meteorological Data

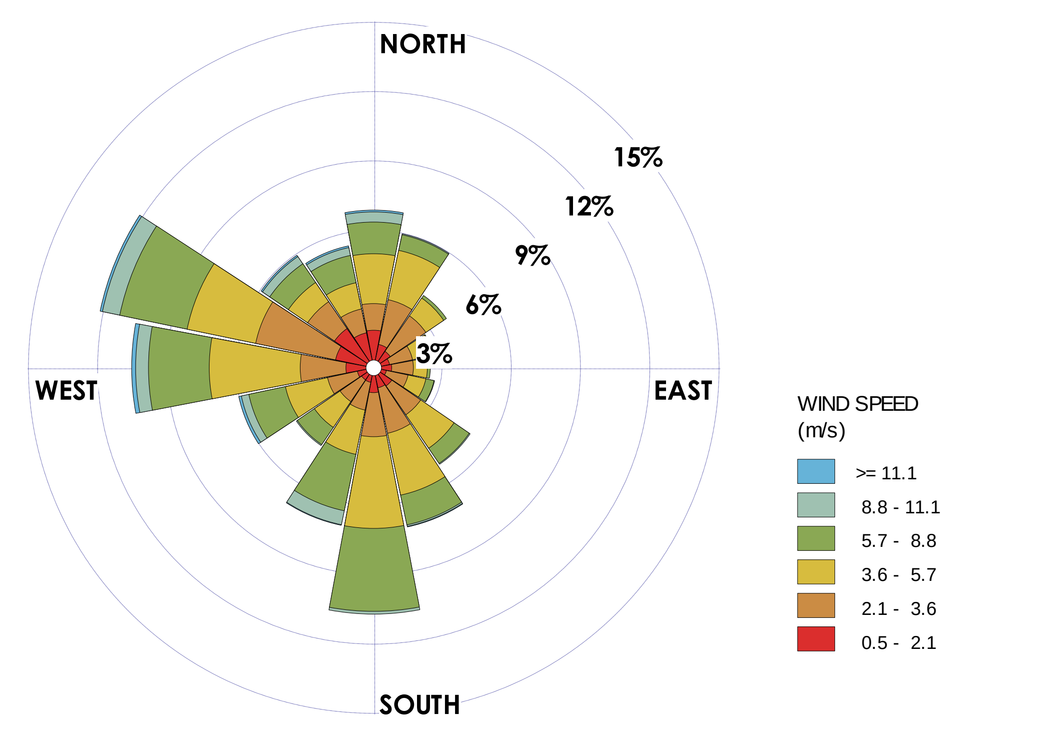
B1 Meteorological Data Evaluation

The primary meteorological parameters involved in modelling plume dispersion in this study are wind direction, wind speed, turbulence (atmospheric stability), and mixing height (depth of turbulent layer). The meteorological data used in the assessment are evaluated below.

B1.1 Wind

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points – N, NNE, NE, etc. The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the bar sections correspond to wind speed categories, the nearest to the centre representing the lightest winds. Thus it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

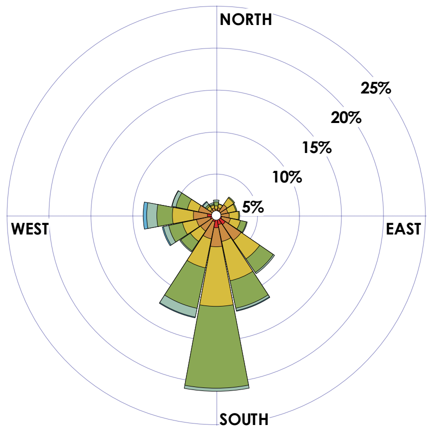
Wind roses extracted at the site location (for the full year, as well as seasonal and time of day) from the meteorological data file used in the dispersion model are provided in Figure B.2 to Figure B.4



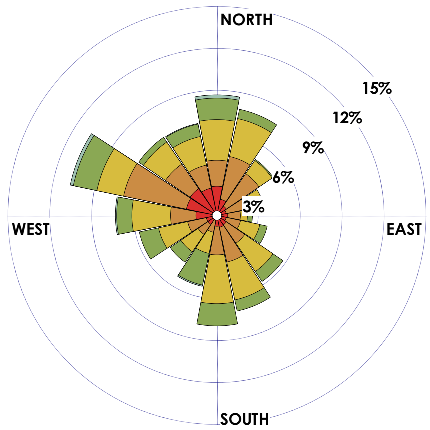
Location: Lascelles Wharf, Geelong	Data Period: 2014	Data Type: CALMET Extract
Calm Winds: 1.6%	Average Wind Speed: 4.2 m/s	Plot: R Chalmer

Figure B.2: *Annual wind rose 2014 Site location at Lascelles Wharf, Geelong*

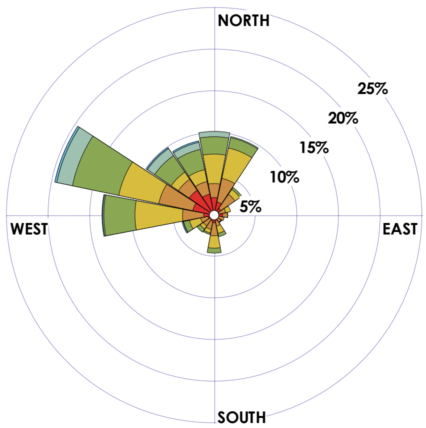
Summer



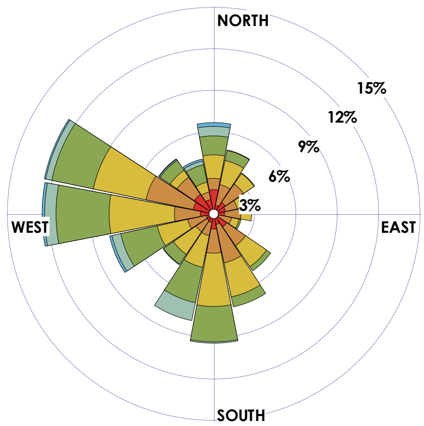
Autumn



Winter



Spring



Period	Average wind speed (m/s)	Calm winds frequency
Summer	4.7	1.0%
Autumn	3.7	1.7%
Winter	4.2	1.5%
Spring	4.3	2.1%

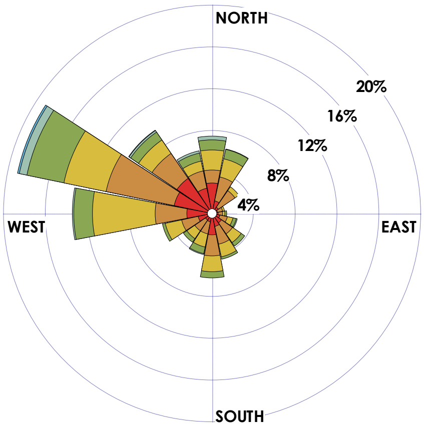
WIND SPEED (m/s)

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

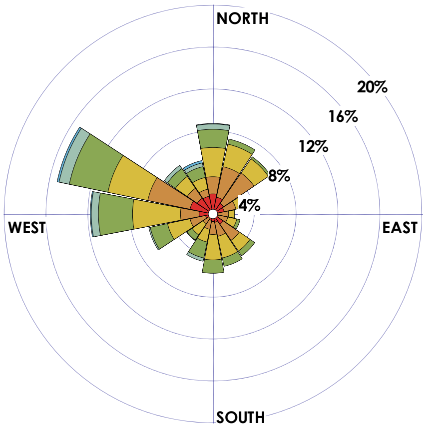
Location:	Data Period:	Data Type:	Plot:
Lascelles Wharf, Geelong	2014	CALMET Extract	J Meline

Figure B.3: *Time of year wind roses 2014 Site location at Lascelles Wharf, Geelong*

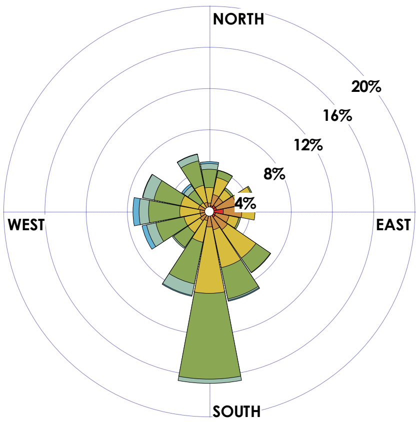
12 am to 6 am



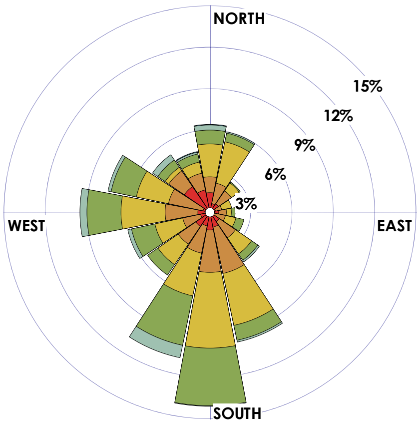
6 am to 12 pm



12 pm to 6 pm



6 pm to 12 am



Period	Average wind speed (m/s)	Calm winds frequency	WIND SPEED (m/s) >= 11.1 8.8 - 11.1 5.7 - 8.8 3.6 - 5.7 2.1 - 3.6 0.5 - 2.1
12 am to 6 am	3.4	2.7%	
6 am to 12 p	4.0	1.6%	
12 pm to 6 pm	5.3	0.3%	
6 pm to 12 am	4.1	1.7%	
Location: Lascelles Wharf, Geelong	Data Period: 2014	Data Type: CALMET Extract	Plot: J Meline

Figure B.4: *Time of day wind roses 2014 Site location at Lascelles Wharf, Geelong*

B2.1 Stability

Atmospheric turbulence is an important factor in plume dispersion. Turbulence acts to increase the cross-sectional area of the plume due to random motions, thus diluting a plume. As turbulence increases, the rate of plume dilution increases. Weak turbulence limits plume dilution and is a critical factor in causing high plume concentrations downwind of a source, particularly when combined with very low wind speeds. Turbulence is related to the vertical temperature gradient, the condition of which determines what is known as stability, or thermal stability. The most well-known stability classification is the Pasquill-Gifford scheme, which denotes stability classes from A to F. Class A is described as highly unstable and occurs in association with strong surface heating and light winds, leading to intense convective turbulence and much enhanced plume dilution. At the other extreme, class F denotes very stable conditions associated with strong temperature inversions and light winds, which commonly occur under clear skies at night and in early mornings. Under these conditions plumes can remain relatively undiluted for considerable distances downwind.

Intermediate stability classes grade from moderately unstable (B), through neutral (D) to slightly stable (E). Whilst classes A and F are strongly associated with clear skies, class D is linked to windy and/or cloudy weather, and short periods around sunset and sunrise when surface heating or cooling is small. As a general rule, unstable (or convective) conditions dominate during the daytime and stable flows are dominant at night. This diurnal pattern is most pronounced when there is relatively little cloud cover and light to moderate winds.

The frequency distributions of stability classes over hour of day in the meteorological file used in the dispersion modelling is presented in Figure B.5. The data shows a high frequency of neutral conditions which is consistent with windy near coastal locations.

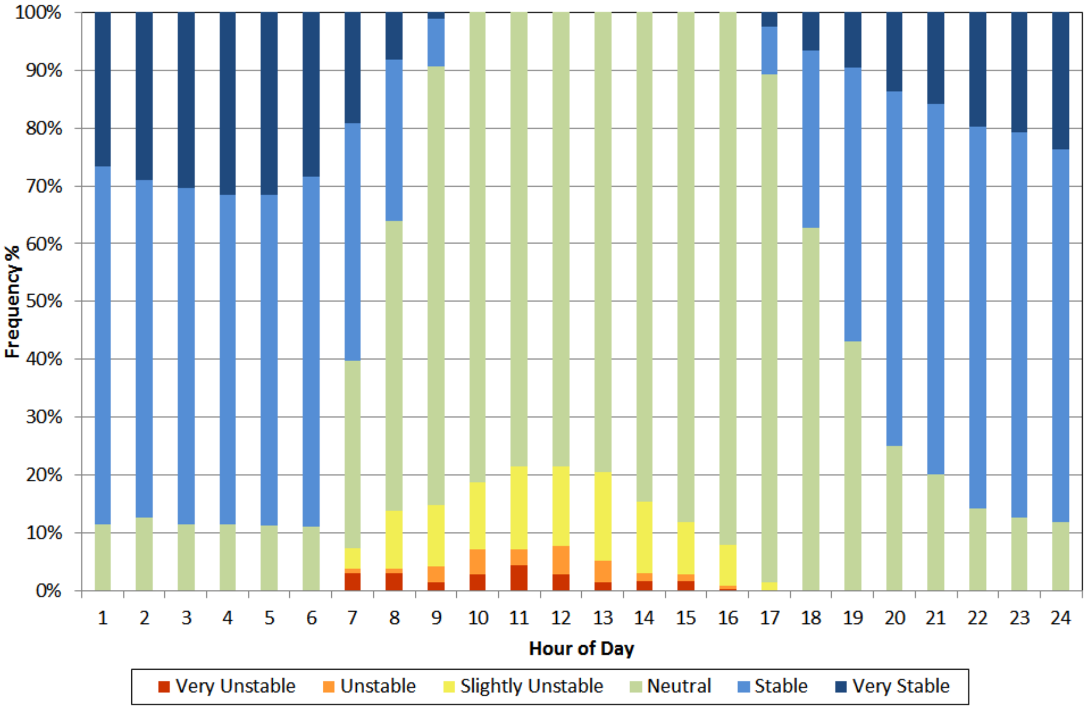


Figure B.5: *Time of day distribution of stability classes, 2014, Site location at Lascelles Wharf, Geelong*

B3.1 Mixing Height

Mixing height is the depth of the atmospheric mixing layer beneath an elevated temperature inversion. It is an important parameter in air pollution meteorology as vertical diffusion or mixing of a plume is generally considered to be limited by the mixing height. This is because the air above this layer tends to be stable, with restricted vertical motions.

The diurnal variation of mixing heights at the site location is summarised and presented in Figure B.6. The diurnal cycle is typical, with mixing height growth during daytime hours in response to convective mixing resulting from solar heating of the earth's surface until late afternoon, followed by a decline around early evening and sunset with lower mixing heights throughout the night and minimum mixing heights just before dawn. Overall, the profile of the mixing heights at the Lascelles Wharf location is consistent with a near coastal location.

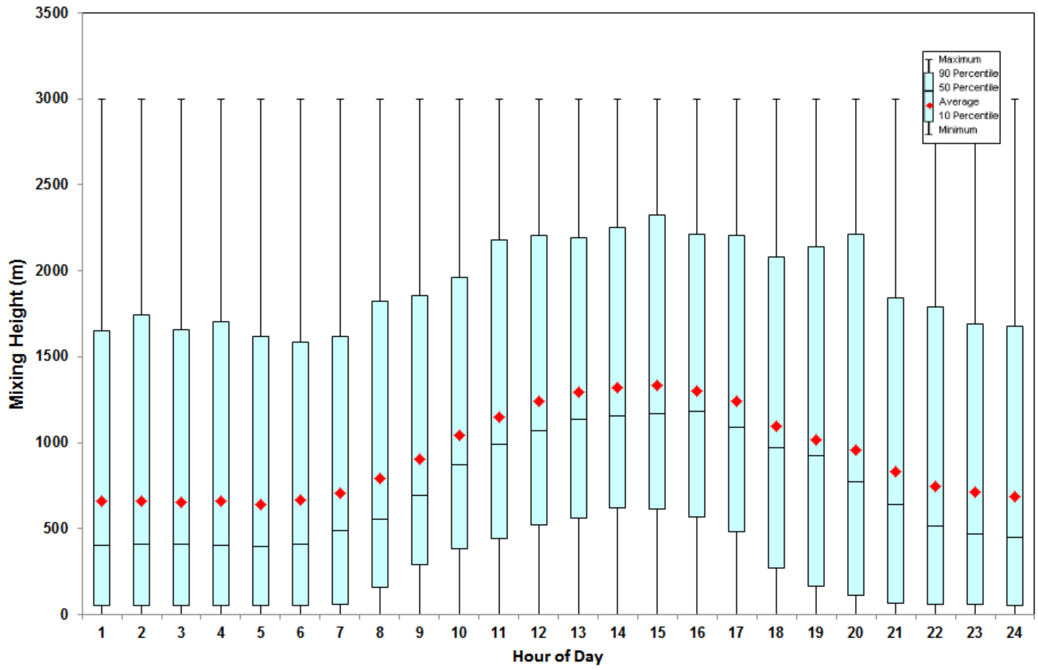


Figure B.6: *Mixing height distribution over time of day, 2014, Site location at Lascelles Wharf, Geelong*

Appendix C

EPA Letter

EPA VICTORIA

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05/07/2016

Mr Johan Meline
Principal Engineer/Manager - SA
Pacific Environment Ltd
Level 1, 35 Edward Street,
NORWOOD SA 5067

Dear Mr. Meline

USE OF CALPUFF MODEL FOR ASSESSING AIR QUALITY IMPACTS FROM PROPOSED BORAL CEMENT GRINIDNG FACILITIES AT LASCELLES WHARF IN GEELONG

Thank you for your recent letter requesting permission to use CALPUFF as alternative model for assessing the air quality impacts from the proposed Boral Cement Grinding facilities at Lascelles wharf in Geelong.

Under Schedule C Part A Clause 3 of the State environment protection policy (Air Quality Management) (“the policy”) the Authority may approve the use of an alternative model to be used in assessing impacts from emissions.

I agree with the modelling concerns associated in near coastal setting with AERMOD using meteorological files constructed by conventional land based data and methodology.

The USEPA acknowledge there are number of issues associated with AERMET-AERMOD for offshore applications. To overcome these issues, USEPA recommends replacing AERMET with AERCOARE the use of AERCOARE-AERMOD is accepted as technically more appropriate for marine applications. USEPA have approved AERCOARE-AERMOD modelling for offshore applications.

Although USEPA’s preference is to use the USEPA AERCOARE-AERMOD regulatory model approach it is not currently recommended in Victoria as there is no local guidance on the use or evaluation of the AERCOARE-AERMOD model in Victoria. Calpuff is used for near shore applications.

EPA approves the use of CALPUFF due to the technical issues of the AERMET-AERMET model in modelling near shore applications.

Yours sincerely

P. Torre

PAUL TORRE
DELEGATE OF THE ENVIRONMENT
PROTECTION AUTHORITY

Appendix D

Dust Management Plan

1. Dust Management Plan

1.1 Introduction

This Dust Management Plan (DMP) has been prepared for the management of dust emissions from the proposed Boral clinker grinding facility at Lascelles Wharf in Geelong.

The dust management plan includes:

- the plan objective and responsibilities
- facility and operation descriptions
- description of dust control activities for dust management
- a complaints management procedure
- details about reporting and review requirements.

1.2 Objective and Purpose

The objective of the DMP is to minimise the potential for adverse dust related impacts on nearby residential and industrial/commercial receptors.

The purpose of the DMP is to provide details for the operation of the facility to achieve the objective.

1.3 Responsibilities

The facility/site manager is responsible for the implementation of the DMP. This includes:

- ensuring that all personnel and contractors conform with requirements of the DMP
- ensuring that personnel on site are aware of their environmental responsibilities and obligations and that this is covered in relevant site inductions
- responding to complaints
- reviewing and updating the DMP as required.

Geelong Port is responsible for the unloading and portside activities.

1.4 Description of Facility and Operations

The site for the proposed clinker grinding facility is at Lascelles Wharf at the Port of Geelong at the North Shore. The site, as shown in Figure 1.1, is to the west of The Esplanade, north of Walchs Road and south of Madden Avenue.

The layout of the site is presented in Figure 1.2.

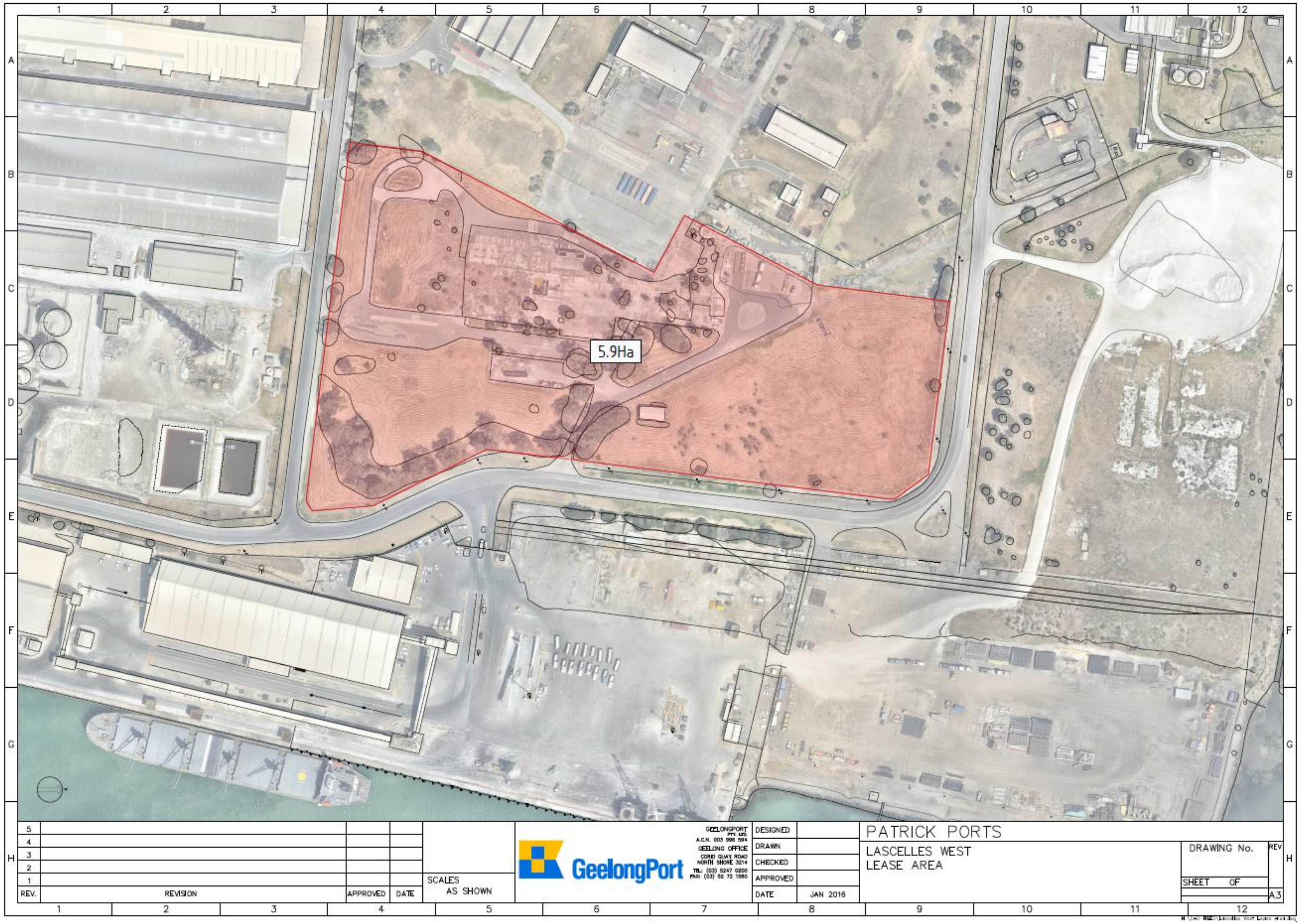


Figure 1.1: *Site location (red polygon) for the clinker grinding facility*

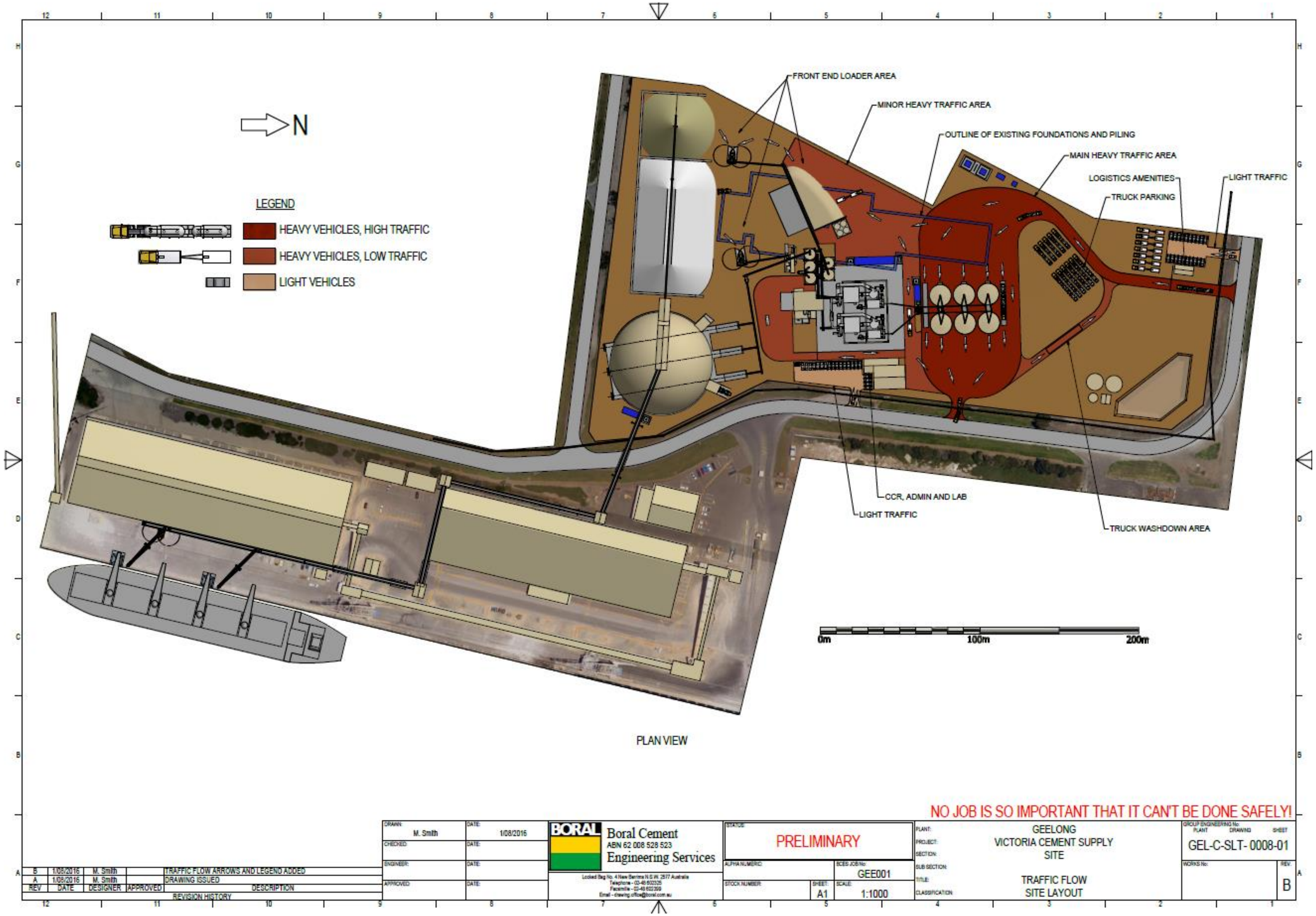


Figure 1.2: *Facility site layout also showing site traffic flows and directions*

The nearest sensitive, residential receptors are located approximately 500 m south of the facility, in the North Shore residential area.

Wind roses presenting details on the typical wind conditions at site (including time of day and seasonal wind roses) are presented in Appendix A.

The clinker grinding facility is planned to produce 950 Ktpa of cement products. Production is forecasted to incrementally grow to around 1.3 Mtpa by 2040. The facility production process consists of grinding and mixing of clinker, slag, gypsum and limestone to product specifications. Clinker, slag and gypsum will be received via shipments and will be unloaded via a covered conveyer system to the storage areas. The clinker will be unloaded and stored within an enclosed storage space. The gypsum and slag will be stored in open stock piles in walled storage bays. Lime stone will be delivered to site via trucks and will be stored in a walled storage bay.

Clinker will be reclaimed from the enclosed storage via underground conveyer belts. Slag, gypsum and lime stone will be reclaimed from the stock pile bays with a front end loader and loaded into hoppers to conveyer systems to process feed storage bins. After grinding, the product is transferred via a sealed system to six product storage silos from which load out of product takes place.

1.5 Dust Management

Effective dust management is best achieved through a combination of:

- use of standard/routine dust control methods
- regular maintenance and inspections to ensure performance of systems and controls
- active management of operations including visual observations of site dust conditions.

The facility's main dust generating activities and sources include:

- materials handling
- wheel generated dust from vehicle movements
- wind erosion from site open surfaces and stockpiles.

Control and management activities are provided below in Table 1.1 to Table 1.7 for:

- materials handling (Table 1.1)
- mobile plant and vehicle movements in bulk storage areas (Table 1.2)
- materials storage (Table 1.3)
- wind erosion (Table 1.4)
- trucks leaving site (Table 1.5)
- stack sources (Table 1.6)
- vehicle exhaust emissions (Table 1.7).

Table 1.1: *Dust control activities for materials handling*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Materials handling including conveyer transfers, truck unloading/loading and front end loader activities	Dust generated from materials handling, unloading and loading activities.	Conveyers to be covered/enclosed with dust extraction at transfer points.
		Dust controls on transfer points to be maintained and inspected regularly to ensure performance to specifications.
		Machinery and control systems to be maintained and inspected regularly to ensure performance to avoid incidents due to malfunctions. Service records to be kept.
		Materials handling and controls systems to be fitted with automated warnings/alerts of malfunction.
		Water sprays at conveyer material drop off points at open stock piles.
		Where relevant, ensure that material moisture content is maintained at sufficient levels (i.e. >4%) to reduce dust emissions for loading and unloading operations.
		Drop heights to be minimised for loading and unloading operations.
		If required, use water sprays at active stockpile faces where loading and unloading occurs.
		Installation of wind break fencing where required.[1]
		Covered loads on material deliveries.

[1] Additional dust control measure that can be implemented if required to control wind erosion or materials handling dust emissions. Wind break fences are typically at least the same height as the activity or stock pile that is targeted for control. Required height for desired efficiency can vary depending on the distance of the fence from the activity/stock pile.

Table 1.2: *Dust control activities for mobile plant and vehicle movements in bulk storage areas*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Wheel generated dust from mobile plant and truck movements for materials handling and deliveries on site in bulk storage areas.	Dust is generated from wheel generated dust in bulk materials handling areas. Dust emissions increase proportionately with surface silt loadings. Silt loading increases from materials spillage build up and can be further exacerbated by dry conditions.	Street sweeping at required frequency of bulk materials handling area trafficked by front end loader between stockpiles and hoppers.
		Speed limits as required in the bulk materials handling areas to reduce dust emissions.
		Watering of areas in between sweeping events, if required, to supress generation of dust.
		Access for non-essential vehicles to be limited in bulk materials storage areas.
		If required, installation of wind break fences, where practicable, as part of site boundary fences.

Table 1.3: *Dust control activities for materials storage*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Materials on site storage	Wind erosion from stockpiled materials	Watering of exposed areas if dust is observed leaving the site. This typically occurs during dry and windy conditions.
		Use of wind break fences around stockpile areas, if required[2].
		Enclosed storage of the clinker stockpile.

Table 1.4: *Dust control activities for wind erosion*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Wind erosion from site	Wind erosion from whole of site	Regular sweeping of bulk materials handling, open and trafficked areas to reduce material build up.
		Watering of exposed areas if dust is observed leaving the site. This typically occurs during dry and windy conditions.
		Use of wind break fences around site and extra wind break fences, as required.
		Where feasible, and if required, consider the use of dust binder products.
		Where practical, vegetation can contribute to break/reduce winds and the potential for wind erosion.

[2] Additional dust control measure that can be implemented if required to control wind erosion or materials handling dust emissions. Wind break fences are typically at least the same height as the activity or stock pile that is targeted for control. Required height for desired efficiency can vary depending on the distance of the fence from the activity/stock pile.

Table 1.5: *Dust control activities for trucks leaving site*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Wheel generated dust from trucks leaving site.	Mud drag out from site due to material spillages on to public roads creating off site dust generation.	Clean up of material when observed.
		Trucks leaving site to pass through the truck wash when required to prevent mud drag out.
		Cement trucks to keep to the designated main heavy traffic area

Table 1.6: *Dust control activities for stack sources*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Particulate emissions from stack sources	Emitted residual particulate matter after dust control	Emission controls to be maintained and inspected regularly to ensure performance to specifications.
		Emission control systems to be fitted with automated warnings/alerts of malfunction.

Table 1.7: *Air quality control activities for vehicle exhaust emissions*

Dust Generating Activity	Issue	Dust Control/ Dust Control Activity
Vehicle exhaust emissions	Emissions of heavy vehicle diesel engine exhaust emissions.	Maintenance of plant equipment to ensure good working conditions to minimise visible smoke.
		Vehicles with excessive smoke emissions to be sent for maintenance.
		Unnecessary idling of trucks and mobile plant should be avoided.

1.6 Monitoring

A weather station should be installed at site to provide a record of wind conditions (wind speed and wind directions) for any complaints investigations and to provide information and data on weather conditions relevant for the site dust management.

1.7 Complaints Management

A well managed response process to dust complaints can play a significant role in managing potential nuisance and community relations.

1.7.1 Background

A complaints register is to be maintained at the site by Boral. Any complaints made to Boral will be entered in the register. The register will be maintained on an ongoing basis and will also be used as a tool to improve the management of the site.

1.7.2 Complaints Response Process

Upon receipt of a dust complaint, the following information shall be recorded:

1. The date and time of complaint.
2. Who the complaint was received by.
3. The method by which the complaint was made (i.e. verbal, telephone, written).
4. Any personal details of the complainant which were provided, or if no such details were provided, a note to that effect.
5. Whether the dust was visible (air borne) or deposited.
6. The location of the nuisance observation.
7. Wind speed and direction prior to, and at the time the complaint was received (data from onsite weather station).
8. Record of any visible dust plumes leaving site at the time of the complaint and/or the period leading up to the complaint.
9. Site activities at the time of the complaint.
10. The action/actions taken by Boral in relation to the complaint, including any follow up contact with the complainant.
11. If no action was taken, the reason(s) why no action was taken.

The facility/site manger shall be informed immediately of any complaints.

A complaints registry form is included in Appendix B.

1.7.3 Complaints Validation Process

When the facility/site manager becomes aware of a complaint the following will occur:

1. Review of onsite activities and resulting dust generation.
2. Observation if dust generated onsite can be observed leaving site.
3. If visible dust is leaving the site, measures within this DMP will be implemented to reduce emissions to an acceptable level.
4. The facility/site manager or other nominated and appropriately trained person will travel to the site of the complaint (if known) and identify whether visible dust is leaving the site or make observations regarding whether the observed dust can be attributed to the facility operations.
5. If dust is not observed leaving the site, the manager or appointed person will drive around the local area to identify other possible dust sources and make notes about the observations.

4\. The actions of the response will be recorded in the complaint register.

Should complaints be made or provided after the fact, details of the complaint will be investigated to the extent possible following the above process.

1.7.4 Notifications

Notifications of received complaints will be provided to the regulator as required by environmental licence conditions.

1.8 Reporting

1.8.1 Internal Reporting

All employees and contractors are required to report generation of significant dust emissions to the facility/site manager.

1.8.2 Compliance/Complaints Reporting

Compliance and complaints reporting will be provided to the regulator as required by environmental license conditions.

1.9 Review of DMP

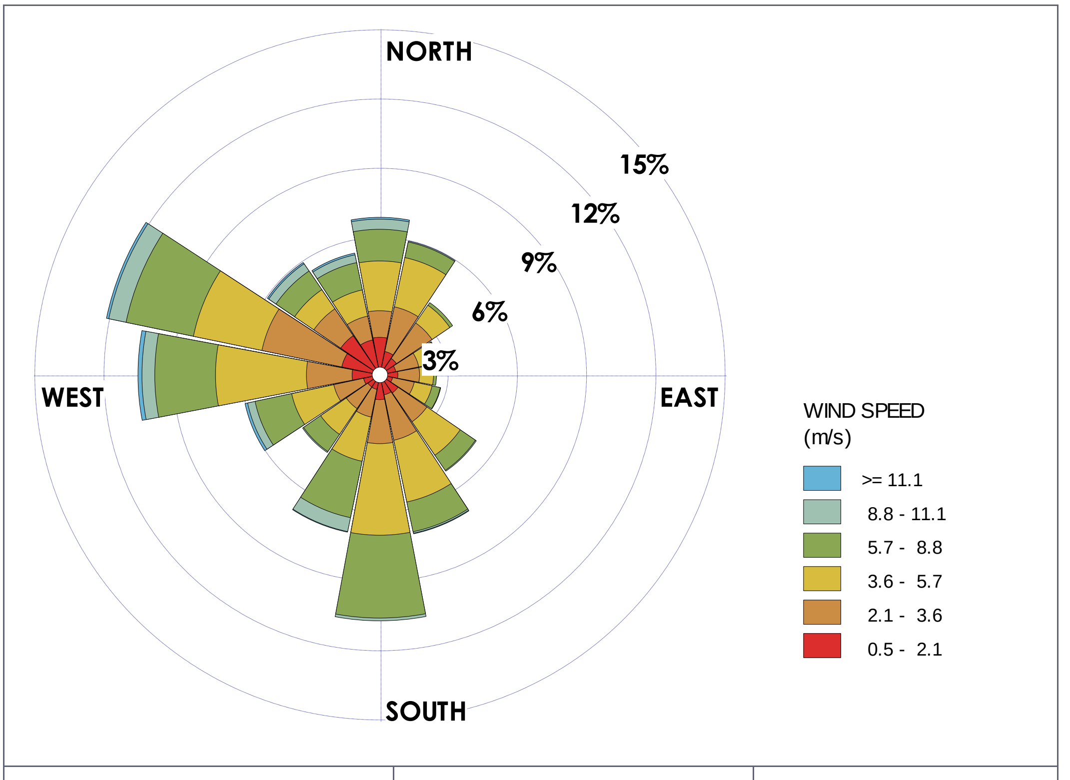
The facility/site manager will review the DMP at least every two years to ensure that the DMP is up to date with the site conditions and operating procedures. For example, such a review could be required if:

- prompted by complaints
- due to a change is site conditions
- due changes in site activities or the production process.

Appendix A
Wind Roses

A1 Wind Roses

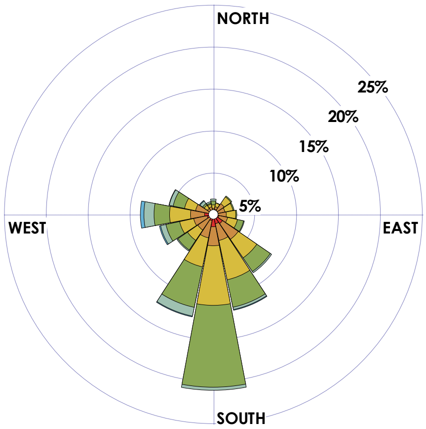
Wind roses extracted at the site location (for the full year, as well as seasonal and time of day periods) from the meteorological data file used in the dust impact assessment are provided in Figure A.3 to Figure A.5



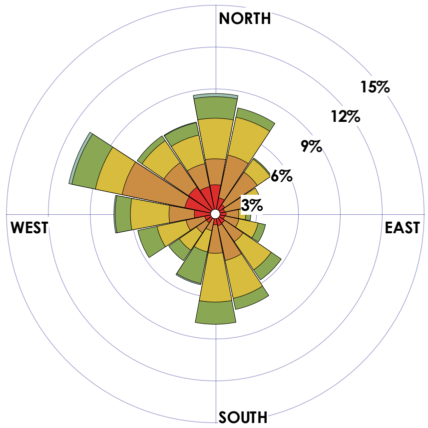
Location: Lascelles Wharf, Geelong	Data Period: 2014	Data Type: CALMET Extract
Calm Winds: 1.6%	Average Wind Speed: 4.2 m/s	Plot: R Chalmer

Figure A.3: *Annual wind rose 2014 Site location at Lascelles Wharf, Geelong*

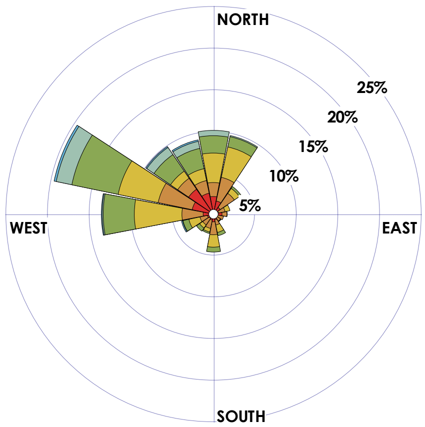
Summer



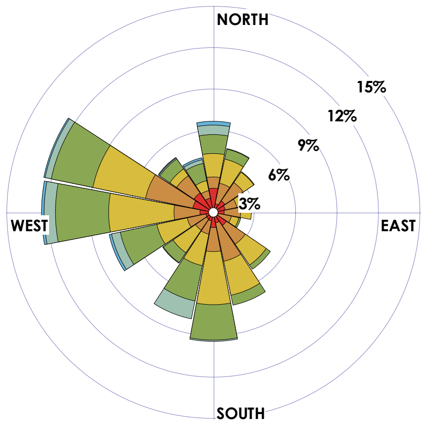
Autumn



Winter



Spring



Period	Average wind speed (m/s)	Calm winds frequency
Summer	4.7	1.0%
Autumn	3.7	1.7%
Winter	4.2	1.5%
Spring	4.3	2.1%

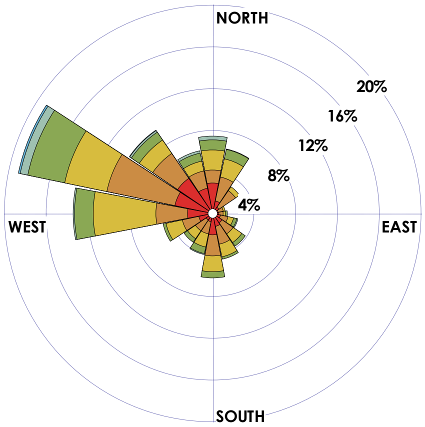
WIND SPEED (m/s)

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

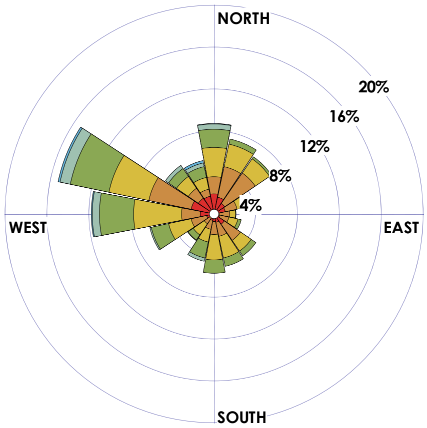
Location: Lascelles Wharf, Geelong	Data Period: 2014	Data Type: CALMET Extract	Plot: J Meline

Figure A.4: *Time of year wind roses 2014 Site location at Lascelles Wharf, Geelong*

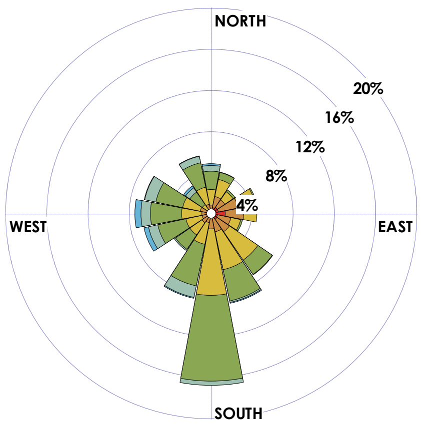
12 am to 6 am



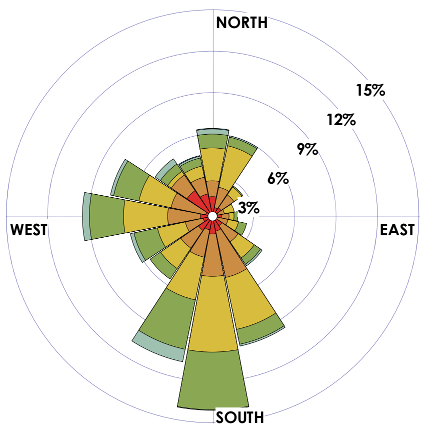
6 am to 12 pm



12 pm to 6 pm



6 pm to 12 am



Period	Average wind speed (m/s)	Calm winds frequency
12 am to 6 am	3.4	2.7%
6 am to 12 p	4.0	1.6%
12 pm to 6 pm	5.3	0.3%
6 pm to 12 am	4.1	1.7%

WIND SPEED (m/s)

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

Location:	Data Period:	Data Type:	Plot:
Lascelles Wharf, Geelong	2014	CALMET Extract	J Meline

Figure A.5: *Time of day wind roses 2014 Site location at Lascelles Wharf, Geelong*

Appendix B
Complaint Registry Form

B1 Complaint Registry Form

Date and time of complaint:	
The method by which the complaint was made (i.e. verbal, telephone, written).	
Any personal details of the complainant which were provided by the complainant, or if no such details were provided, a note to that effect.	
Whether the dust was visible (airborne) or deposited.	
The location of the nuisance observation.	
Wind speed and direction prior to, and at the time the complaint was received (from onsite weather station).	
Record of any visible dust plumes leaving site at the time of the complaint and/or the period leading up to the complaint.	
Site activities on site at the time of the complaint.	
The action/actions taken by Boral in relation to the complaint, including any follow up contact with the complainant.	
If no action was taken, the reason(s) why no action was taken.	
Complaint received by:	

Appendix C
Facility and Operations Description

C1 Facility and Operations Description

The facility and operations description below is a summary of the different facility activities included to provide background information to the DMP.

Descriptions are provided for the following processes:

- Port unloading & raw material transfer to storage
- Raw material storage - clinker store
- Raw material storage - slag storage
- Raw material storage - gypsum storage
- Raw material storage - limestone storage
- Clinker reclaim and transport
- Slag reclaim and transport
- Slag drying
- Gypsum and limestone reclaim and transport
- Clinker dosing bin and feed
- Slag dosing bin and feed
- Gypsum dosing bin and feed
- Limestone dosing bin and feed
- Cement/clinker grinding
- Finished product storage and dispatch

C1.1 Port Unloading & Raw Material Transfer to Storage

The unloading of materials at Geelong Port necessitates that the berth be available for other ships to unload cargo unrelated to Boral operations. This requires the reception hoppers and initial conveying equipment to be of a portable type that can be easily mobilised, de-mobilised and stored within the port complex.

The clinker, slag and gypsum will arrive into the port via ship with an estimated nominal capacity of 33 kt or 44 kt for clinker and slag and 30 kt for Gypsum. These materials are to be unloaded with the ships crane into two mobile reception hoppers. These hoppers will be capable of a combined throughput of ~650 tph for clinker, slag and gypsum.

Each hopper will have an intermediate conveyor from the outlet feeding onto a portable transfer conveyor. In turn the portable conveyors will feed onto the fixed system of conveyors which will deliver the raw materials into the site.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from designed transfer points. All conveyors including the portable type will have some form of weather protection to prevent wind-blown fugitive dusts and rain impairment of the materials.

The conveyor system will discharge clinker into the covered clinker storage. Slag and gypsum will be directed via a two-way diverter chute onto a series of tripper conveyors to the respective storage areas.

As a minimum, all transfer points will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will be discharged onto the following conveyor of the series.

C2.1 Raw Material Storage - Clinker Store

A covered Clinker Store will be provided for the clinker storage. This store will have a nominal capacity of 85 kt and is proposed to be of concrete construction with a dome profile to minimise physical footprint and maximise live capacity. The store will have a top apex section with a diverter chute for clinker and slag/gypsum feed and a five or six leg chute to distribute the clinker. The diverter chute and clinker distribution chutes will have appropriate isolation arrangements.

The store will have a dust filtration system capable of maintaining a 20 mg/Nm^3 clean air discharge for clinker/air displacement to suit the 650 tph feed rate and the volumetric capacity of the store. Collected clinker dust will be fed back into the clinker transport system.

Entry into the store will be via two doors suitable for front end loader to safely access. The doors shall be manually operated with a mechanical slide arrangement sealed from dust ingress. These doors shall only be opened 1 to 2 times per year unless a shipment of material is missed.

C3.1 Raw Material Storage - Slag Storage

Slag will be stored in an open stockpile. Concrete retaining walls on three sides will segregate the material. Water mist spraying or other approved dust suppression system will be required around the slag storage area and the discharge chute. The combined storage capacity of slag and gypsum is a maximum of 75 kt.

C4.1 Raw Material Storage - Gypsum Storage

Gypsum will be stored in an open stockpile. Concrete retaining walls on three sides will segregate the material. The combined storage capacity of slag and gypsum is a maximum of 75 kt.

C5.1 Raw Material Storage - Limestone Storage

Limestone will be stored in an open stockpile of 3.5 kt capacity. Concrete retaining walls on three sides will segregate the material. Limestone is to be delivered into site via truck on a daily basis.

C6.1 Clinker Reclaim and Transport

The Clinker Store will have sufficient outlets to achieve 75% live clinker loading. Clinker discharge will be via clam shell or similar arrangement with rod gates for isolation.

Each outlet shall have a local filtration system attached capable of achieving 20 mg/Nm^3 clean air discharge with collected dust deposited directly onto the local conveyor belt.

Three conveyor belts will be located below the clinker store and will feed material into a fourth belt that will emerge from below to above ground and discharge into a bucket elevator. The elevator will be positioned at ground level and will feed to a further belt conveyor that will transport the clinker into the dosing bin.

The bucket elevator will be designed to suit the temperature and abrasive profile of the material conveyed and will incorporate guarding and safety mechanisms to latest Australian Standards and statutory requirements.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust shall discharge onto the following conveyor of the series.

C7.1 Slag Reclaim and Transport

Slag will be collected with a front end loader and fed into the slag dryer reception hopper. The hopper will have sufficient capacity to store 40 t of material.

C8.1 Slag Drying

Slag will be dried to the required specification through the dryer system. The dryer will be capable of an output of 100 tph dry slag with an input of raw slag at bulk density 1,400 kg/m^3 with a typical moisture content in the range of 8% to 10% (maximum 12%) moisture content. The dryer will be a natural gas type unit and will have dust collection facilities incorporated capable of 10 mg/Nm^3 clean air discharge and filter media capable of normal operation at the elevated operating temperatures.

The slag dryer will feed dry slag into a screw conveyor or similar approved steel conveying system into a bucket elevator. The elevator will convey material to a height suitable of transfer via a further screw conveyor or similar approved steel conveyor. The bucket elevator will be designed to suit the temperature and abrasive profile of the material conveyed and will incorporate guarding and safety mechanisms to latest Australian Standards and statutory requirements.

It is envisaged that the slag will be at a temperature of 100-110 ˚C at the outlet of the dryer.

The fixed conveyor systems will be designed for the temperature and abrasive profile of the conveyed material, prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge and filter media capable of normal operation at the elevated operating temperatures. Collected dust will discharge onto the following conveyor of the series or dosing bin.

C9.1 Gypsum and Limestone Reclaim and Transport

Gypsum and Limestone will be collected with a front end loader typically 1 to 2 times a day for 1 to 2 hours and fed into a strategically located reception hopper. The hopper shall have sufficient capacity to 10 t of gypsum and 10 t of limestone without discharge onto the transfer conveyor.

The hopper will feed gypsum or limestone onto a belt conveyor that will transport the material into either the gypsum or limestone dosing bins via a diverter chute.

The fixed conveyor system shall be designed to prevent material spillage and reduce dust generation from designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms to latest Australian Standards and statutory requirements.

As a minimum all transfer points shall have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge and filter media capable of normal operation at the elevated operating temperatures. Collected dust shall discharge onto the following conveyor of the series or dosing bin.

C10.1 Clinker Dosing Bin and Feed

Clinker will be stored in a single dosing bin of 300 t capacity to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure clinker onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bin or onto the following conveyor of the series.

C11.1 Slag Dosing Bin and Feed

Slag will be stored in two dosing bins of 600 t capacity to feed the ball mills within the grinding circuit. The dosing bins will have an automatic feed system at the outlet which will measure slag onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bins or onto the following conveyor of the series.

C12.1 Gypsum Dosing Bin and Feed

Gypsum will be stored in a single dosing bin of 120 t capacity to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure gypsum onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from effectively designed transfer points. They shall have access walkways as specified and guarding and safety mechanisms to latest Australian Standards and statutory requirements.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bin or onto the following conveyor of the series.

C13.1 Limestone Dosing Bin and Feed

Limestone will be stored in a single dosing bin of 300 t capacity to feed the ball mills within the grinding circuit. The dosing bin will have an automatic feed system at the outlet which will measure limestone onto the feed conveyor system into the ball mills.

The fixed conveyor system will be designed to prevent material spillage and reduce dust generation from designed transfer points.

As a minimum all transfer points and the silo will have adequate dust collection capable of maintaining 20 mg/Nm^3 clean air discharge. Collected dust will discharge into the dosing bin or onto the following conveyor of the series.

C14.1 Cement/Clinker Grinding

The grinding circuit will primarily consist of two ball mills capable of achieving 95-105 tph [3] throughput for GP Cement; the facility will include dynamic, high efficiency separation within a closed circuit.

The circuit will require hot gas generation and a recirculation duct and damper arrangement will be required from the mill outlet back to the inlet to enable the mill outlet temperature to be controlled. An emergency cold air bleed arrangement will be required at the inlet to the main dust collector to provide protection from overheating. The discharge from the main dust collector will be ducted to an exhaust fan which will in turn discharge the gas to the main stack for discharge to the atmosphere. The main dust collector will be capable of maintaining 30 mg/Nm^3 clean air discharge.

Finished product will leave the circuit via a bucket elevator and feed airslides into the finished product silos.

The bucket elevator will be designed to suit the temperature and abrasive profile of the material conveyed and will incorporate guarding and safety mechanisms to latest Australian Standards and statutory requirements.

Airslides will be designed to convey product efficiently, they will have access walkways as specified and guarding and safety mechanisms to latest Australian Standards and statutory requirements.

Strategically located filters are required to ensure that the circuit operates in a completely dust free manner. As a minimum, transfer points into will have adequate dust collection capable of maintaining 30 mg/Nm^3 clean air discharge.

C15.1 Finished Product Storage and Dispatch

It is proposed that six finished product silos will be erected; three silos for GP Cement; two silos allocated to slag and a single silo for HES Cement.

The feed rate into the silos will be designed to 150 tph and they shall have a combined capacity of 20.5 kt of live product; the discharge rate shall be 28 t in 10 minutes per truck. The silos will be of steel construction with inlet and outlet dust collection facilities. The product will be fed from the silo via airslides to a loading spout. Weighbridge facilities will be located below the loading spouts. The silos will include an integral aeration and discharge facility at the outlet. Dust collectors will be installed at the truck loading point.

C16.1 Annual Production and Raw Materials

The annual raw material handling quantities for the facility production rate as assessed for FY 2040 at 1.3 Mtpa of produced cement products are presented in Table C.8.

---

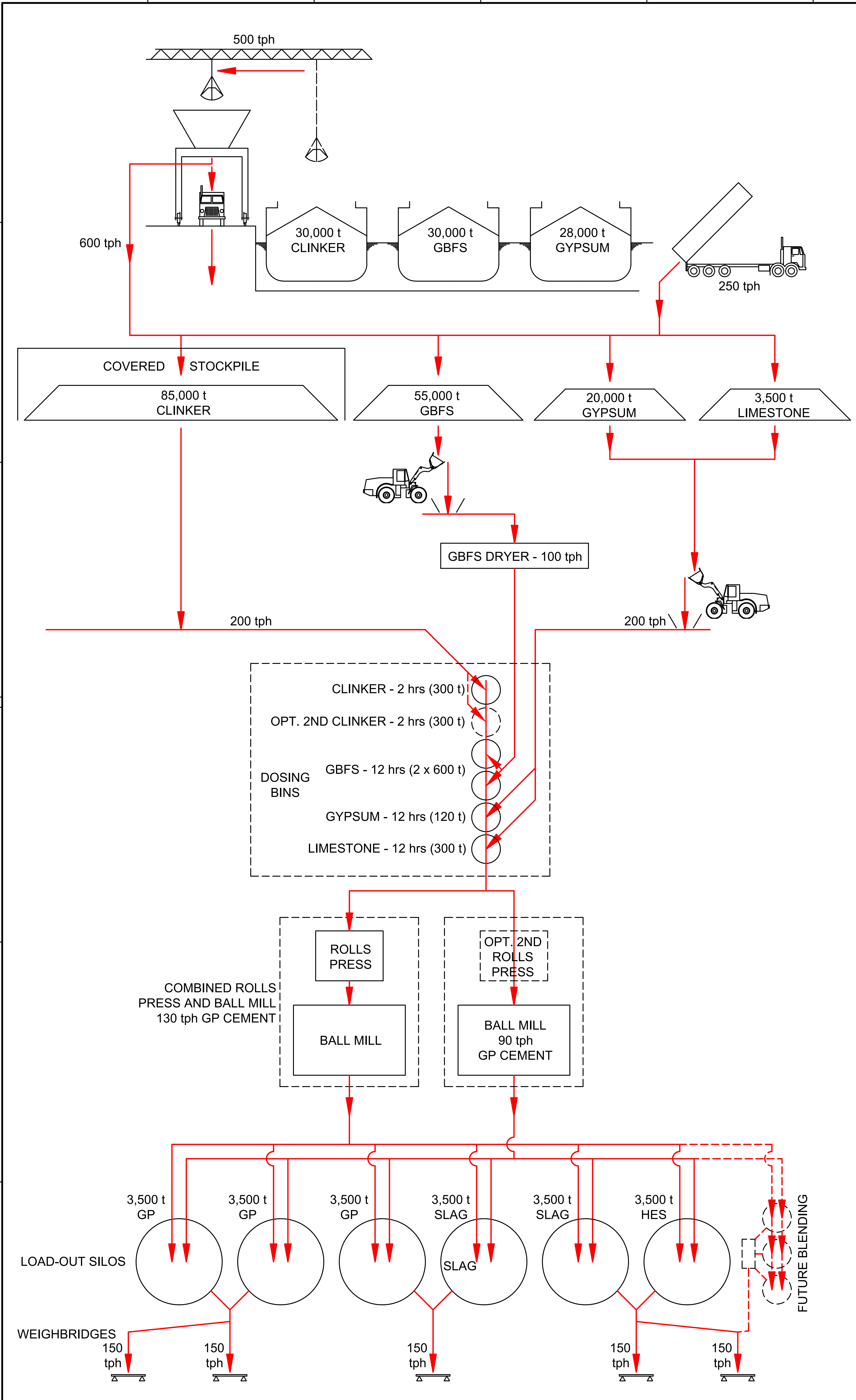
[3] Mill capacity for FY 2040 150 tph.

Table C.8: *Annual raw material handling rates 2020 and 2040 as assessed*

Raw material	GP Cement product ratio	HES Cement product ratio	Slag product ratio	Annual material handling rate 2020	Annual material handling rate 2040
Clinker	87.5%	90%	-	678,000 t	922,000 t
Raw slag	-	-	95%	146,000 t	198,000 t
Limestone	7,5%	5%	-	79,000 t	108,000 t
Gypsum	5%	5%	5%	47,000 t	64,000 t

Appendix E

Facility Layouts and drawings



DRAWING No: GEL-M-MFD-0002-01

REV. B

WORKS No:

TITLE: CLINKER AND SLAG GRINDING MATERIAL FLOW DIAGRAM

PLANT:
PROJECT:
SECTION:
SUB SECTION:
CLASSIFICATION:

SCALE:
JOB No: GEE001
ALPHA NUM:
SHEET A3

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APPROVED:		DATE:

REV.	DATE	BY	APP	REVISION
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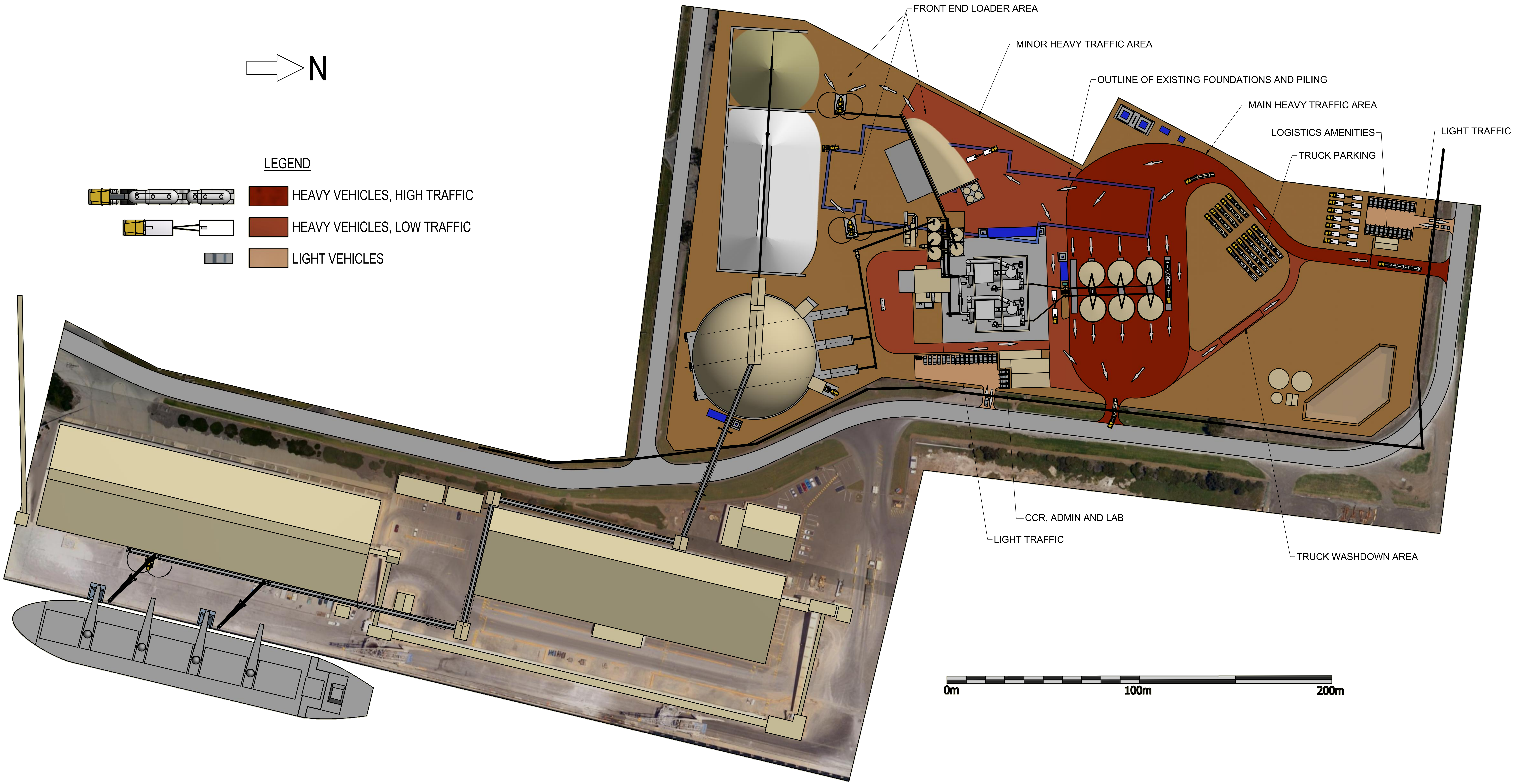
A	27/05/16	MJS		DRAWING ISSUED



PLAN VIEW

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REV	DATE	DESIGNER	APPROVED	DESCRIPTION
B	1/08/2016	M. Smith		TRAFFIC FLOW ARROWS AND LEGEND ADDED
A	1/08/2016	M. Smith		DRAWING ISSUED

REVISION HISTORY

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CHECKED:	DATE:		
ENGINEER:	DATE:		
APPROVED:	DATE:		

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STATUS: PRELIMINARY

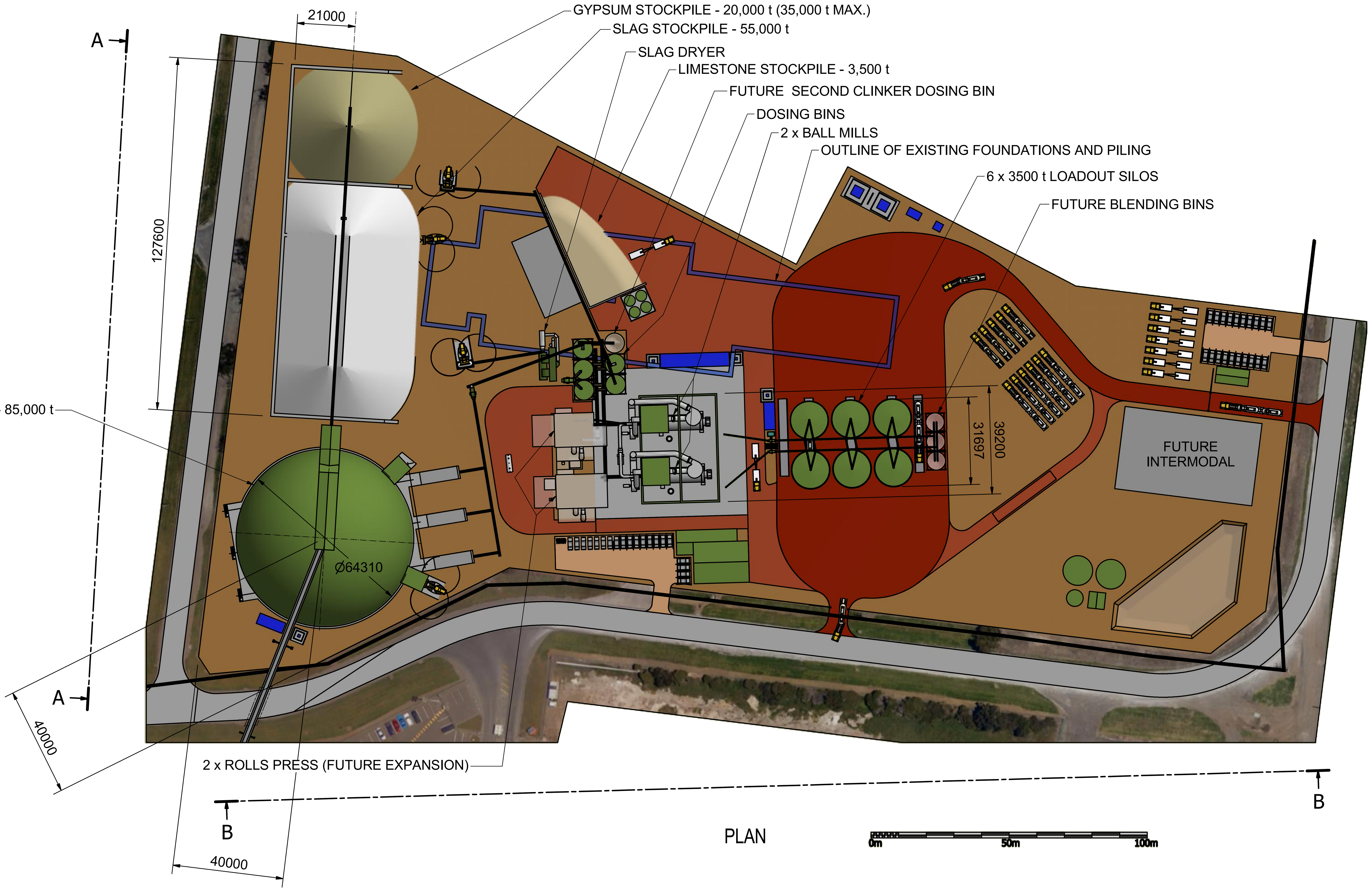
ALPHA NUMERIC:
BCES JOB No: GEE001
STOCK NUMBER:
SHEET: A1
SCALE: 1:1000

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY SITE
SECTION:
SUB SECTION:
TITLE: TRAFFIC FLOW SITE LAYOUT
CLASSIFICATION:

GROUP ENGINEERING No: PLANT DRAWING SHEET
GEL-C-SLT- 0008-01
WORKS No:
REV. B

N

NOTE:
ALL DIMENSIONS AND RL's ARE APPROXIMATE.



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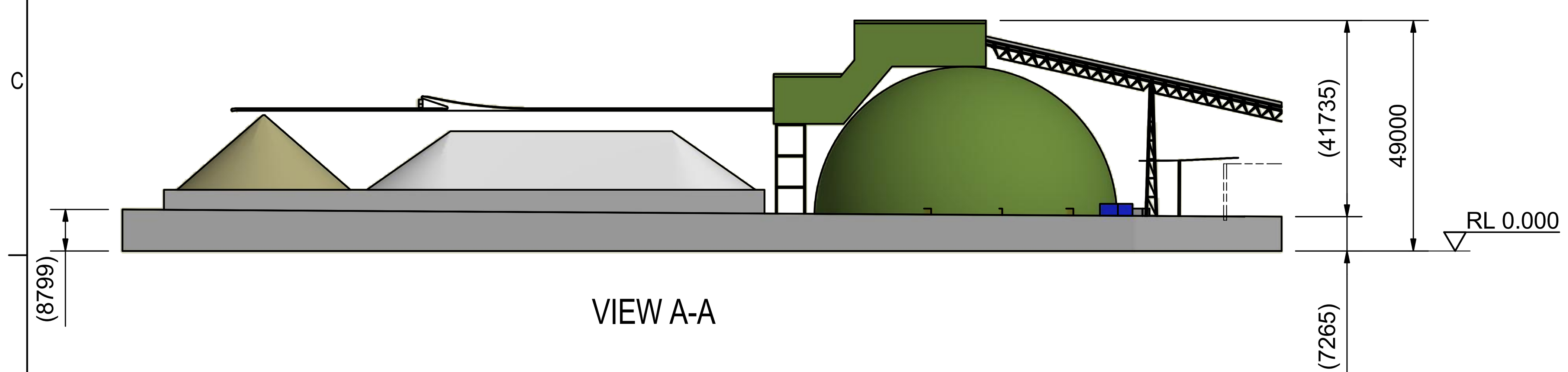
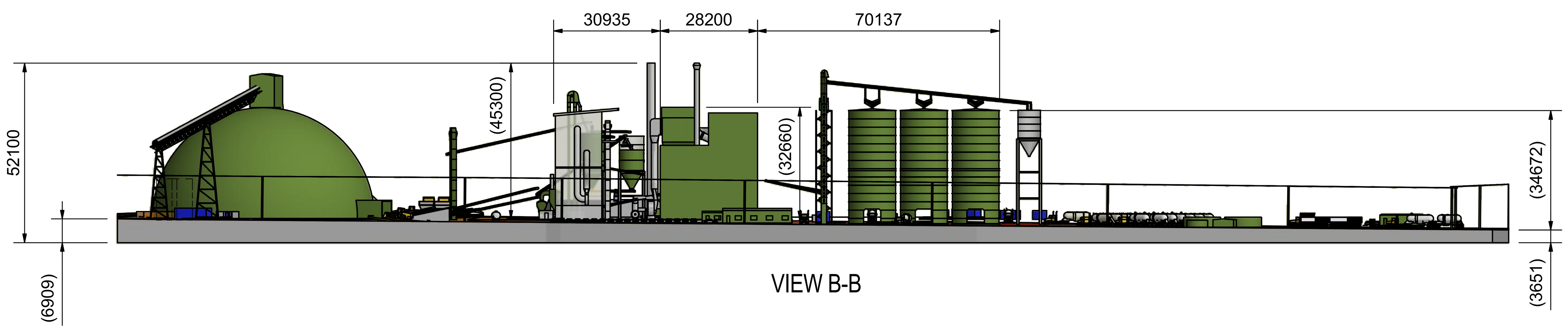


VIEW A-A



VIEW B-B

NO JOB IS SO IMPORTANT THAT IT CAN'T BE DONE SAFELY!

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
B	03/08/2016	M. Smith		DETAIL ADDED TO BALL MILL AREA
A	28/07/2016	M. Smith		DRAWING ISSUED

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DRAWN: M. Smith DATE: 28/07/2016
CHECKED: DATE:
ENGINEER: DATE:
APPROVED: DATE:

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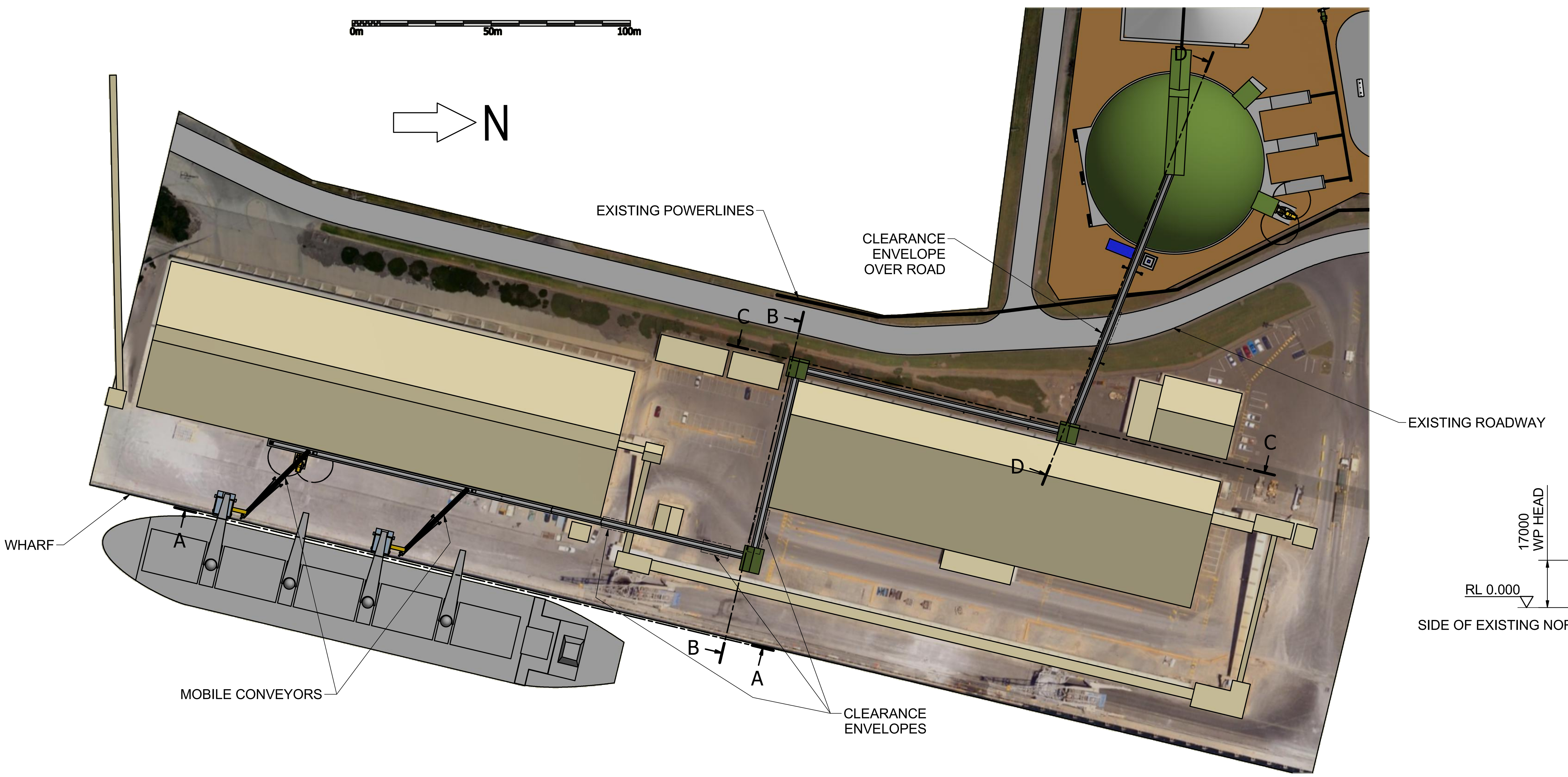
STATUS: PRELIMINARY
ALPHA NUMERIC: BCES JOB No:
STOCK NUMBER: SHEET: A1 SCALE: 1:1000

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY
SECTION: SITE
SUB SECTION: CEMENT GRINDING PLANT
TITLE: DOME CLINKER / LINEAR SLAG & GYPSUM STORES
CLASSIFICATION: SITE LAYOUT

GROUP ENGINEERING No: PLANT DRAWING SHEET
GEL-C-SLT- 0007-03
WORKS No:
REV. B



PLAN VIEW

NOTE:
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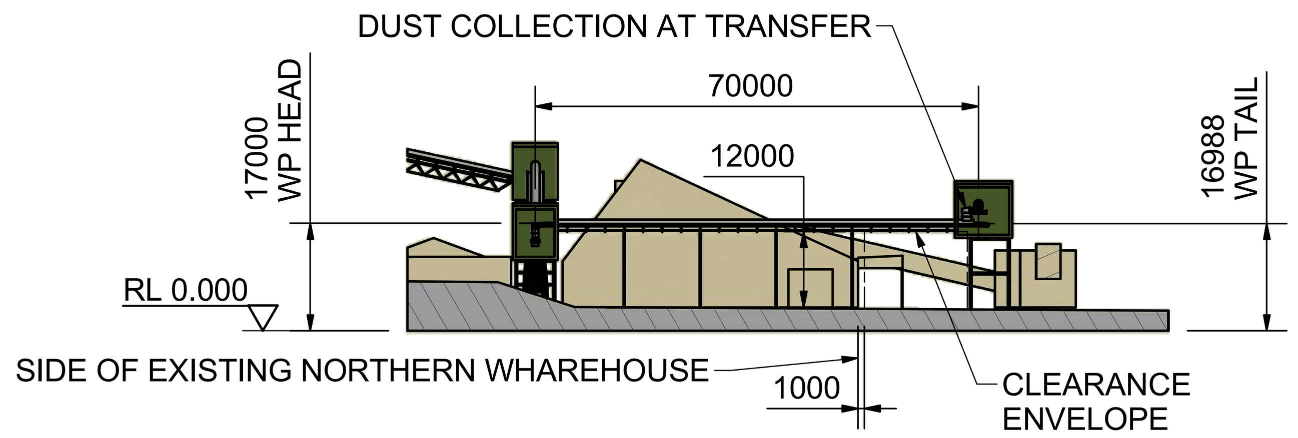

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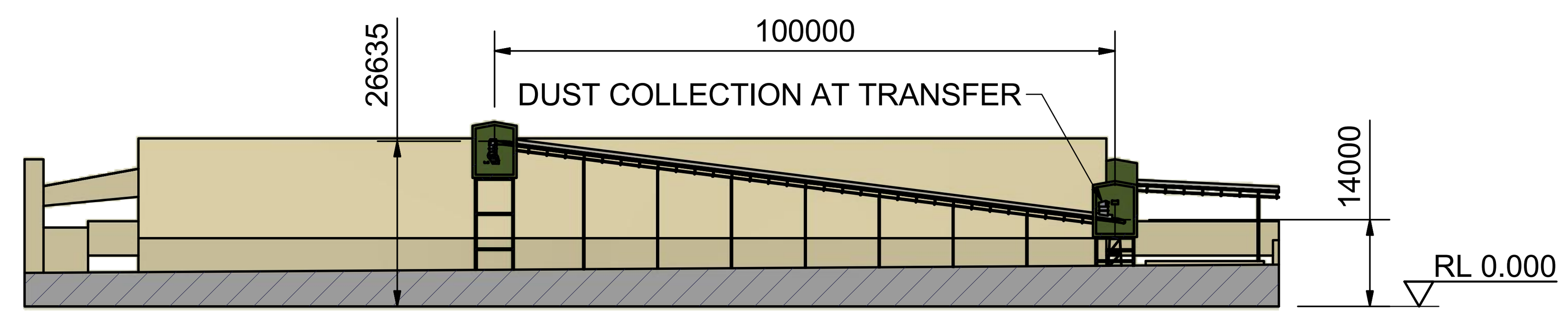

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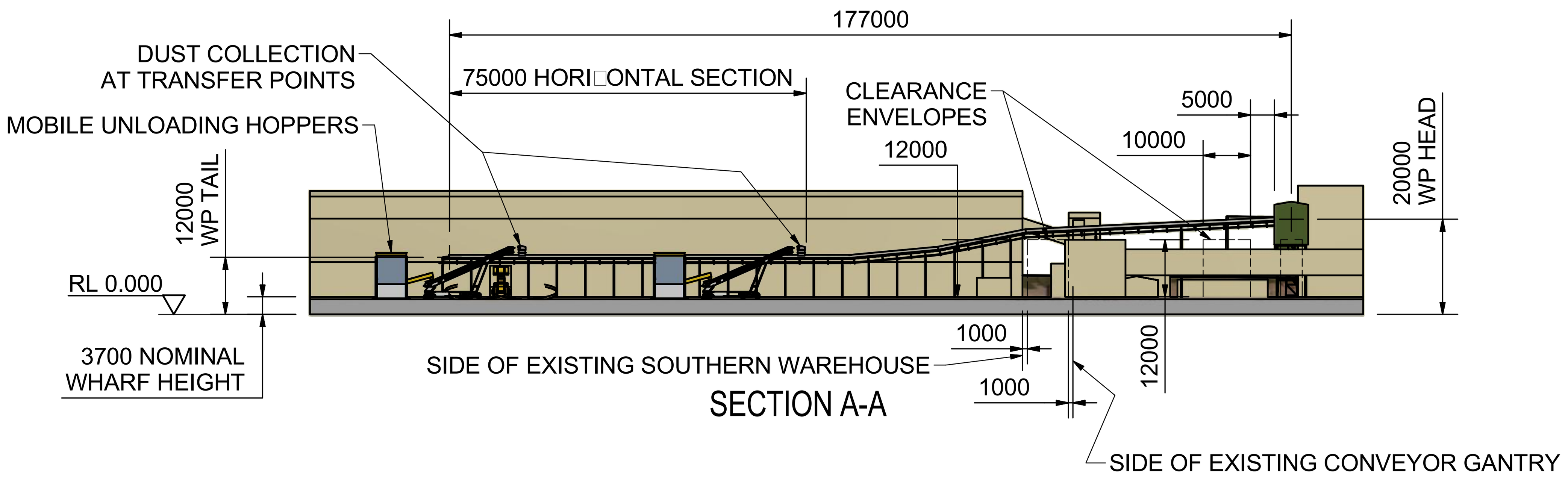

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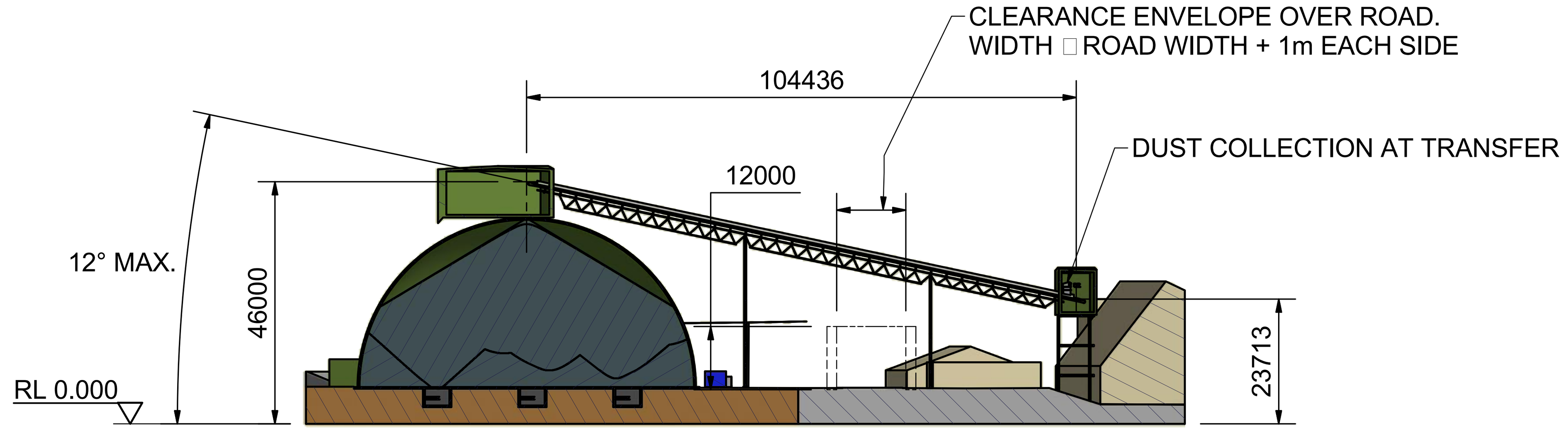

SECTION D-D

REV	DATE	DESIGNER	APPROVED	DESCRIPTION
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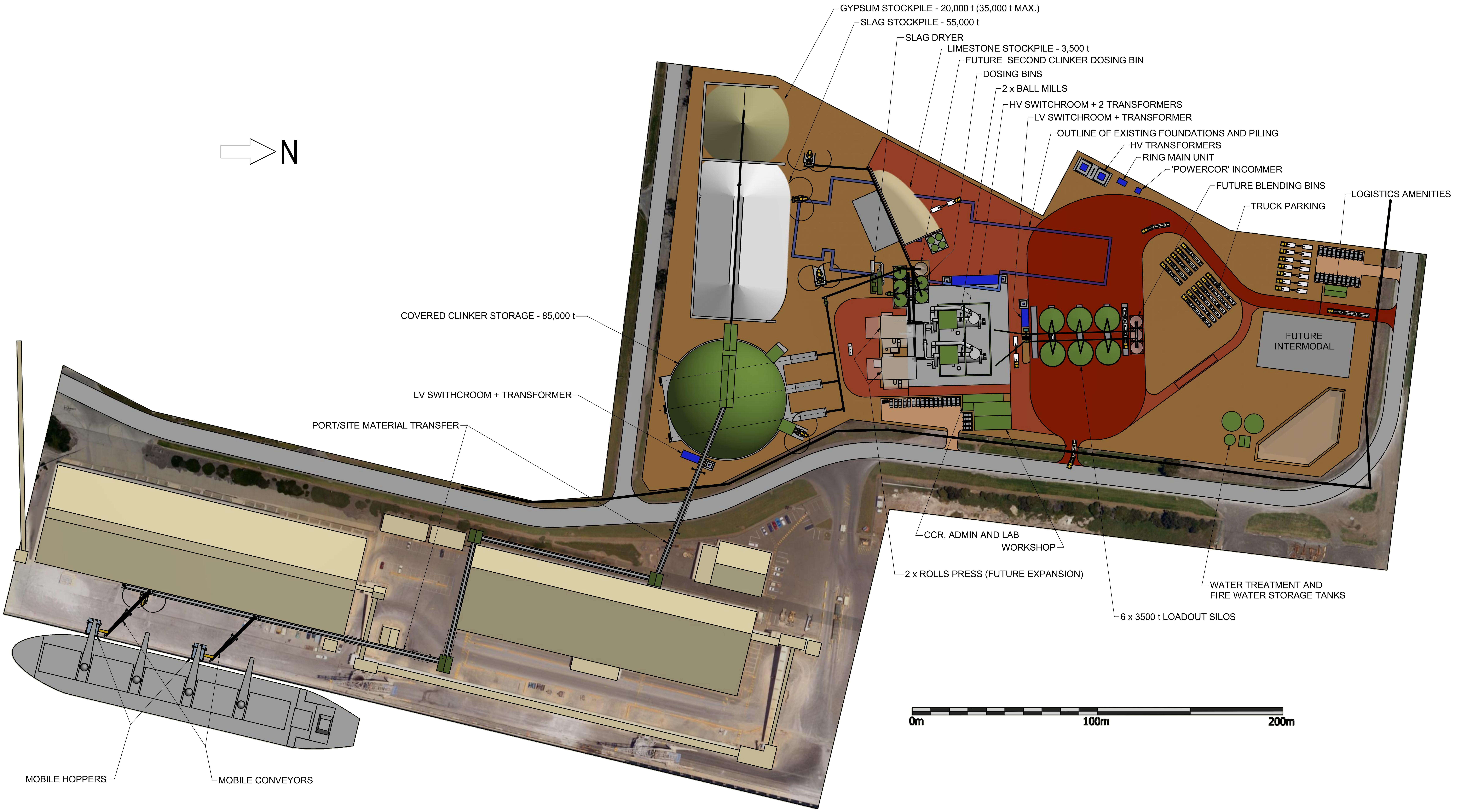
ALPHA NUMERIC:	BCES JOB No: GEE001
STOCK NUMBER:	SHEET: A1
	SCALE: 1:500

PLANT:	GEELONG
PROJECT:	VICTORIA CEMENT SUPPLY
SECTION:	RAW MATERIALS
SUB SECTION:	CONVEYORS
TITLE:	STANDARD CONVEYORS TO DOME CLINKER STORE
CLASSIFICATION:	GENERAL ARRANGEMENT

DRAWING No: GEL-C-SLT- 0007-02

WORKS No:

REV: A



PLAN VIEW

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REV	DATE	DESIGNER	APPROVED	DESCRIPTION
D	3/08/2016	M. Smith		DETAIL ADDED TO MILLING AREA
C	22/07/2016	M. Smith		GENERAL UPDATE
B	20/07/2016	M. Smith		GENERAL UPDATE, NOTES ADDED
A	5/07/2016	M. Smith		DRAWING ISSUED

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STATUS: PRELIMINARY

ALPHA NUMERIC: | BCES JOB No:

STOCK NUMBER: | SHEET: A1 | SCALE:

PLANT: GEELONG
PROJECT: VICTORIA CEMENT SUPPLY
SECTION: SITE
SUB SECTION:
TITLE: DOME CLINKER / LINEAR SLAG & GYPSUM STORES
CLASSIFICATION: SITE LAYOUT

GROUP ENGINEERING No: PLANT DRAWING SHEET
GEL-C-SLT- 0007-01

WORKS No:

REV. D

Appendix E

41 Pages

Clinker Grinding Plant Environmental Noise Assessment – Marshall Day Acoustics (1 June 2017)

MARSHALL DAY Acoustics

CLINKER GRINDING PLANT
ENVIRONMENTAL NOISE ASSESSMENT

Rp 001 R02 2016100ML | 1 June 2017

MARSHALL DAY Acoustics

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Project:	**CLINKER GRINDING PLANT**
Prepared for:	**Boral Cement** **251 Salmon Street Port Melbourne** **Melbourne VIC 3207** **AUSTRALIA**
Attention:	**Ms Sally Harle**
Report No.:	**Rp 001 R02 2016100ML**

Document Control

Status	Rev	Comments	Date	Author	Reviewer
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Draft	02	Prepared for review	30/11/2016	G Lee	T Marks
Final	-	Prepared for review	5/1/2017	G Lee	T Marks
Final	01	Responds to legal review	30/1/2017	G Lee	T Marks
Final	02	Fixed typographical error	1/6/2017	G Lee	T Marks

Certified System ISO 9001

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APPENDIX B PLANNING MAP

APPENDIX C BACKGROUND NOISE MEASUREMENTS

APPENDIX D LEGISLATION AND GUIDELINES

APPENDIX E NOISE LEVEL DATA

APPENDIX F LOCATION OF SOURCES ON SUBJECT SITE

1.0 INTRODUCTION

Boral Cement has identified a parcel of land at 37-65 Walchs Road, North Shore, as a potential location for the construction of a new raw materials import and clinker grinding facility.

Boral Cement has commissioned Marshall Day Acoustics Pty Ltd (MDA) to prepare a noise assessment for proposed operations at the site in accordance with the relevant Victorian environmental noise regulations.

This preliminary draft report provides details of relevant noise criteria, measurement surveys and predicted noise levels.

A glossary of acoustic terminology is provided in Appendix A.

2.0 SITE DESCRIPTION

2.1 Site location and surrounds

The site is part of the Geelong Port complex, located at North Shore, Victoria. The main site is at 37-65 Walchs Road, west of Lascelles Wharf, with the main entrance onto The Esplanade.

The site is bounded by:

- The Esplanade to the east, with Lascelles Wharf beyond
- Walchs Road to the south
- Madden Avenue to the north.

Industrial or commercial uses in the vicinity of the subject site are detailed in Table 1.

Table 1: Commercial/Industrial uses in the vicinity of the subject site

Business name	Business operations	Address
Terminals Pty Ltd	Chemical Plant	40 Wharf Rd
Shell Refinery	Oil refinery	Refinery Rd
Geelong Fabrications	Engineering/Steel Fabrication	19 Madden Ave
Omya Australia Pty Ltd	Producer of ground calcium carbonates	27 – 41 Madden Ave
Lascelles Wharf	Wharf	83 The Esplanade
Onesteel	Steel fabrication	Walchs Rd
Graincorp	Grain Bunker	Walchs Rd/Seabeach Pde
Incitec Pivot	Super phosphate producer	Sea Breeze Parade

The site is zoned Port (PZ), with the surrounding area to the east and north also zoned Port, and Industrial 2 (IN2Z) to the west and south.

The nearest identified residential areas are:

- South of Sea Breeze Parade, approximately 500 m south of the site
- West of Station Street, approximately 1 km west of the site.

A zoning map is provided in Appendix B.

An aerial image of the subject site and the surrounding area is provided in Figure 1. The nearest identified noise-sensitive receivers to the subject site are shown in Figure 2.

Figure 1: Subject site and surrounds (Source: Nearmap)

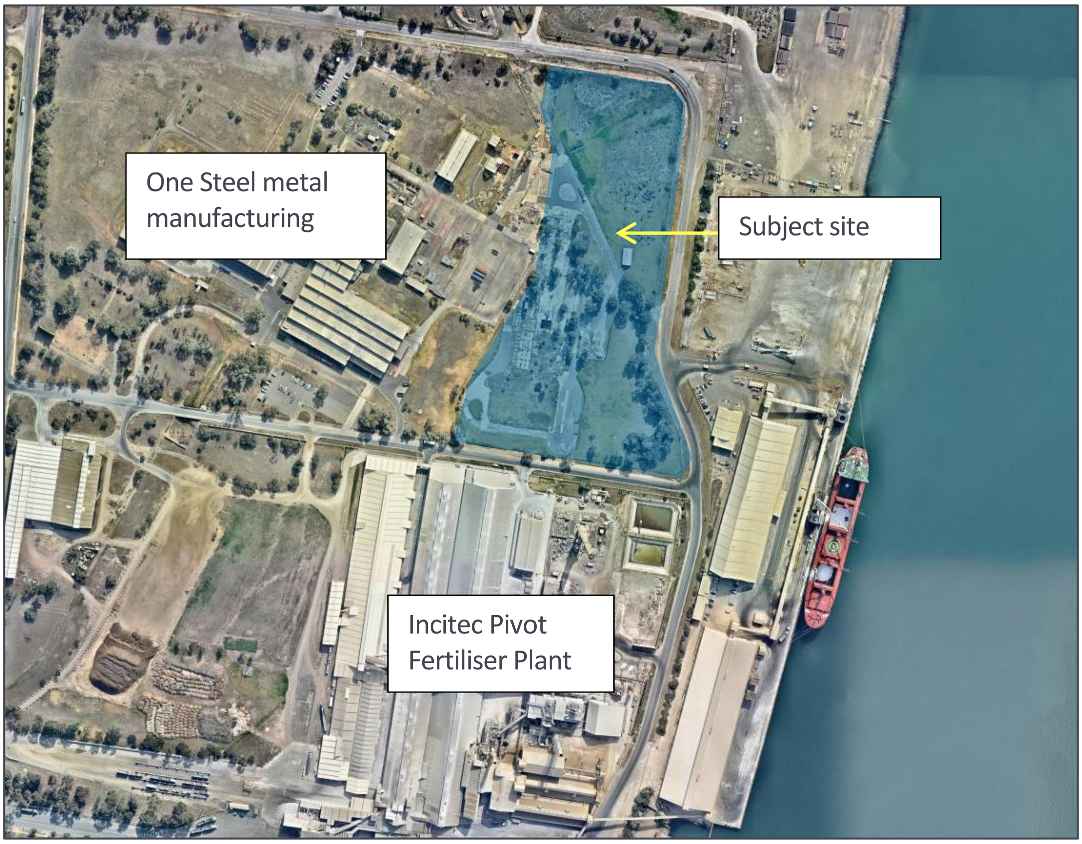


Figure 2: Nearest identified noise-sensitive receivers to site (Source: Nearmap)

2.2 Site context

The proposed Boral site has previously been utilised by BHP as an industrial facility operating a steel mill. The site will be cleared of existing structures and services where viable and the site levelled prior to construction works.

The proposed site will receive unloaded raw materials from ships at Lascelles Wharf of Geelong Port.

Boral already utilise Lascelles Wharf to unload raw materials from ships, where they are currently loaded into trucks and transported via road to a processing site in Waurn Ponds. It is proposed to continue utilising Lascelles Wharf for unloading operations, however under the proposed scheme, unloaded raw materials would be transported to the proposed site via portable and fixed covered conveyors.

Lascelles Wharf is also currently used for the importation and unloading of general cargo for other clients, including minerals and fertiliser for the adjacent phosphate works (Incitec Pivot), separate to the Boral site.

3.0 EXISTING NOISE ENVIRONMENT

Ambient noise measurements have been undertaken by MDA as part of this study to gain a better appreciation of the existing noise environment near to the subject site. The results of this monitoring are presented in Section 3.1.

In addition, background noise measurements have been undertaken at noise-sensitive receivers in order to derive noise criteria for the project. The results of this monitoring are presented in Section 3.2.

In general, the noise environment in the vicinity of the subject site and nearby noise-sensitive areas, is characterised by noise from existing industrial operations and port activity.

The noise environment around the site is complex, comprising influences from a range of variable factors. Key complicating variables in this respect are:

- The presence of other existing noise producing industries in the area, each of which operates at different intensities with time varying and non-steady noise emissions
- Significant road and rail routes which influence both the underlying background and total ambient noise environment in the surrounding area
- The influence of wind direction and speed on sound propagation from the site in question, as well as other contributors to the background and ambient noise environment

Given the complexity of the environmental noise conditions, isolating the individual contribution of the various industry or noise sources under relevant conditions is problematic in practice. In recognition of these factors, the survey predominantly comprised attended measurements. Unattended measurements from previous studies in the vicinity of the project site were also reviewed to provide a comprehensive summary of background noise data at nearby noise-sensitive areas.

The following sections provide details of the methodology and data obtained from the surveys.

3.1 Existing industry noise levels

MDA has measured noise from industrial sites in proximity to the subject site to inform the discussion of cumulative noise impacts at the nearest noise-sensitive receivers to the site.

Table 2: Measured ambient noise levels of existing industrial operations close to the site

Ref	Noise sources during the measurement	Location	Date/Time	Measurement duration	Noise level dB L_{Aeq}
1	Ship unloading at Lascelles Wharf. Noise sources include operation of a crane, trucks, ship engine, Incitec Fertiliser Plant audible*	Southern extent of Lascelles Wharf	19/9/2016 1607hrs	15 mins	57
2	Ship crane operating throughout, occasional passing trucks, Incitec Fertiliser Plant audible*	Southern extent of Lascelles Wharf	19/9/2016 1634hrs	16 mins	55
3	Incitec Fertiliser Plant operations*, air compressor operating for short duration	19 Phosphate Road, North Shore	19/9/2016 1709hrs	15 mins	60
4	Dominated by Incitec Fertiliser Plant operations. One stack running. Infrequent traffic and two train horns.	19 Phosphate Road, North Shore	19/9/2016 2010hrs	15 mins	60
5	Incitec Fertiliser Plant operations, wharf operations including ship unloading, trucks on Walch Street, occasional distant traffic	Walchs Road	19/9/2016 2034hrs	15 mins	63
6	Fertiliser unloading and loading trucks, reversing alarms from mobile plant on site. Incitec Fertiliser Plant operations, wharf operations including ship unloading, Shell refinery operations, occasional passing trucks	Madden Avenue	19/9/2016 2106hrs	15 mins	56
7	Dominated by Incitec Fertiliser Plant operations. Occasional passing B-double truck	19 Phosphate Road, North Shore	20/9/2016 0337hrs	15 mins	60

* It is understood that no stacks at Incitec Pivot were operating at the time of measurement due to wind direction-based restrictions on operations.

The locations of the measurement positions are detailed in Table 2 are shown in Figure 3.

Figure 3: Ambient noise measurement locations described in Table 5

3.2 Background noise measurements

Background noise measurements were conducted by MDA at selected locations around the subject site to form a basis for the derivation of noise criteria applicable at the nearest noise-sensitive receivers to the site.

Details of the background noise surveys and discussion in relation to the setting of criteria is presented in Appendix C.

4.0 REGULATORY FRAMEWORK

The following section outlines a review of:

- Key Victorian noise legislation and guidelines applicable to this project
- Other guidelines commonly referenced in Victorian noise assessments
- Specific information provided by EPA Victoria.

4.1 Key noise legislation and guidelines

A range of guidelines and legislation are used in Victoria to assess and control environmental noise. A summary of the relevant legislation and guidelines is provided in Table 2.

Table 3: Key noise legislation/guidelines

Document	Overview
Environment Protection Act 1970	Establishes obligations for the control of environmental noise and applies to all types of noise sources except rail operations. The legislation does not specify noise limit values, but sets out legal requirements to comply with State Environment Protection Policies and prescribed standards.
State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1 (SEPP N-1)	SEPP N-1 defines noise limits and measurement procedures for assessing environmental noise levels associated with commercial and industrial operations. The noise limits represent legal requirements for industries located within the Melbourne Metropolitan area, and represent the EPA's recommended levels for industries located in Major Urban Areas outside of the Melbourne Metropolitan area. SEPP N-1 is relevant to this project as the site is located within the Major Urban Area boundary of Geelong. The limits apply to the total level of industry noise occurring at sensitive receivers as a result of the cumulative effect of all surrounding industrial or commercial premises. The noise limits are determined on the basis of land zoning and background noise levels, and are separately defined for day, evening and night periods.
EPA Publications 1411-1413 *Noise from Industry in Regional Victoria* (NIRV)	Prescribes recommended maximum noise levels (recommended levels) for commercial, industrial or trade premises in regional Victoria. The NIRV document is a non-statutory guideline. Accordingly, the recommended levels are only legally binding when applied through statutory instruments, such as a planning permit or notice. NIRV categorises regional Victoria as either 'major urban' or 'rural'. In major urban areas, the recommended levels are derived using the SEPP N-1 procedure. In rural areas, NIRV defines a separate procedure for defining recommended levels, based on a range of contextual factors including land zoning and background noise levels. The proposed development site is located within the Geelong major urban area. The limits apply to the total level of industry noise occurring at sensitive receivers as a result of the cumulative effect of all surrounding premises.

4.2 Supplementary noise guidelines

The following table describes additional guidelines considered in this assessment. These guidelines do not represent mandatory limits, but are commonly referenced in Victoria when assessing the noise of a new development, hence their inclusion in this study. Further details on these guidelines are provided in Appendix D.

Table 4: Supplementary noise guideline documents

Guideline or Standard	Status	Type of noise covered by document
Sleep disturbance criteria sourced from NSW Road Noise Policy 2011 (Sleep disturbance criteria)	Guideline	The provisions of this document are often referred to in Victoria for general guidance on potential sleep disturbance. Based on a review of research into sleep disturbance, the NSW policy nominates maximum external night-time noise levels at noise sensitive locations which are unlikely to disturb sleep. Refer to Appendix D2.
EPA Publication 1254 *Noise Control Guidelines* (EPA Guidelines)	Guideline	Contains relevant guidelines for construction noise that is not covered by SEPP N-1. Refer to Appendix D3.

While not specifically a guideline, the EPA Publication 1513 'North Geelong Noise' has been reviewed within the context of this assessment. The publication identifies North Geelong as an area with a number of commercial industries contributing to high noise levels at residential locations. The publication notes that Pollution Abatement Notices may be served to industries that exceed their obligations with regard to noise.

4.3 Noise criteria

4.3.1 NIRV

The recommended maximum noise levels (RMNLs) of EPA Publication 1411, derived in this case on the basis of the SEPP N-1 procedure, are provided in Table 5. The recommended levels have been derived taking into account local land zoning and background noise levels at neighbouring sensitive receiver locations, are shown in Table 5. Background noise levels are presented in Section 3.2 and a planning map is included as Appendix B.

A detailed description of EPA Publication 1411 and SEPP N-1 including the derivation of recommended levels is provided in Appendix D.

Table 5: Summary of derived EPA Publication 1411 recommended maximum noise levels

Address	RMNLs, L_{eff} dB		
	Day	Evening	Night
Dwellings to the south of the subject site	55	50	48
Dwellings to the west of the subject site	57	52	47

Background noise levels used in the derivation of the recommended levels are based on short-term attended measurements. While this methodology is in accordance with the procedure defined in SEPP N-1, there is a potential for background noise levels to be lower than stated, which could potentially result in lower (i.e. more stringent) recommended levels.

The SEPP N-1 Noise Limit is equal to the 'zoning level' unless the background level at the noise sensitive site is categorised as 'low' or 'high' according to Clause B3 of the Policy.

The measured background noise levels during the night period were defined as 'high' according to SEPP N-1. However to enable a conservative assessment in light of the uncertainty regarding background levels, night-time background noise levels have been assumed to be 'neutral' relative to levels based on zoning, for dwellings to the south and west of the subject site.

Historical noise monitoring undertaken by MDA to the south of the subject site for a previous project demonstrated noise levels during the night period that are considered 'low'. This indicates the possibility of overstatement of background noise levels at dwellings to the south of the subject site, however we note that this measurement survey was undertaken in 2011 and is likely to no longer represent typical background noise levels in the vicinity of the subject site, hence its exclusion from consideration in this study.

The RMNLs of EPA Publication 1411 are applicable at the residential locations.

SEPP N-1 Clause 13 states:

> *The effective noise level shall not exceed the derived noise limit.*

SEPP N-1 Clause 18 states:

> *Where two or more premises contribute to the effective noise level in a noise sensitive area, each shall be controlled so that the contribution from each of the premises, when combined, will meet the noise limit at the noise sensitive area.*

In accordance with the above, the cumulative noise level from all contributing commercial sites should meet the noise limits described in Table 5 at nearby residential receptors.

The levels provided in Table 6 are provided as target criteria for individual premises to achieve in order to enable the total cumulative noise level of all industry, including the proposed development, to comply with within the NIRV recommended levels.

Derived in this way, the levels provided in Table 6 represent design criteria that enable a practical approach to assessing the noise from the proposed development while including a reasonable consideration of the cumulative noise from other surrounding industries. In practice, the contribution of other surrounding industries will differ from the equal contribution factored in this cumulative assessment. These other industries will also be subject to separate permit requirements, and therefore potentially alternative forms of noise limits.

Table 6: Cumulative target noise criteria to account for noise from surrounding industries

Address	Cumulative target criteria L_{eff} dB		
	Day	Evening	Night
Dwellings to the south of the subject site	50	45	43
Dwellings to the west of the subject site	52	47	42

5.0 PROPOSED OPERATIONS

Boral proposes to construct and operate a clinker processing facility on the subject site.

Currently, clinker is imported through Lascelles Wharf at the Port of Geelong and transported 30 km by road to the existing manufacturing site at Waurn Ponds. The proposed development will move processing operations from Waurn Ponds to a location closer to the port. The new facility will import clinker and slag for manufacturing into a range of cementitious products. By unloading these raw materials from the ship directly onto conveyors for transportation to the proposed site, truck movements to and from Lascelles Wharf would cease under the proposed scheme, providing a significant reduction in noise associated with truck traffic.

5.1 Overview of the process

Clinker, gypsum and slag will arrive at Lascelles Wharf via ship. Portable reception hoppers/conveyors (known as “wharf grabs”) will receive the raw material from the ship, lifting it onto conveyors that transfer the material to the processing site.

Limestone will arrive at the facility via road transport.

Clinker will be stored within an enclosed building. Noise sources in this location include a dust extractor fan located on top of the building and associated movements of trucks and front-end loaders entering and exiting the building.

Gypsum, slag and limestone will be stored in open stockpiles, with front-end loaders used to transfer material and groom the piles.

The raw materials will then be fed through a drying and milling process involving conveyors, dust extractors, bucket elevators, a slag dryer, feed systems associated with the dosing bins, and the ball mills, which are also contained within an enclosed building.

Finished product is then transferred to six storage silos via bucket elevators and feed airslides. Positive displacement blowers provided the necessary air pressure for the airslide operation.

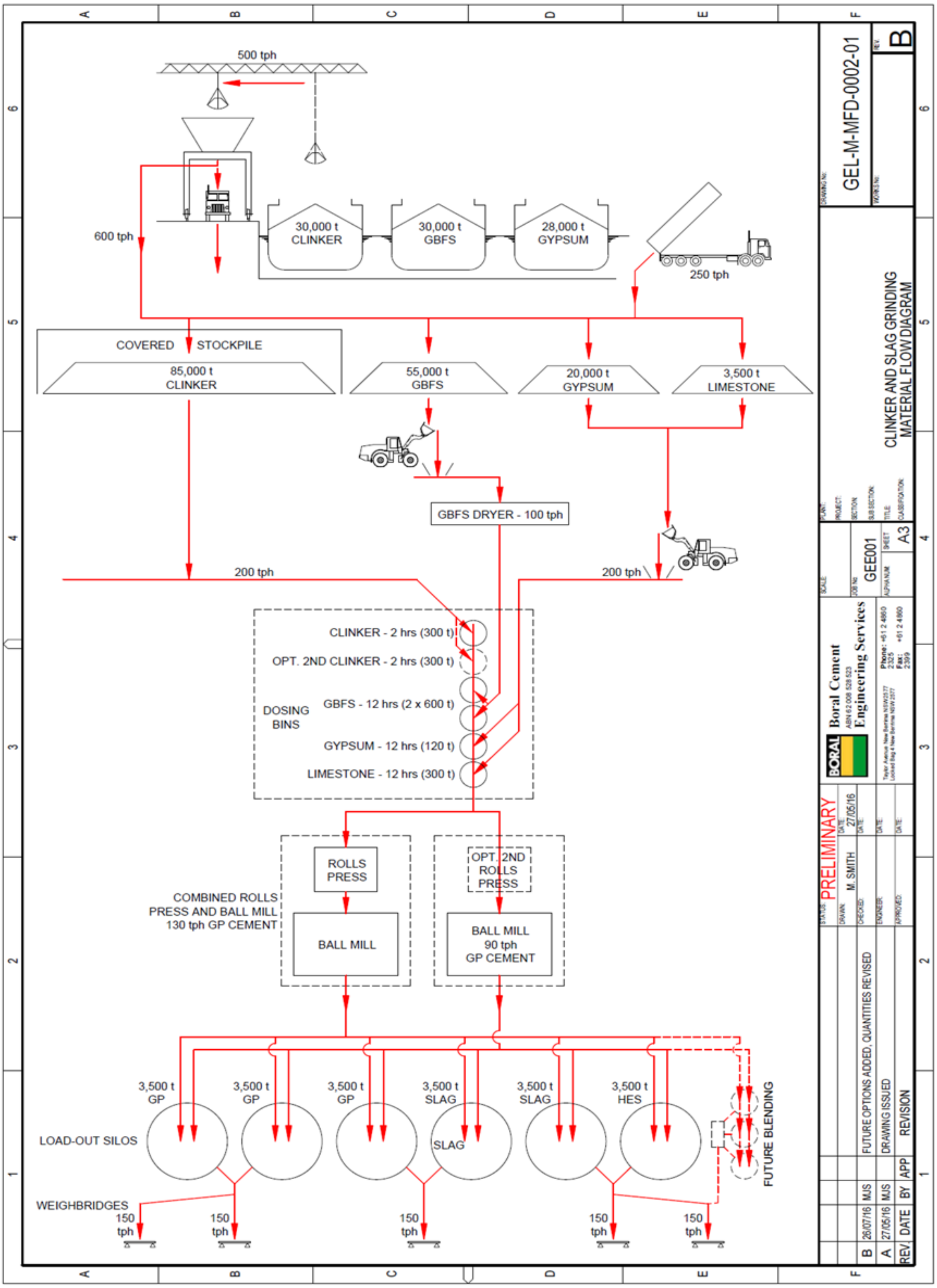
Product is then transferred to dispatch trucks via airslides.

An isometric view of the proposed site layout is shown in Figure 4.

Figure 4: Proposed site layout

A site process diagram is shown in Figure 5.

Figure 5: Site process diagram



5.2 Proposed hours of operation

It is proposed to operate the processing facility 24 hours a day, 7 days a week.

Ships will arrive with material according to the following schedule:

- Clinker (30-44kT) one delivery every 2-3 weeks
- Gypsum/Ground Blast Furnace Slag (GBFS) (30kT) one delivery every 7-8 weeks
- Gypsum (28-30kT) one delivery every 22-23 weeks.

The typical duration for unloading of each vessel is understood to be 3-4 days.

Limestone tankers will arrive at the site to deliver limestone according to the following schedule:

- 1 limestone tanker per hour during peak times

Dispatch trucks will be loaded with material from the silos according to the following schedule:

- 4 trucks loading at one time during peak times
- Loading to take 10-15 minutes per truck, resulting in 8 trucks loaded for dispatch per 30 minutes during peak times.

6.0 NOISE ASSESSMENT DETAILS

The following sections present a summary of the noise assessment as follows:

- Data used to represent noise levels at the subject site during typical worst-case operations
- Predicted noise levels from the site at noise-sensitive receivers
- Conceptual mitigation measures to control noise from the site.

6.1 Noise Prediction Method

To predict noise levels at nearby noise-sensitive receivers, the following factors have been considered:

- The noise being generated by equipment at the site
- The distance between the sources and receivers
- The presence of obstacles such buildings or stockpiles that obstruct the noise path
- The ground type between the source and receiver
- The presence of hard reflective surfaces that may enable additional noise paths.

The following sections describe the data used to quantify the noise generated from the proposed operations and the modelling used to extrapolate that data to surrounding receiver locations, accounting for the above factors.

6.2 Noise model scenario

One ‘worst-case’ noise model scenario has been prepared, with the following operational assumptions for any given 30-minute assessment period:

- All fixed plant assumed to operate continuously
- The front-end loader is assumed to travel between stockpiles continuously
- 4 loading silos would be loading trucks continuously
- 8 dispatch truck movements
- 1 limestone tanker movement

- 3 m high solid vertical screens would surround the raw material stockpiles on the west, south and eastern sides
- A 3 m high solid vertical screen has been assumed to be located along the west and southern site boundaries
- Noise mitigation measures are incorporated for individual sources as described in Section 8.2.

6.3 Noise model inputs

The noise model considers the following critical inputs:

- Topographical data to represent the subject site and surrounding footprint.
- Location of all noise-producing plant and equipment. Mobile equipment has been located at the typical worst-case position (i.e. a position that has the least amount of screening, or is closest to the worst-affected receivers, in order to produce the highest likely noise level).
- Meteorological conditions that consider downwind propagation (i.e. wind blows from source to receiver in all cases - a conservative assumption).

The noise model has been prepared using SoundPlan v7.4 proprietary noise mapping software which enables the calculation of noise levels over a wide area, and accounts for key considerations including reflected noise, terrain conditions at the site and location of sources. The model calculates noise levels at selected receptor locations in accordance with the standard ISO 9613-2:1996 *Attenuation of sound during propagation outdoors – Part 2: General method of calculation* (ISO 9613-2). The ISO 9613-2 propagation model is a general purpose noise propagation method that has become established as the primary international standard for calculation of industrial noise into the environment.

Key aspects of the model are summarised in Table 7.

Table 7: Noise model input summary

Feature	Description
Terrain data	Assumed to be flat ground for the project area and surrounding residential areas from inspection of terrain data for the subject site and surrounding areas sourced from Vicmap online resources.
Environmental ground conditions	Assumed to be 'hard ground' for concreted or paved areas, and '50% soft ground' for grassed areas near the subject site and surrounds.
Site development plan	Provided by the client
Building heights on site	Provided by the client. It has been assumed that buildings on site would be constructed from 0.6mm steel
Dwelling heights	Nearest dwellings to site on Sea Breeze Parade, Phosphate Rd, Sparks Rd and Station Street are single storey.
Receiver heights	1.5m above ground
Receiver locations	Worst-affected receivers to site identified specifically as follows: • 33 Sea Breeze Parade (south of subject site) • 183 Sparks Road (west of subject site)
Noise calculation method	Noise propagation calculated according to ISO 9613-2:1996
Description of proposed activities on site	Provided by the client
Noise mitigation measures	The purpose of this preliminary modelling and assessment study was carried out to determine if noise mitigation may be required, and if so, describe conceptual forms of mitigation measures which may be appropriate. Conceptual noise mitigation measures are described in Section 8.2.
Noise data for all equipment	Selected from a review of data from equipment manufacturers, current Australian and International standards and measurements to represent the typical upper range of noise levels described for each item of equipment
Noise data for existing off-site industry	Based on measurements conducted on-site and detailed in Section 5.3.
Operating duration	All fixed and mobile plant assumed to operate continuously for any given 30-minute assessment period, with the exception of trucks, which travel on known routes with the site
Truck speed	Assumed to be 8km/h for all trucks on site
Truck loading from silos	The client has indicated that loading into trucks would occur for up to 15 minutes for a double-wagon truck and 10 minutes for a single-wagon truck, but this would occur successively. Loading could potentially occur at four loading points simultaneously.

6.4 Noise source information

Noise sources at the subject site, including those at Lascelles Wharf associated with the unloading of ships and transportation of raw materials to site, have been informed by the Client. A schedule of noise-producing fixed and mobile plant items is contained in Table 8 and has formed the basis of our noise assessment.

Table 8: Noise sources

Name	Associated Process/Location	Quantity
Extraction Fan Motor	Extraction of dust on conveyors	1
Dust Collection units	Collection of dust from conveyors	36
Positive Displacement Blowers	Installed at Ball Mills and Silos	4
Hot Gas Generator	Drying of raw materials	2
Standard Conveyor motors	Movement of material around site	15
Dispatch trucks	Dispatch of material	8
Ball Mills	Processing of raw materials	2
Front end loader	Distribution of material around site	1
Load-out silos	Dispatch of material	6
Limestone tankers (trucks)	Delivery of limestone	1
Bucket Elevators	Movement of material around site	3
Rolls Press	Processing of raw materials	2

6.5 Noise level data

Operational processes at the subject site have the potential to produce significant noise. Sound power levels for equipment have been derived from a number of sources, giving preference to manufacturer's data where available, however many equipment selections have not yet been confirmed. Other data reviewed included current Australian and British standards and measurement data from the MDA database for similar-sized items of plant.

The following standards were referenced to review the validity of derived sound power levels for each equipment item:

- Australian Standard AS 2436:2010 *Guide to noise and vibration control on construction, demolition and maintenance sites* (AS 2436:2010)
- British Standard BS 5228–1:2009 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise* (BS 5228-1:2009)

In each case, the derived sound power level was found to be at the upper range quoted by AS 2436:2010 and BS 5228-1:2009, representing a conservative assessment.

A list of octave band sound power level data used in the model, is contained in Appendix E.

6.6 Further model comments

6.6.1 Adjustments for character of noise

For major premises (as relevant in this case), SEPP N-1 prescribes adjustments for the presence of specific characteristics such as intermittency and tonality of noise sources.

There is potential for some sources on site to exhibit tonal characteristics. A tonality penalty may generally increase the predicted noise levels by between 2 – 5 dB, depending on the prominence of the tonal noise.

Noise sources that could attract tonality penalties, such as reversing signals or start-up sirens, should be replaced with broadband, swept or 'smart' (self-adjusting) signals, which eliminate the tonal characteristics. Regular maintenance of equipment, such as conveyor belts, will provide additional control of tonal noise, however tonality presents an uncertainty associated with the noise assessment.

It is noted that according to SEPP N-1there is no penalty for impulsive sound for major premises. Any impulsive characteristics of noise sources, for example, the ball mills, are measured or predicted and taken into account as a continuous equivalent noise level. We also note that processing equipment which may feature impulsive characteristics is contained within steel structures on the site, which will attenuate noise levels (including audible impulsiveness) significantly.

Should any final plant selections be identified as exhibiting impulsive or tonal characteristics, noise mitigation, regular maintenance and/or re-selection of plant items are likely to be required.

6.6.2 Adjustments for duration of activity

For this assessment, duration adjustments have been applied to truck movements on site to account for the total time taken by trucks to move around the site.

No duration correction has been applied to loading activity from silos to trucks as there would not be a significant portion of time between each successive truck load.

All fixed plant has been assumed to operate continuously over any given 30-minute period.

6.6.3 Limitations to the accuracy of noise prediction and inherent conservativeness

The ISO 9613-2 propagation model is specified to be validated for a maximum source height of 30 metres, and a maximum source-receiver distance of 1000 metres. Within these bounds, the stated accuracy of the model is +/-3dB. Use beyond these parameters is not precluded, but no statement of error bounds is provided in this case. The noise model prepared for the project fits within these parameters, with the exception of two stacks which each have a height of 45 metres.

Uncertainty in the noise predictions comes from real-world variables such as weather conditions, sound power levels for noise sources, the ground surface model and attenuation due to obstacles between the source and receiver. In response to the inherent uncertainties associated with noise prediction, a conservative approach has been taken to enable a cautious assessment. Conservative aspects of the model are discussed in further detail below.

As noted above, ISO 9613-2 predictions assume that receivers are generally downwind from each source. In the context of this assessment, this implies that each receiver location is exposed to the same wind conditions at the same time. In practical terms, such assumptions are pragmatic and appropriate for the purposes of an engineering assessment intended to provide a reliable representation of the upper noise levels expected in practice.

In practice, alternative weather conditions, such as wind blowing from the receiver to the source, or warmer temperatures, would likely result in lower noise levels than those reported at some receivers.

As noted in Section 6.5, sound power data for equipment in the model has been selected from current available information and standards to represent the upper (higher) range of quoted operating noise levels, when manufacturer or measurement data has not been available.

Although not an inherent conservatism, it is noted that due to the way sound levels are logarithmically added, small variations from noise level assumptions are not compounded due to the large number of noise sources operating. For example, using logarithmic addition, if all sources changed level by 1 dB, the net result would be a change of 1 dB overall.

7.0 PREDICTED NOISE LEVELS

Preliminary predicted noise levels at noise-sensitive locations close to the subject site have been calculated based on the information detailed in Section 6.0.

The predicted noise levels are presented in Figure 6 as a noise contour map calculated at 1.5m height above ground to demonstrate the spread of noise from the subject site and wharf to the surrounding noise sensitive areas. Two specific residences have been identified as being worst-affected and have formed the basis of discussion regarding noise mitigation. They are shown in Figure 6 and include:

- 183 Sparks Road (to the west of the subject site)
- 33 Sea Breeze Parade (to the south of the subject site).

Numerical predicted noise levels at these specific locations are presented in Table 9.

The noise contour map does not include noise from surrounding industrial sites.

Figure 6: Predicted noise levels – continuous operations with worst-affected locations noted

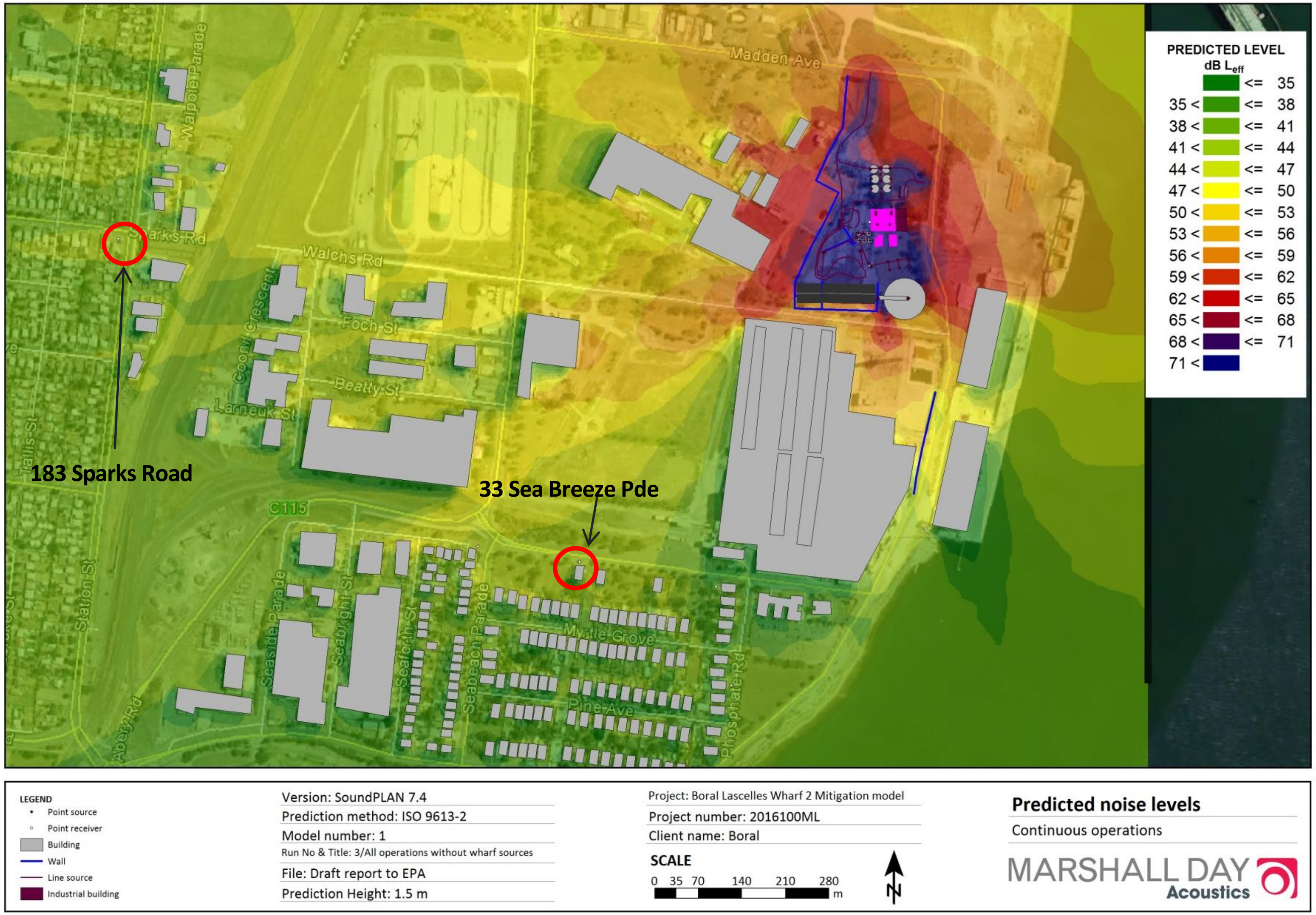


Table 9: Predicted noise levels at worst-affected receivers to the west and south of the subject site

Address	Predicted noise levels, L_{eff} dB	
	183 Sparks Road	33 Sea Breeze Parade
Predicted noise level, dB L_{eff}	42	43
Recommended night noise level (NIRV)	47	48
Cumulative target noise criteria (night)	42	43
Compliance?	Yes	Yes

The results detailed in Figure 6 and Table 9 demonstrate that the worst-affected noise sensitive areas to the west and south of the subject site are predicted to achieve the recommended levels contained in Table 5 for all time periods.

Following consideration of cumulative noise impacts from the surrounding industry, the analysis indicates that noise-sensitive dwellings are also predicted to comply with the recommended target levels in Table 6.

The preliminary noise modelling results include conceptual mitigation controls to achieve the target recommended levels contained in Table 6. The requirement and extent of mitigation measures will depend on final equipment selections and will be refined as the design progresses. Noise mitigation measures are discussed further in Section 8.2.

8.0 DISCUSSION/RECOMMENDATIONS

8.1 Cumulative noise impacts

The contribution from all nearby industry, when combined, is required to achieve the recommended levels. To account for noise from other industry, target criteria were developed on the premise of up to three industries (including the proposed development) contributing equally to the total noise of industry at surrounding receivers. The cumulative target noise criteria are contained in Table 6.

The preliminary noise modelling results demonstrate that mitigation controls would likely be required for the site to achieve the cumulative target criteria contained in Table 6. However, the need for such additional measures, and the extent of such measures, would be dependent on the noise associated with other industry in the area. The noise from these industries will differ according to operational and environmental conditions. It is for this reason the cumulative target criteria represent design targets established for the purposes of this preliminary assessment.

Compliance with the target criteria in Table 7 is required from all contributing industries in order to meet the RMNLs at noise-affected areas. It is likely, based on the measurements contained in Table 2, that existing nearby industries may not currently comply with the target criteria contained in Table 7.

Notwithstanding the above, conceptual mitigation measures have been recommended in the following section to target the highest contributing noise sources from the Boral site.

8.2 Conceptual mitigation measures

Conceptual noise mitigation measures selected on the basis of reducing noise levels from the loudest contributing noise sources at the subject site are outlined below. The contribution from specific sources varies according to the location of the receiver.

Table 10 identifies the noise sources that make the greatest contribution to the overall noise level at the two most sensitive locations in the vicinity of the subject site, and outlines conceptual mitigation strategies that have been included in the assessment.

The results from this study will assist in the final selection of appropriate plant and confirmation of mitigation measures for the subject site. The information in Table 10 is not intended to be final, but to demonstrate practical examples by which noise from the subject site may be mitigated.

Table 10: Highest contributing noise sources at the nearest noise-sensitive receivers

Ref	Highest contributing noise sources	
	183 Sparks Road	**33 Sea Breeze Parade**
1	Stockpile conveyor	Stockpile conveyor
2	Discharge stack 1 (separator filter)	Dispatch truck
3	Discharge stack 2 (separator filter)	Conveyor CO21 (limestone to small silos)
4	Hot Gas Generator (outside)	Conveyor Motor 15 (top of small silos)
5	Loader	Discharge stack 1 (separator filter)
6	Conveyor CO21 (limestone to small silos)	Discharge stack 2 (separator filter)
7	Positive Displacement Blower 1 intake	Conveyor Motor 11 (top of small silos)
8	Positive Displacement Blower 2 intake	Conveyor Motor 14 (top of small silos)
9	Discharge stack 3 (mill filter)	Loader
10	Discharge stack 4 (mill filter)	Rolls Press Building

Conceptual noise mitigation strategies that have been identified and included in the noise assessment are detailed in Table 11.

Table 11: Conceptual noise mitigation strategies incorporated in the noise assessment

Description of plant	Mitigation incorporated to reduce noise level	Anticipated mitigation reduction
Stockpile conveyor belt (CO10)	Place motor at ground levels, and; Construct screening of 1.5m in height along the southern and western sides of the conveyor, and; Regular maintenance of conveyor belt.	5 dB overall from screening conveyor >10 dB from placement of conveyor motor at ground level
Discharge stack 1 and 2 (separator fan)	Fitted with enclosure, or muffler/attenuator devices	5 dB per unit
Dust collection units on top of clinker building	Enclosed within 'penthouse' structures or attenuated	5-10 dB per unit
Dust collection units on top of ball mill building	Enclosed within 'penthouse' structures or attenuated	5-10 dB per unit
Hot Gas Generator	Localised screening around plant at ground level. Screening must be 1 m higher than the top of the plant and installed on west and southern sides of the plant	5-10 dB per unit
Loader	Current proposed item is CAT972 which is a smaller unit with lower operating noise level than other loaders.	4 dB quieter than alternative loaders (e.g. CAT988)
All sources	3m screening around site along west and south site boundary	5-10 dB reduction, predominantly effective for mobile plant such as trucks and loader, loading in silos and low-level conveyor belts and associated motors.

9.0 MANAGEMENT AND MITIGATION

Conceptual mitigation measures that have been incorporated in the noise assessment are listed in Table 11. Further to these specific mitigation measures, it is proposed that the following measures be implemented in the work plan as 'best practice':

- Regular maintenance of equipment, including conveyor belts and dust collectors
- Siting of noisy plant equipment at locations that are screened from residential areas where possible
- Sealing roads and plant site with concrete or bitumen
- Positioning of site entry and exit points away from noise-sensitive receivers
- Use of self-adjusting, broadband or swept start-up sirens and reversing signals to eliminate annoying tonal characteristics from mobile and fixed plant
- Positioning of fixed start-up sirens so they are screened, or face away from noise-sensitive receivers.

As discussed in Section 8.2, confirmation of specific mitigation measures for the subject site will depend on the final selection of appropriate plant. However, the noise assessment demonstrates that with appropriate implementation of commonplace mitigation measures, the site is predicted to comply with the recommended levels and target cumulative levels for all time periods.

10.0 CONCLUSIONS

Boral has commissioned a preliminary noise assessment for the proposed operations at a clinker grinding facility at 37-65 Walchs Road, North Shore.

The noise assessment accounts for the following:

- Operations to represent activities undertaken at the subject site, including on-site processes and truck movements at the site
- Derived noise data obtained to represent all equipment operations and activity at the site based on previous measurement data and current Australian and British standards
- Screening from various structures and buildings between the subject site and the nearest noise-sensitive receivers
- Noise mitigation measures as described in Table 10.

Noise criteria for the project have been determined in accordance with NIRV, the applicable guideline document for industrial noise sources in Major Urban Areas of Victoria. For such areas, NIRV specifies that recommended levels are defined according to SEPP N-1 methodology.

The existing noise environment at nearby noise-sensitive areas was typically found to be characterised by industrial noise from multiple nearby industrial facilities. Uncertainty with respect to night-time background levels has been reduced by basing the night recommended level on the local zoning. Based on measurements of existing industry, it may be likely that other local industries do not comply with the NIRV recommended noise levels.

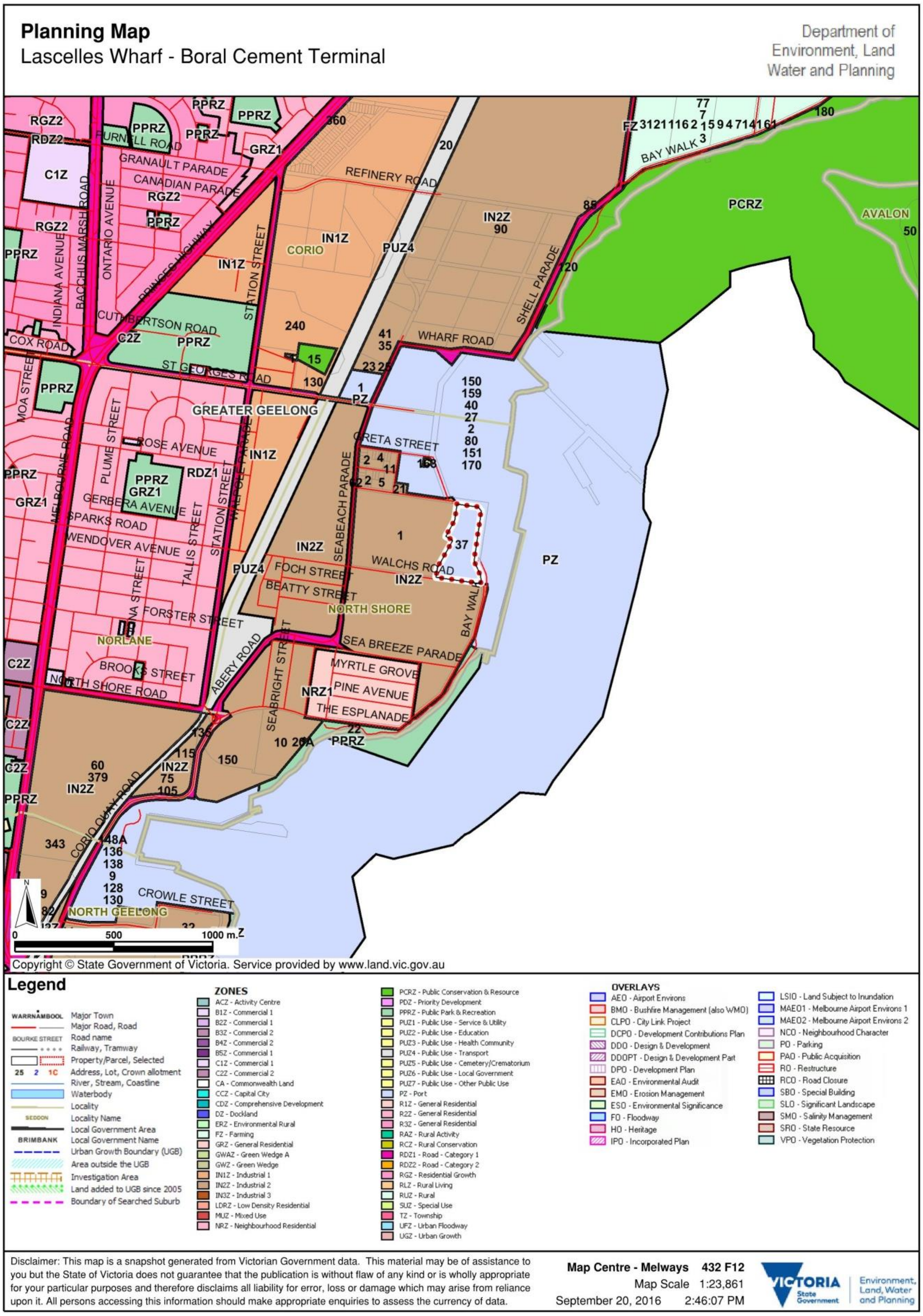
The contribution from all nearby industry, when combined, is required to achieve the NIRV recommended levels. To account for noise from other industry, target criteria ('target recommended levels') were developed on the premise of up to three industries (including the proposed development) contributing equally to the total noise at surrounding receivers. As mentioned above, it is likely that current operations at some local industry facilities exceed the NIRV recommended levels, and would need to be reduced in order to allow the cumulative noise targets to be met.

The preliminary noise modelling results predict that the Boral site will comply with the NIRV recommended levels, and also the target recommended levels contained in Table 6, as long as appropriate noise mitigation measures are implemented. As the design progresses and plant selections are finalised, the conceptual noise mitigation measures described in this report will be reviewed and changed if required to maintain compliance with the target recommended levels.

APPENDIX A GLOSSARY OF TERMINOLOGY

Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz).
Hertz (Hz)	Hertz is the unit of frequency. One hertz is one cycle per second. One thousand hertz is a kilohertz (kHz).
dB	Decibel. The unit of sound level.
L_{A90}	The noise level exceeded for 90% of the measurement period, measured in dB. This is commonly referred to as the background noise level.
L_{Aeq}	The equivalent continuous sound level, measured in dB. This is commonly referred to as the average noise level.
L_{eff}	The effective noise level of commercial or industrial noise determined in accordance with *State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* (SEPP N-1). This is the L_{Aeq} noise level over a half-hour period, adjusted for the character of the noise, measured in dB. Adjustments are made for tonality, intermittency and impulsiveness.
L_w (or SWL)	Sound Power Level. The level of total sound power radiated by a sound source.
Octave band	Sound, which can occur over a range of frequencies, may be divided into octave bands for analysis. The audible frequency range is generally divided into 7 octave bands. The octave band frequencies are 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.

APPENDIX B PLANNING MAP



APPENDIX C BACKGROUND NOISE MEASUREMENTS

Attended background noise level measurements were carried out at the nearest noise-sensitive receivers to the south and west of the subject site respectively. Measurements were undertaken using a Brüel and Kjær Type 2250 precision integrating sound level meter fitted with a windshield.

The microphone was mounted on a tripod at a height of approximately 1.5 m above local ground level under free-field conditions.

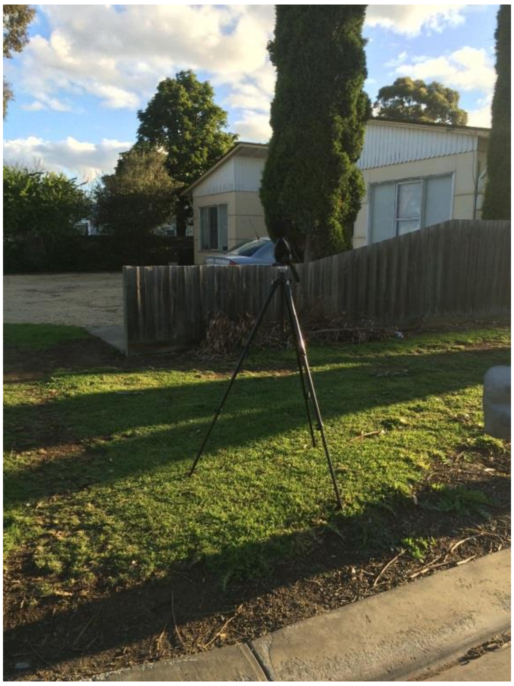
Measurements were obtained using the 'F' response time and A-weighting frequency network. The equipment was checked before and after the survey and no significant calibration drifts were observed.

Short-term (15-minute) noise level samples were obtained on 17 April 2016, and 19-20 September 2016.

Photographs of the measurement survey are presented as Figures C1 – C2.

Figure C

Figure C2: 183 Sparks Road, Norlane



Results of the background survey are shown below.

Table C1: Attended 15-minute background measurements

Location of background measurement	Date	Start Time	Measurement result	
			L_{A90} dB per measurement	Selected background value used as the basis of project criteria, L_{A90} dB
South				
26 Myrtle Grove	17/4/2016	1244hrs	42	42[1]
37 The Esplanade	19/9/2016	1743hrs	44	
26 Myrtle Grove	17/4/2016	1826hrs	40	40[1]
37 The Esplanade	19/9/2016	1945hrs	48	
37 The Esplanade	20/9/2016	0300hrs	47	47[2]
37 The Esplanade	20/9/2016	0315hrs	47	
West				
91 Station Street	17/4/2016	1315hrs	46	46[1]
183 Sparks Road	19/9/2016	1743hrs	51	
91 Station Street	17/4/2016	1802hrs	45	43[1]
183 Sparks Road	19/9/2016	1958hrs	43	
183 Sparks Road	20/9/2016	0304hrs	49	49[2]
183 Sparks Road	20/9/2016	0319hrs	49	

1 Represents the lower of two measured short-term samples of background noise

2 Represents arithmetic average of two measured short-term samples of background noise.

Continuous noise logging was unable to be carried out for this stage of the project as a suitable monitoring location unaffected by plant noise was not able to be located. As an alternative to continuous noise logging, short-term attended measurements were undertaken to provide two 15-minute samples of background noise at noise sensitive receivers during the day, evening and night periods, in accordance with SEPP N-1 methodology. During the attended measurements, some noise from nearby neighbouring industries was audible, but not considered intrusive. As some degree of industrial noise was audible at all nearby residential locations, measurement locations were selected according to areas least affected by industrial noise.

The location of the two day time and evening background noise measurements refer to two different addresses, however they are located in the same general vicinity. Different addresses were selected for the second day time and evening background noise measurement as the original location was overly affected by plant noise from nearby industry.

SEPP N-1 methodology states the following in relation to short-term measurements:

> *Where the conditions of Schedule C3.1 cannot be met, the L_{A90} may be measured over less than the full period, but shall be based on the arithmetic average of at least two samples, each of 10 minutes duration, so as to obtain a background level that represents the background level during the period of concern.*

Background levels for the evening and night periods have been calculated according to the above methodology. Background noise samples for the day and evening time periods show a wider variance than the night samples, likely as a result of the measurements being undertaken on different days and at different locations. This introduces uncertainty that the day and evening background samples represent 'typical' background noise levels at both the western noise sensitive locations, and southern noise sensitive locations. To enable a conservative assessment, the lower of the two samples has been used in this case to calculate a noise limit based on the background noise level. We note however that as the project site is intended to operate continuously, the night noise criteria will be the most stringent to achieve.

Background noise samples from the day and night periods were classified as 'low' and 'high' respectively, according to SEPP N-1 methodology. This result indicates a requirement to measure background noise levels continuously to provide a more robust basis for determining the background noise levels at noise sensitive locations. Noise monitoring would likely need to be undertaken at derived points, (i.e. a substitute measurement point to facilitate the assessment of background noise) as the area is significantly affected by noise from neighbouring industrial sites.

For the purposes of this preliminary study, night-time background noise levels have been assumed to be equal to the zoning levels until further noise monitoring may be undertaken.

Figure shows the location of background noise measurements on a map.

Figure C3: Location of background noise measurements

APPENDIX D LEGISLATION AND GUIDELINES

D1 NIRV

D1.1 Assessment methodology

For Major Urban Areas, NIRV adopts SEPP N-1's procedures for setting recommended levels, and the measurement of noise.

SEPP N-1 is a policy and technical document. The Policy prescribes the methodology and measurement procedure used to determine applicable noise limits and assessment of compliance.

SEPP N-1 defines a 'noise sensitive area' as an area of land within 10m outside the external walls of:

a dwelling or residential building

a dormitory, ward or bedroom of a caretaker's house, hospital, hotel, institutional home, motel, reformative institution, tourist establishment or work release hostel.

The assessment of noise from the subject site under SEPP N-1 is based on the calculation of a noise limit at a receiver position, taking into account a zoning noise level derived from the land zoning types in the surrounding area and the background noise level.

Once a noise limit is established, the noise level (L_{Aeq}) due to the commercial premises is measured or predicted. If necessary, the L_{Aeq} noise level is adjusted for noise character and duration to give the effective noise level (L_{eff}). If the L_{eff} level exceeds the noise limit, then remedial action is required.

D1.2 Calculation of noise limits

NIRV requires that recommended levels within Major Urban Areas are determined in accordance with SEPP N-1 methodology.

SEPP N-1 criteria are calculated taking into account land 'zoning types' within a 70 m and 200 m radius of a noise sensitive building. Zoning types are categorised as type 1, 2 or 3.[1] A prescribed formula is used to calculate a corresponding Zoning Level. In general, zone type designations are as follows.

- areas such as residential, rural and open space are type 1;
- areas such as commercial, business and light industry are type 2; and
- areas such as general industry and major roads are type 3.

Greater areas of type 2 and 3 land within a 200 m radius of a noise sensitive site result in higher Zoning Levels than a site with respectively larger areas of type 1 land.

The SEPP N-1 Noise Limit is equal to the 'zoning level' unless the background level at the noise sensitive site is categorised as low or high according to Clause B3 of the Policy. If the background level is low or high, the Noise Limit is calculated from a formula taking into account the Zoning Level and the Background Level.

The limits are separately defined for the day, evening and night periods as defined in Table and Table for dwellings to the south and west of the subject site, respectively.

[1] EPA Publication no.: 316a, 17 February 2000, *Designation of Types of Zones and Reservations in the Metropolitan Region Planning Schemes for the Purposes of State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1* <http://www.epa.vic.gov.au/our-work/publications/publication/2000/february/316a>

Table D1: SEPP N-1 time periods and noise limits – Dwellings to the south

Period	Day of week	Start time	End time	Measured background, L_{A90} dB	Zoning level, dB	Background relative to zoning level	Noise limit, L_{eff} dB
Day	Monday-Friday	0700hrs	1800hrs	42	59	Low	55
	Saturday	0700hrs	1300hrs				
Evening	Monday-Friday	1800hrs	2200hrs	40	53	Low	50
	Saturday	1300hrs	2200hrs				
	Sunday, Public holidays	0700hrs	2200hrs				
Night	Monday-Sunday	2200hrs	0700hrs	-*	48	Neutral	48

* Measured attended background noise level for the night period was 'high', relative to the zoning level. To enable a conservative assessment, the background level at this location has been considered 'neutral', relative to the zoning level.

Table D2: SEPP N-1 time periods and noise limits – Dwellings to the west

Period	Day of week	Start time	End time	Measured background, L_{A90} dB	Zoning level, dB	Background relative to zoning level	Noise limit, L_{eff} dB
Day	Monday-Friday	0700hrs	1800hrs	46	59	Low	57
	Saturday	0700hrs	1300hrs				
Evening	Monday-Friday	1800hrs	2200hrs	43	52	Neutral	52
	Saturday	1300hrs	2200hrs				
	Sunday, Public holidays	0700hrs	2200hrs				
Night	Monday-Sunday	2200hrs	0700hrs	-*	47	Neutral	47

* Measured attended background noise level for the night period was 'high', relative to the zoning level. To enable a conservative assessment, the background level at this location has been considered 'neutral', relative to the zoning level.

Further discussion in relation to the background noise levels selected for the derivation of project criteria is provided in Appendix C.

D2 Sleep Disturbance Criteria

The NSW Road Noise Policy 2011 produced by the NSW EPA, provides guidance on potential for sleep disturbance. While the Policy applies strictly only in NSW, the provisions of the document are often referred to in Victoria for general guidance on potential sleep disturbance.

The NSW policy notes that from the research on sleep disturbance to date it can be concluded that:

- maximum internal noise levels below 50–55 dB L_{Amax} are unlikely to awaken people from sleep
- one or two noise events per night, with maximum internal noise levels of 65–70 dB L_{Amax}, are not likely to affect health and wellbeing significantly.

D3 EPA Publication 1254

The EPA Publication 1254, dated October 2008, recommends noise limits and controls for construction noise. The noise limits are shown in Table B7.

Table B7: Recommended construction noise limits, EPA 2008

Period	Day of the week	Time Period	Noise limit depending on construction duration	
			Up to 18 months	After 18 months
Day	Monday-Friday	0700-1800hrs	No limit	
	Saturday	0700-1300hrs		
Evening	Monday-Friday	1800-2200hrs	10 dB above background, outside residential dwelling	5dB above background, outside residential dwelling
	Saturday	1300-2200hrs		
	Sunday, Public Holidays	0700-2200hrs		
Night	Monday-Sunday	2200-0700hrs	Noise from construction activities must be inaudible inside a habitable room with windows open	

There are no laws in Victoria which specifically relate to construction noise. However, there are laws relating to the control of nuisance. Enforcement of these laws requires a reasonable interpretation of the term "nuisance". Generally, noise is not considered to be a nuisance if the noise levels comply with the relevant EPA guidelines.

While there is no limit specified for daytime activities, there must still be control of noise levels. The relevant Section of EPA Publication 1254, which outlines noise control works that would be expected, is reproduced in Figures E1 and E2 for reference.

During the night period, noise is required to be inaudible within a habitable room of any residential premises. However, the EPA guidelines allows for flexibility where it is not possible to avoid construction activities during the night. Under such circumstances, the guidelines require that "affected premises should be notified of the intended work, its duration and times of occurrence". Under certain circumstances, some negotiation with residents may also be necessary.

The EPA Publication 1254 also states the following:

> *Noise from the site needs to comply with the requirements of the schedule, except for:*
>
> - *Unavoidable works*
> - *Night period low-noise or managed-impact works approved by the local authority.*
>
> Unavoidable works are defined as:
>
> *Works that cannot practicably meet the schedule requirements because the work involves continuous work– such as a concrete pour– or would otherwise pose an unacceptable risk to life or property, or risk a major traffic hazard.*

Figure B1: Extract 1 from EPA Publication 1254

2 CONSTRUCTION AND DEMOLITION SITE NOISE

This applies to:

- industrial and commercial premises
- large-scale residential premises under construction in non-residential zones, as defined in regulation 9 of the *Environment Protection (Residential Noise) Regulations 2008*.

Other than for some large-scale residential premises, this guideline does not apply to noise from construction of private residential dwelling(s). These are subject to the *Environment Protection (Residential Noise) Regulations 2008*.

The purpose of this guideline is to protect nearby residential premises from unreasonable noise. Commercial and other premises affected by noise should be considered and reasonable measures implemented to reduce impact on these premises.

Community consultation and work scheduling

Community consultation is essential for large-scale projects or high-impact works. Where the community will be significantly impacted, consult on the benefits and drawbacks of different scheduling, planning and remediation options.

The following requirements apply to large projects with nearby sensitive uses:

- Inform potentially noise-affected neighbours about the nature of construction stages and noise reduction measures.
- Give notice as early as possible for periods of noisier works such as excavation. Describe the activities and how long they are expected to take. Keep affected neighbours informed of progress.
- Appoint a principal contact person for community queries.
- Provide 24-hour contact details through letters and site signage. Record complaints and follow a complaint response procedure suitable to the scale of works.
- Within normal working hours, where it is reasonable to do so:
  - schedule noisy activities for less sensitive times, (for example, delay a rock-breaking task to the later morning or afternoon)
  - provide periods of respite from noisier works (for example, periodic breaks from jackhammer noise).
- The weekend/evening work hours in the schedule (including Saturday afternoon or Sunday) are more sensitive times and have noise requirements consistent with quieter work.
- The weekend/evening periods are important for community rest and recreation and provide respite when noisy work has been conducted throughout the week. Accordingly, work should not usually be scheduled during these times.

Work requirements

Noise reduction measures should be developed through initial project planning, tenders for equipment and subcontracts. Larger projects should develop a noise management plan (potentially part of a broader environmental management plan) and may require advice from an acoustic specialist, particularly if works are proposed outside of normal working hours.

The following measures apply:

- Where work is conducted in a residential area or other noise-sensitive location, use the lowest-noise work practices and equipment that meet the requirements of the job.
- Site buildings, access roads and plant should be positioned such that the minimum disturbance occurs to the locality. Barriers such as hoardings or temporary enclosures should be used. The site should be planned to minimise the need for reversing of vehicles.
- All mechanical plant is to be silenced by the best practical means using current technology. Mechanical plant, including noise-suppression devices, should be maintained to the

Figure B2: Extract 2 from EPA Publication 1254

manufacturer's specifications. Internal combustion engines are to be fitted with a suitable muffler in good repair.

- Fit all pneumatic tools operated near a residential area with an effective silencer on their air exhaust port.
- Install less noisy movement/reversing warning systems for equipment and vehicles that will operate for extended periods, during sensitive times or in close proximity to sensitive sites. Occupational health and safety requirements for use of warning systems must be followed.
- Turn off plant when not being used.
- All vehicular movements to and from the site to only occur during the scheduled normal working hours, unless approval has been granted by the relevant authority.
- Where possible, no truck associated with the work should be left standing with its engine operating in a street adjacent to a residential area.
- Special assessment of vibration risks may be needed, such as for pile-driving or works structurally connected to sensitive premises.
- Noise from the site needs to comply with the requirements of the schedule, except for:
  - unavoidable works
  - night period low-noise or managed-impact works approved by the local authority.

Unavoidable works are works that cannot practicably meet the schedule requirements because the work involves continuous work – such as a concrete pour – or would otherwise pose an unacceptable risk to life or property, or risk a major traffic hazard. Affected premises should be notified of the intended work, its duration and times of occurrence. The relevant authority must be contacted and any necessary approvals sought.

Low-noise or managed-impact works are works approved by the local authority:

- that are inherently quiet or unobtrusive (for example, manual painting, internal fit-outs, cabling)

or

- where the noise impacts are mitigated (for example, no impulsive noise and average noise levels over any half hour do not exceed the background) through actions specified in a noise management plan supported by expert acoustic assessment.

Low-noise or managed-impact works do not feature intrusive characteristics such as impulsive noise or tonal movement alarms.

Schedule: Construction and demolition site noise

Normal working hours

Noise to follow the requirements above during the hours of:

7 am – 6 pm Monday to Friday

7 am – 1 pm Saturdays

Weekend/evening work hours

Noise level at any residential premises not to exceed background noise by:

10 dB(A) or more for up to 18 months after project commencement

5 dB(A) or more after 18 months

during the hours of:

6–10 pm Monday to Friday

1–10 pm Saturdays

7 am – 10 pm Sundays and public holidays

Night period

Noise inaudible within a habitable room of any residential premises during the hours of:

10 pm – 7 am Monday to Sunday

Note: Noise from construction of large-scale residential premises in non-residential zones (see regulation 9 of the *Environment Protection (Residential Noise) Regulations 2008*) is subject to the unreasonable noise provisions of s48A(3) of the EP Act at all times of day. In all circumstances, the assessment may have regard to this noise control guideline.

This guideline affirms the minimum expectation that noise from these sites must not be audible within a habitable room of any residential premises between 10 pm and 7 am. This is considered unreasonable noise under the EP Act. However, provision is made for circumstances of unavoidable works or low-noise or managed-impact works.

This guideline does not limit the general ability of a local government or police officer to assess the unreasonableness of noise at any time. For example, if unavoidable works were done in an unnecessarily noisy way, this may be considered to be unreasonable. General noise at any time during the day might still be considered unreasonable, taking into account the work practices and circumstances of the noise. As specified in s48A(4) of the EP Act, assessment must consider the attributes of the noise and the time, place and circumstances in which it is emitted.

APPENDIX E NOISE LEVEL DATA

Table E1: Octave band sound power levels used in the noise model

Source	Source height	Source of data	Octave Band Centre Frequency (Hz)							
			63	125	250	500	1k	2k	4k	A
Extraction Fan Motor	26 m	Based on previous measurements conducted by MDA	98	95	94	94	93	90	89	98
Dust Collection units	2 m to 31 m	Based on sound power calculations accounting for size and duty of plant as provided by Client	98	101	104	102	100	94	88	104
Positive Displacement Blower intake	30 m	Based on previous measurements conducted by MDA	86	92	99	101	92	89	84	100
Positive Displacement Blower discharge	23.5 m	Based on previous measurements conducted by MDA	76	82	89	91	82	79	74	90
Hot Gas Generator	1.5 m	Based on previous measurements conducted by MDA	104	105	100	89	82	78	74	95
Standard Conveyor motors	1m to 26 m	BS 5228	101	102	100	101	102	96	94	105
Dispatch trucks*	2 m	Based on previous measurements conducted by MDA	115	110	109	107	105	101	99	110
Ball Mill	2 m	Based on previous measurements conducted by MDA	121	116	112	111	107	106	96	113
Ball Mill motor	2 m	Based on previous measurements conducted by MDA	97	103	105	95	101	90	85	103
Front end loader	2 m	Based on manufacturer data for typical CAT 972 Loader	121	116	112	110	109	107	101	114
Load-out silos	2 m	Based on previous measurements conducted by MDA	108	107	102	104	104	104	101	110
Limestone tankers*	2 m	Based on previous measurements conducted by MDA and AS 2107 typical range	105	107	102	97	95	94	93	102
Bucket Elevator	0 m to 21 m	Based on previous measurements conducted by MDA	96	92	90	91	95	86	86	97
Rolls Press**	0 m to 21 m	Based on previous measurements conducted by MDA and other consultants	93	93	92	96	95	90	85	98

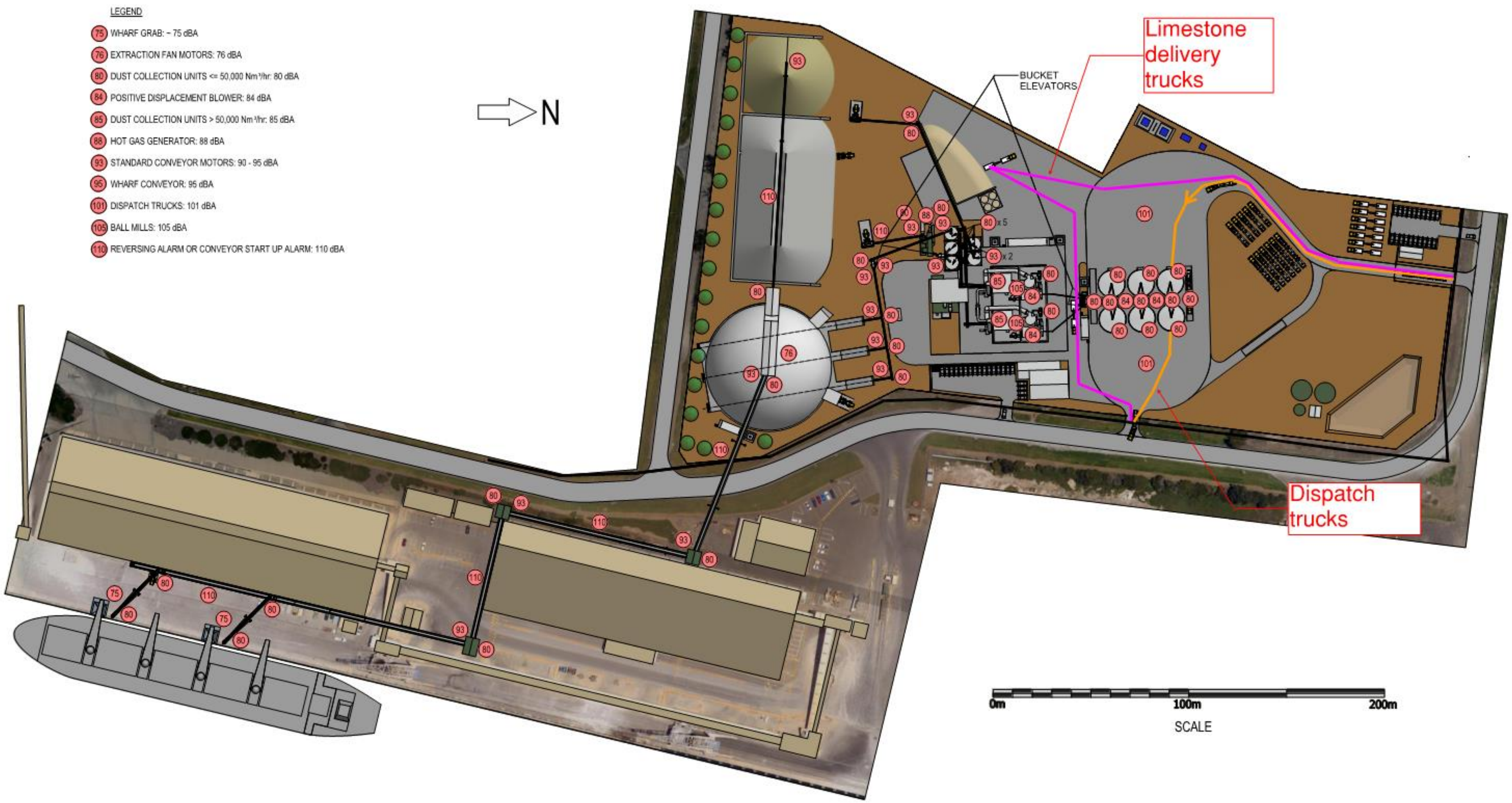
* includes adjustments for duration of truck movement and number of trucks

** Data refers to a reverberant sound pressure level

APPENDIX F LOCATION OF SOURCES ON SUBJECT SITE

APPENDIX F LOCATION OF SOURCES ON SUBJECT SITE

Figure F1: Location of noise sources at the subject site



Appendix F

45 Pages

Clinker Grinding Plant – 37 Walchs Road, North Shore Planning Submission – Calibre Consulting (5 June 2017)

PREPARED FOR BORAL CEMENT LIMITED
JUNE 5TH 2017
15-004335-005-PS-AU-JM-AT
FINAL
URBAN DEVELOPMENT

Clinker Grinding Plant – 37 Walchs Road, North Shore
Planning Submission

COMMERCIAL IN CONFIDENCE

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DOCUMENT CONTROL

15-004335-005-PS-AU-JM

Issue	Date	Issue Details	Author	Checked	Approved
A	June 2016	Draft Submission 1	GH	FS	FS
B	Nov 2016	Draft Submission 2	JM/AT	FS	FS
C	Jan 2017	Draft Submission 3	FS	FS	FS
D	Feb 2017	Draft Submission 4	FS/IG	FS	FS
E	June 2017	Final Submission	FS/JM	FS	FS

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APPENDIX B	EXISTING CONDITIONS PLAN PREPARED BY BORAL REF GEL-G-SURV-0001-01;
APPENDIX C	SITE CONTEXT PLAN PREPARED BY CALIBRE REF: 15-004335C VER.B;
APPENDIX D	PROPOSED DEVELOPMENT PLANS PREPARED BY BORAL;
APPENDIX E	PROPOSED NATIVE VEGETATION REMOVAL PLAN PREPARED BY CALIBRE REF: 15-004335 NATIVE VEGETATION REMOVAL-A;
APPENDIX F	PRELIMINARY CULTURAL HERITAGE STUDY PREPARED BY ECOLOGY AND HERITAGE PARTNERS PTY LTD;
APPENDIX G	BIODIVERSITY ASSESSMENT PREPARED BY ECOLOGY AND HERITAGE PARTNERS PTY LTD;
APPENDIX H	NOISE ASSESSMENT PREPARED BY MARSHALL DAY ACOUSTICS;
APPENDIX I	AIR QUALITY ASSESSMENT PREPARED BY PACIFIC ENVIRONMENT;
APPENDIX J	TRAFFIC AND TRANSPORT ASSESSMENT PREPARED BY CARDNO;
APPENDIX K	LETTER OF SUPPORT FROM GEELONG PORT PTY LTD;
APPENDIX L	LETTER TO COUNCIL FROM HERBERT SMITH FREEHILLS;
APPENDIX M	STORM WATER MANAGEMENT PLAN PREPARED BY THYSSENKRUPP

1 SNAPSHOT

Application Details	
Applicant	Boral Cement Limited
Subject Land	Lot 2 PS434155
Subject Address	37-65 Walchs Road, North Shore VIC 3214, The Esplanade Road Reserve and PC371680Q (Ports Land)
Municipality	City of Greater Geelong
Proposal	Development of a Clinker Grinding Plant, removal of native vegetation and erection of business identification signs.
Structure Plan	Geelong Port Structure Plan
Zone	Port Zone (PZ)
Overlay	Design and Development Overlay – Schedule 20 (DDO20)
Permit Triggers	Pursuant to Clause 37.09-4 (PZ) a permit is not required for the use as the proposed Clinker Grinding Plant is associated with port operations and Clause 52.10 does not apply as the use does not include the production of cement. Pursuant to Clause 37.09-4 (PZ) a permit is not required to construct a building or construct or carry out works where a Works Approval and Licence is required under the Environment Protection Act 1970. Pursuant to Clause 43.02-2 (DDO) a permit is required to construct a building or construct or carry out works. Pursuant to Clause 52.17 a permit is required to remove, destroy or lop any native vegetation. Pursuant to Clause 52.05- 8 Category 2 Signage a permit is required for business identification signage that exceeds 8 square metres.
Site Area	5.9ha approximately

Table 1-1: Application Details

2 INTRODUCTION

This submission is made on behalf of Boral Cement Limited for the purpose of obtaining a Planning Permit for the development of a Clinker Grinding Plant and associated works including the removal of native vegetation and associated signage, at Lascelles Wharf, 37-65 Walchs Road, North Shore.

By way of background, Boral currently operate a Clinker Grinding Plant in Waurn Ponds. The clinker is currently imported through the Port of Geelong and over a 5-7 day period 24 hours per day, is transported 30km to the manufacturing site.

This application seeks to move operations away from Waurn Ponds to a location closer to the Port at Lascelles Wharf. The new site will accommodate a dedicated clinker grinding facility including storage of raw materials and finished products.

The subject site is comprised of 37-65 Walchs Road North Shore.

The proposal requires planning approval for buildings and works pursuant to the provisions of the Design and Development Overlay (Schedule 20), **Clause 43.02-2**, of the Greater Geelong Planning Scheme, for vegetation removal pursuant to **Clause 52.17** and for the erection of signage pursuant to Clause **52.05- 8**.

This submission has been prepared to:

- Provide a description of the site and surrounding area;
- Outline the nature of the proposal;
- Outline the relevant provisions of the State and Local Planning Policy Frameworks, the Port Zone, Design and Development Overlay, Geelong Port Structure Plan, Port of Geelong Development Strategy and other relevant Particular and General Provisions; and
- Provide justification for the proposed development of the site.

The following information is also provided in support of the application:

- A current copy of Title;
- Existing Conditions Plan prepared by Boral Ref GEL-G-SURV-0001-01;
- Site context Plan prepared by Calibre Ref: 15-004335C Ver.B;
- Proposed development plans prepared by Boral including:
  - Port and site layout plan Ref: GEL-G- SLT 0002-01;
  - Site layout raw materials storage Ref: GEL-G-SLT-0002-2;
  - Cement Grinding layout plan Ref: GEL-G-SLT-0002-03;
  - Port conveyors to Clinker Storage (info only not part of this application) Ref: GEL-G-SLT 0002-04;
  - Site plans showing setbacks, ancillary buildings and signage Ref: GEL-G-SLT-0002-05;
  - Office and Workshop floor plan Ref: GEL –G-SLT-0002 -06;
  - Office and Workshop elevations plan Ref: GEL-G- SLT-0002- 07;
- Proposed Native Vegetation Removal Plan prepared by Calibre Ref: 15-0004335 Native Vegetation Removal – A;
- Preliminary Cultural Heritage Study prepared by Ecology and Heritage Partners Pty Ltd;
- Biodiversity Assessment prepared by Ecology and Heritage Partners Pty Ltd;
- Noise Assessment prepared by Marshall Day Acoustics;
- Air Quality Assessment prepared by Pacific Environment;
- Traffic and Transport Assessment prepared by Cardno;
- Stormwater Management Plan prepare by thysessenkrupp and
- Letter of Support from Geelong Port Pty Ltd.

3 SUBJECT SITE

The site is described as Lot 2 on Plan of Subdivision 434155 with a street address of 37-65 Walchs Road, North Shore. A Certificate of Title is included at **Error! Reference source not found.**. An aerial image of the site can be seen within Figure 3-3.

The land is irregular in shape with frontages to local roads including Walchs Road to the south and The Esplanade running along the north edge of the site and down the eastern side. The site sits within the Port of Geelong, approximately 160m west of the water's edge.

The site is largely sealed and was previously utilised by BHP as an industrial facility operating a steel mill. There are redundant concrete structures above and below ground level to the west of the site. The north-eastern portion of the site is reclaimed land. The site currently includes concrete and bitumen roadways, carparks and associated surface water drainage.

Figure 3-1: Existing entrance off the Esplanade

Figure 3-2: Existing concrete hardstand

The subject site is zoned Port Zone (PZ) and is covered by the Design and Development Overlay – Schedule 20. The site is also identified as an area of Cultural Heritage Sensitivity. A Cultural Heritage Assessment accompanies this application at Appendix F and confirms that the site has been subject to significant ground disturbance, therefore a Cultural Heritage Management Plan is not required to issue a planning permit for this development.

As this site is located within the Port of Geelong, the Geelong Port Structure Plan 2007 has been considered within this report at Section 6.6.1.

Lascelles Wharf has three main berthing facilities handling dry bulk cargo. Boral currently utilise berth 1 and would continue to do so. To facilitate the proposed use, the Port of Geelong will be providing fixed and mobile unloading facilities at the berth, which connect to the new plant (works within the Port land do not form part of this application and will be separately dealt with by the Port. Berth 1 will also continue to be used to import materials unrelated to Boral operations.

Figure 3-3: Aerial Photo of Subject Site

4 SITE CONTEXT

4.1 BACKGROUND

The site has been previously utilised by BHP as an industrial facility operating a steel mill. There are redundant concrete structures below and protruding above ground level from the redundant steel mill workings to the west of the site. The site also includes concrete and bitumen roadways, carparks and associated surface water drainage.

It is envisaged that the site will be cleared of most of these structures and services, and the site levelled prior to construction works if successful in obtaining a planning permit.

4.2 SURROUNDS

The subject site is located in the Lascelles Wharf precinct, which forms part of the broader Geelong Port in the City of Greater Geelong municipality. The Geelong Port area comprises various precincts including Point Henry Pier, Bulk Grains Pier, Corio Quay, Point Wilson, Refinery Pier and Lascelles Wharf. The Geelong Port Structure Plan includes all of the above with the exception of the facilities at Point Henry given their geographical isolation from the remainder of the port.

The Geelong Port is located to the east of the residential areas of North Shore and sits within Corio Bay. The port is located approximately 6km north of Geelong's main city centre and is the largest regional port in Victoria and continues to provide a broad range of port, ship and wharf-side services to its clients.

The land is largely surrounded by other industrial sites. The OMYA processing plant is located to the north which includes the external calcite stockpiles within close proximity of the boundary.

The Port to the east includes operations such as ship unloading facilities and transport from the berth area via trucks. The main port entrance to the berth is located directly opposite the site.

Incitec Pivot is located to the south of the site and produces fertiliser for which the products are imported via Geelong Port at the same berth utilised by Boral Cement. The pre-fertiliser product is moved from the Port to the Incitec site with road trucks. This material is stored on the berth in Warehouse 1 and then fed via the front end loader onto a conveyor belt into the Incitec site (over The Esplanade). The proposed the Clinker Grinding Plant operation will move materials the same way utilising a new conveyor (provided by the Port) which will feed into the Clinking Grinding facility (over The Esplanade).

Land to the west of the site is occupied by OneSteel who manufacture and distribute steel and steel products. Their operations are largely conducted within enclosed manufacturing facilities.

As previously identified, the site is zoned Port Zone (PZ). The nearest residential land use from the subject site is located approximately 500 metres to the south in the Neighbourhood Residential Zone. Land adjacent to the south and west of the site is zoned Industrial 2 Zone. The subject site and surrounding properties can be viewed within Figure 4-4.

Figure 4-1: Subject Site and Surrounds

Figure 4-2: View to Incitec located to the south of the site

Figure 4-3: View to Port to the east

Figure 4-4: View to One Steel to the west

Figure 4-5: View to OMYA to the north and Madden Avenue interface

5 PROPOSAL

This application proposes the development of the subject land for a Clinker Grinding Plant which falls under the 'Industry' land use definition at Clause 74 of the Greater Geelong Planning Scheme.

In the Port Zone (PZ) Industry is a Section 1 use (permit not required) if the following conditions have been complied with:

Section 1 – Permit not required		
Use	**Condition**	**Response**
Industry (other than Materials recycling, Refuse disposal, Transfer station, Rural industry)	*Must be located on land and associated with port operations.*	Complies as the operations associated with the proposed Clinker Grinding Plant will be directly associated with the Port operations as it involves importing of clinker, slag and gypsum through this Port.
	Must not be located on Station Pier, Port Melbourne.	Complies as the proposed Clinker Grinding Plant is not located on either of Station Pier or Port Melbourne.
	Must not be a purpose shown with a Note 1 or Note 2 in the table to Clause 52.10.	Clause 52.10 of the Scheme does not apply to the proposed use. See below.
	The land must be at least the following distances from land (not a road) which is in a residential zone, Capital City Zone or Docklands Zone, land used for a hospital or an education centre or land in a Public Acquisition Overlay to be acquired for a hospital or an education centre: • *The threshold distance, for a purpose listed in the table to Clause 52.10.* • *30 metres, for a purpose not listed in the table to Clause 52.10.*	Clause 52.10 of the Scheme does not apply to the proposed use. See below.

Table 5-1: Zoning: Response to Industry Use Conditions in Port Zone

As outlined in the Herbert Smith Freehills letter dated 23 November 2016 to Council (Appendix L), there is a distinction between a cement production facility and a Clinker Grinding Plant, reflected in the *Environment Protection (Scheduled Premises and Exemptions) Regulations 2007.* Given the distinction, it is considered that the works related to 'cement production' will occur elsewhere (not on this site) and therefore Clause 52.10 (Uses with Adverse Amenity Potential) of the Scheme does not apply to this application. The proposed Clinker Grinding Plant meets the conditions in the Port Zone for Industry use and a planning permit is not triggered for the use under this zone.

In the Port Zone (Clause 37.09-4), a planning permit is not required for buildings and works where a Works Approval and licence is required under the *Environment Protection Act* 1970. The proposed Clinker Grinding Plant will require a Works Approval and licence under the EP Act as it falls within category H01 (Cement) item (ii) 'Premises for cement works in which cement clinker or clays or limestone or like materials are ground' as set out in the Scheduled Premises Regulations. On this basis, a planning permit will not be required for building and works under the Port Zone.

By email dated 16 December 2016, The City of Greater Geelong confirmed that the only trigger for a planning permit will be for building and works under the Design and Development Overlay – Schedule 20 (DDO20).

As outlined above, whilst the use for Clinker Grinding Plant does not trigger a planning permit requirement, an understanding of the plant's processes clarifies the logic regarding the placement of buildings and works that will form the facility. A description of the plant is provided below and the processes are outlined in the diagram at Figure 4-1: Visual Process Diagram.

The proposed Clinker Grinding Plant is to be fed by an automated transport system of belt conveyors from Berth 1 at Lascelles Wharf into the proposed site. These belt conveyors do not form part of this application and will be provided by the Port of Geelong who will obtain any required approvals. This system will transport clinker, slag and gypsum to the site.

In summary, the proposed plant will include the following:

- Materials Storage:
    - The site will be used to store Slag, Gypsum and Rock Limestone.
    - Slag and Gypsum will be delivered via the belt conveyors from the Port and then stored in separate, open stockpiles with a combined capacity of ~75kt. These stockpiles will utilise retaining concrete walls to segregate and enclose the material. Dust suppression will be provided to industry standards.
    - Rock Limestone will be sourced locally and delivered to the site daily via truck. This stockpile will utilise concrete retaining walls to enclose the Limestone and will have a capacity of ~3.5kt.
- Plant:
    - A slag drying plant will be constructed and will process and feed slag into the grinding circuit by a rubber belt conveyor. Dust collection facilities will be located at all material transfer points.
    - The Grinding Circuit will include dosing bins, material transport systems, ball mills, particle separation and dust collection facilities. Materials are fed automatically into the ball mills, with each capable of achieving 95-105tph of material throughput for general cement and 45-50tph for slag cement respectively. The grinding circuit will be housed within an appropriately sized building.
    - The finished products will be transported from the grinding circuit via bucket elevator and airslide conveyors to six storage silos: three silos for GP Cement; two silos for Slag Cement; and a single silo for HE Cement. Each silo will have a capacity of ~3kt; with a discharge rate of 28t per 10 minutes per truck. The silos and loading network will have appropriate dust collection facilities.
    - Unlike the above materials, Limestone will be delivered to the site via truck and deposited on stockpile. It will then be fed into a Reception Hopper and will enter a dosing bin, after which the Limestone will also

go through the process of being fed into Ball Mills and the finished product to be stored in silos for transfer offsite.

- Transport:
  - Trucks will enter the site and collect the finished product from underneath the silos. The finished products will then be distributed throughout Victoria via the road network.
- Capacity:
  - The plant is expected to be capable of producing 950kt of cementitious product annually.

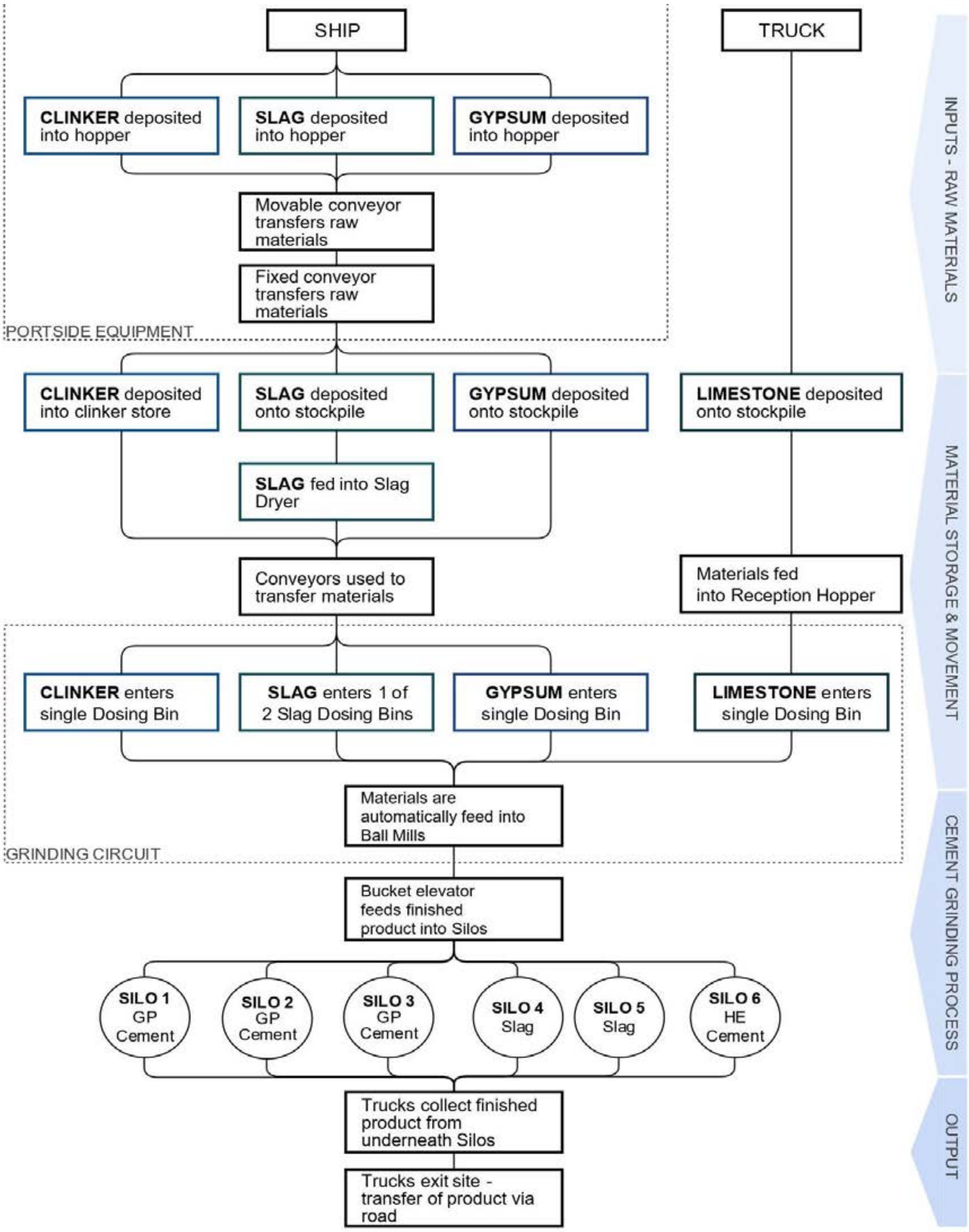

Figure 4-1: Visual Process Diagram

5.1 BUILDINGS AND WORKS

The buildings and works associated with the proposed Clinker Grinding Plant fall under the 'Industry' land use definition at Clause 74 of the Greater Geelong Planning Scheme.

The proposed development will move operations away from Waurn Ponds to a location closer to the Port, being the subject site. The new plant will import clinker and slag for manufacturing into a range of cementitious products. The expected capacity of the plant will be 950kt annually.

The facility is proposed to operate 24 hours a day, 7 days per week and will employ up to 32 people, comprising 12 plant staff and 20 drivers during the day and reducing to 24 staff at night comprising 4 plant staff and 20 drivers.

The site and elevations plans provided at Appendix D illustrate the layout of the facility and dimension of the various buildings proposed as part of the development. The following buildings and works form part of the Clinker Grinding Plant proposal:

- **Earthworks** – The redundant concrete structures below and protruding the ground level along with existing roadways will be removed unless they can be repurposed where economically viable.

- **Vegetation Removal** – A small patch of native vegetation (0.133ha) is proposed to be removed from the south east corner of the site. The vegetation has been identified as Coastal Alkaline Scrub regrowth (Seaberry Saltbush) which is greater than 10 years old and therefore triggers a permit for its removal.

  The Biodiversity Assessment Report (Appendix G) prepared by Ecology and Heritage Partners provides further detail in relation to the offset targets and general mitigation measures.

- **Site Security/Fencing** – The existing chain mesh fencing is proposed to be retained. The vehicular entrance gates will be 'Rhino' type or similar, with swap card access and pedestrian access via swap card turnstile

- **Covered Clinker Storage** – Positioned at the lower, eastern corner of the site will be a covered store for the clinker. The store will have a dome profile and include appropriate dust collection facilities based on a feed rate of ~650tph and capacity of ~85kt. For full details on the stores dimensions refer to drawing GEL-G-SLT-0001-02. The dome will have a circumference of ~64metres and a total height of ~43metres.

- **Slag, Gypsum and Limestone Storage** – Concrete retaining walls on three sides are proposed to segregate the material stockpiles.

  - The open Slag stockpile will have a capacity of ~55kt and will have a total height of ~18 metres and a width and depth of ~51 metres and ~84 metres respectively and will be fitted with dust suppression systems;

  - The open Gypsum stockpile will have a capacity of ~35kt and will have a total height of ~22metres and a width and depth respectively of ~51 metres and ~40 metres respectively.

  - The limestone stockpile is to be sited further north and will have a capacity of ~3,500t.

  - For profile views and dimensions refer to GEL-G-SLT-0001-02.

- **Slag Drying Plant** – Positioned north of the Slag Storage area, the slag dryer will reduce the moisture content of the material. The drying plant will include dust collection facilities.

- **Conveyors** – Conveyors will be used to transport materials from storage to dosing equipment within the grinding circuit. The internal fixed conveyor system will be designed to minimise material spillage and reduce dust generation. Additionally, they shall have access walkways as specified including guarding and safety mechanisms to latest Australian Standard and statutory requirements.

- **Grinding Circuit Equipment** – Positioned south of the Finished Product Silos the *Dosing Bins* and *two (2) Ball Mills* are incorporated within the automated grinding circuit. A combination of the materials is processed into cementious powders and transported via a bucket elevator and airslide conveyor system into the Finished Product Silos. The grinding circuit also includes dedicated product separation and dust collection facilities for each ball mill. To see the full configuration and dimensions view drawing GEL-G-SLT-0001-03.

- **Finished Product Silos** – Located to the north of the clinker grinding circuit and centrally within the site there are six (6), 3.5kt Loadout Silos each of which are ~14 metres in diameter and 34metres high. Three silos are for GP cement, two are allocated for slag and a single silo for HE cement. The silos and truck loading bays will have dedicated dust collection facilities.

- **Signage** – It is proposed to place four Business identification signs on the site. The signs will be located at each of the entrance gates. The signs each comprise dimensions of 2 metres in height and 1.5 metres in width. Indicative signage plans are provided within drawing reference GEL-G-SLT-0002-05.

- **Vehicle Access**– Primary access for heavy vehicles will be provided via a new Madden Avenue crossover. A new crossover is proposed onto the Esplanade, located to the north of the existing access, this new crossover will provide the designated exit point for heavy vehicles. The existing access to the site from The Esplanade will also remain providing access to an additional light vehicle parking area. The largest vehicles accessing the site with be 40 tonne B-double trucks.

- **Car Parking** – A total of 40 vehicle car parking spaces are to be provided across the site. Twenty (20) spaces will be provided within the northern portion of the site adjacent to the *Logistics Amenities* building catering for logistics team drivers. These spaces will be access via a crossover on Madden Avenue. A further 20 spaces, including disabled parking will be provided within the eastern portion of the site, adjacent to the *CCR, Admin, Lab & Workshop* buildings and accessed via The Esplanade. These spaces will cater for production plant operators.

  The north carpark forms two rows accessed via a connecting road from Madden Avenue. The east carpark forms two perpendicular rows, of four and six, again accessed via the existing crossover from The Esplanade. Both carparks will include night time lighting at each entrance/exit point.

- **Circulation** – Plan GEL-C-SLT-0008-01 illustrates the internal vehicle movement. Material collection will be located in the northern part of the site, near the cement silos and a turnaround facility is provided to allow trucks to loop the site if required.

- **Truck Movement** – The anticipated truck movements are outlined in the tables below, Table 5-2 and Table 5-3.

Product of Service	Type of Vehicle	Inbound Movements	Outbound Movements	Total Movements
Limestone	Truck & Dog Closed Tipper Trailer	20	20	40
Production/Logistics Team	Car	58	58	116

Product of Service	Type of Vehicle	Inbound Movements	Outbound Movements	Total Movements
Finished Product (Cement)	Single Bulk Tank trucks	200	200	400
Total Heavy Vehicle (HV) movements per day				440
Total Light Vehicle (LV) movements per day				116
Permanent Development Total Movements per day				556

Table 5-2: Anticipated Daily Traffic Movements – extracted from Cardno Traffic and Transport Assessment

	AM Peak (7:00am – 8:00am)			PM Peak (4:00pm – 5:00pm)		
	In	Out	Total	In	Out	Total
Heavy Vehicles	20	20	40	18	18	36
Light Vehicles	13	8	21	13	8	21
Total	33	28	61	31	26	57

Table 5-3: Anticipated Typical Per Hour Traffic Movements – extracted from Cardno Traffic and Transport Assessment

- **Truck Bays-** Positioned north-west of the Silos are twelve truck parking bays accessible when trucks enter the site from the north, toward their loading position. Additionally, a truck wash down area is positioned between silos and northern entry point; accessible by trucks when travelling around the one-way system. Trucks will load and unload in the large space adjacent to the Loadout Silos.

- **Bicycle Parking** - Six bicycle parking spaces are proposed within the carpark adjacent to *CCR, Admin and Lab & Workshop* buildings.

- **CCR/Admin/Lab & Workshop Buildings** – Abutting the northern car parking area will be a logistics/ amenities building. Adjoining the eastern car parking area will be a workshop and CCR/ Admin building. The logistics and amenities building is to be sited 16.5 metres inside the Madden Avenue title boundary and will comprise and area of 500 square metres. The workshop building is to be attached to the office building of The Esplanade and will be 4.3 metres in height and comprise an area of 210 square metres. The offices will be 3.6 metres in height and comprise an area of 233 square metres. Plans illustrating the floor and elevations for these structures are provided in drawing numbers GEL-G-SLT-0002-07 and GEL-G-SLT-00002-05 provided at Appendix D. Building setbacks are provided in drawing GEL-G-SLT-0002-05.

- **Stormwater Management** – An area of 3600m2 will be set aside for the construction of a Free – Water surface wetland system design to treat potential contaminated water before it emanates from the site catchment areas. The wetland system will be lined with an impermeable membrane as required by the EPA and will be designed to incorporate a 1:8 access ramp and tracks to all hardstand areas (at least 3 metres wide) to enable maintenance to remove solids. Such maintenance is generally required every 5 years. The design and location of the wetland system is detailed within the attached Stormwater Management Plan prepared by thyssenkrupp and included at Appendix M.

It should be noted that the unloading hoppers, site material transfer infrastructure and mobile conveyors in the port area do not form part of this planning application and will be facilitated by Geelong Port Pty Ltd.

A number of technical reports accompany this submission, including:

- **Cultural Heritage Study** – Prepared by Ecology and Heritage Partners Pty Ltd

The Cultural Heritage Review describes the methods and outcomes of detailed investigations undertaken by Ecology and Heritage partners. The Review concludes that the entire site has been subject to 'significant ground disturbance' as defined in r.4 of the Aboriginal Heritage Regulations 2007. This significant ground disturbance has arisen through land reclamation in the northern part of the site that was formerly within the sub tidal zone, and the construction and operation of a former industrial facility on the remainder of the site. Consequently, there is no requirement to prepare a Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006*.

The Cultural Heritage review is provided in full at Appendix F

- **Biodiversity Assessment** – Prepared by Ecology and Heritage Partners Pty Ltd

The Biodiversity Assessment identified 0.133 hectares of native vegetation within the south-east of the site, as such the permit application falls under the Low Risk-based pathway. The offset requirement for native vegetation removal is 0.017 General Biodiversity Equivalence Units (BEU). A Planning Permit from City of Greater Geelong is required to remove, destroy or lops any native vegetation (i.e. Coastal Alkaline Scrub). The report also identifies that no further action is required as per Flora and Fauna Guarantee Act 1988. The full Biodiversity Assessment can be viewed within Appendix G.

- **Noise Assessment** – Prepared by Marshall Day Acoustics

The Noise Assessment report provides noise-modelling results that identify that the site will comply with the NIRV recommended levels, and the target recommended levels. The report confirms that the proposal will comply with SEPP N1 requirements. Appropriate noise mitigation measures are provided within the conclusion section of the report. The full Noise Assessment can be viewed within Appendix H.

- **Air Quality Assessment –** Prepared by Pacific Environment

The Air Quality Assessment identified that the dust impact assessment for the proposed Clinker Grinding Plant proposed to be located at the EPA recommended separation distance of 500 m from the nearest sensitive receptors, shows that risks associated with air quality impacts from the proposed clinker grinding facility can be managed and will comply with the relevant EPA criteria. The full Air Quality Assessment can be viewed within Appendix I.

- **Traffic and Transport Assessment – Prepared** by Cardno.

The Traffic and Transport Assessment outlines that the provision of 40 regular car parking spaces will accommodate the project peak parking demand. Access and internal circulation has been tested for vehicles up to and including a B-Double Truck and is considered to be satisfactory. The heavy and light vehicle traffic generated by the proposal is considered to be readily accommodated by Walchs Road, The Esplanade, Madden Avenue and Seabeach Parade. Nevertheless, heavy vehicle traffic will only use appropriate roads designated by Council for this type of use. The full Traffic and Transport Assessment can be viewed within Appendix J.

- **Stormwater Management Plan** – Prepared by Thysenkrupp

The stormwater management plan outlines the siting and specifications for the provision of a Free Water Surface (FWS) constructed wetland system. An area comprising 3600m2 has been allocated in order to accommodate a 2407m2 wetland system and associated maintenance access areas. The wetland will act as a treatment facility to minimise the environmental impact of the plant from water discharges (reducing the solids content of contaminated water). The stormwater treatment philosophy is outlined in the full report at Appendix M.

6 PLANNING CONTEXT

Planning Policy	
Relevant State Planning Policy	Clause 10 Operation of the State Planning Policy Framework Clause 11 Settlement Clause 12 Environmental & Landscape Values Clause 13 Environmental Risks Clause 15 Built Environment & Heritage Clause 17 Economic Development Clause 18 Transport Clause 19 Infrastructure
Relevant Local Planning Policy	Clause 21.02 City of Greater Geelong Sustainable Growth Framework Clause 21.03 Objectives – Strategies – Implementation Clause 21.04 Vision – Municipal Framework Plan Clause 21.05 Natural Environment Clause 21.07 Economic Development and Employment Clause 21.12 Geelong Port
Zone	Clause 37.09 Port Zone
Overlays	Clause 43.02 Design and Development Overlay – Schedule 20
Particular Provisions	Clause 52.05 Advertising Signs Clause 52.06 Car Parking Clause 52.07 Loading and Unloading of Vehicles Clause 52.10 Uses with Adverse Amenity Impacts Clause 52.17 Native Vegetation
General Provisions	Clause 65 Decision Guidelines
Other Documents	Geelong Port Structure Plan 2007 Port of Geelong – Development Strategy 2013

Table 6-1: Summary of Relevant Provisions, Policy & Controls

6.1 STATE PLANNING POLICY

The following clauses of the SPPF are considered relevant to the proposed subdivision of the subject site.

Clause 10 – 'Operation of the State Planning Policy Framework' seeks to ensure that the objectives of planning in Victoria are fostered through appropriate land use and development planning policies and practices which integrate relevant environmental, social and economic factors in the interests of net community benefit and sustainable development. The objectives of Planning in Victoria are noted as:

a) *To provide for the fair, orderly, economic and sustainable use, and development of land.*
b) *To provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity.*
c) *To secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria.*
d) *To conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value.*
e) *To protect public utilities and other facilities for the benefit of the community.*
f) *To facilitate development in accordance with the objectives set out in paragraphs (a), (b), (c), (d) and (e).*
g) *To balance the present and future interests of all Victorians.*

Clause 11.04-6 – 'A State of Cities' seeks to provide for development that delivers choice, opportunity and global competitiveness.

Clause 11.05-1 – 'Regional Settlement Networks Geelong' identifies Geelong as regional city that will facilitate major growth as a key part of a network of regional cities and towns.

Clause 12 – 'Environmental and Landscape Values' outlines how planning in Victoria is to protect, conserve and enhance the State's unique environments and landscapes.

Clause 12.01 – 'Biodiversity' relates to the protection of biodiversity, with the following objectives to be considered:

- *To assist the protection and conservation of biodiversity, including native vegetation retention and provision of habitats for native plants and animals and control of pest plants and animals.*
- *To ensure that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.*

Clause 12.02-5 – 'Bays' seeks to improve the environmental health of the bays and their catchments.

Clause 13 – 'Environmental Risks' seeks to plan and manage the potential coastal impact of climate change through various strategies.

Clause 13.03-1 – 'Use of Contaminated and Potentially Contaminated Land' seeks to ensure that potentially contaminated land is suitable for its intended future use and development, and that contaminated land is used safely'

Clause 13.04-1 – 'Noise Abatement' seeks to assist the control of noise effects on sensitive land uses and ensure that development is not prejudiced and community amenity is not reduced by noise emissions, using a range of building design, urban design and land use separation techniques as appropriate to the land use functions and character of the area.

Clause 13.04-2 – 'Air Quality' aims 'to assist the protection and improvement of air quality'. There are numerous policies outlined throughout this clause that aim to manage the abovementioned risks.

Clause 14.02 – 'Water' seeks to assist the protection and, where possible, restoration of catchments, waterways, water bodies, groundwater, and the marine environment.

Clause 15 – 'Built Environment and Heritage' and is centred on the following premise:

- *Planning should ensure all new land use and development appropriately responds to its landscape, valued built form and cultural context, and protect places and sites with significant heritage, architectural, aesthetic, scientific and cultural value.*
- *Creating quality built environments supports the social, cultural, economic and environmental wellbeing of our communities, cities and towns.*
- *Land use and development planning must support the development and maintenance of communities with adequate and safe physical and social environments for their residents, through the appropriate location of uses and development and quality of urban design.*

Clause 15.03-2 – 'Aboriginal Cultural Heritage' seeks to ensure the protection and conservation of places of Aboriginal cultural heritage significance.'

Clause 17.02 – 'Industry' seeks to ensure the availability of land for industrial uses in growth areas.

Clause 17.02-1 – 'Industrial Land Development' seeks to ensure that industrial development is located areas whereby the impact on the amenity of surrounding areas is minimised through buffers, whilst protecting land to be used and developed for industrial purposes from non-industrial land uses.

Clause 18.01 – 'Integrated Transport' envisions an integrated and sustainable transport system that provides access to social and economic opportunities, facilitates economic prosperity, contributes to environmental sustainability, coordinates reliable movements of people and goods, and is safe. The following transport policies should be considered:

- *To create a safe and sustainable transport system by integrating land-use and transport* at **Clause 18.01-1** and;
- *To coordinate development of all transport modes to provide a comprehensive transport system* at **Clause 18.01-2**.

Clause 18.03 – **'Ports'** recognises the significant role of the State's commercial trading ports, including Geelong, in supporting local, regional, state and national economies whilst maintaining international competitiveness. This Clause provides for supporting the effective and competitive operation of Victoria's ports.

Clause 19.03 – 'Development Infrastructure' identifies broad objectives relating to water supply, sewerage, drainage services as well as electrical connections.

RESPONSE TO STATE POLICIES

The proposed Clinker Grinding Facility will be located within the Lascelles Wharf precinct that forms part of the broader Geelong Port area and will utilise a new conveyor which will facilitate the movement of materials directly from the Port to the site in keeping with similar activities currently undertaken by adjoining businesses. This use is consistent with the intent of the Ports Policy at Clause 18.08. A development of this nature and scale in a Port area also achieves the aims of the Regional Settlement Networks, Geelong Policy at Clause 11.05-1 by building upon local infrastructure and improving Greater Geelong's standing as a regional industrial and shipping hub.

The co-location of the proposed plant adjacent to Lascelles Wharf facilitates the objectives of Clause 18.01 Integrated Transport and the objective to integrate land use and transport and co-ordinate the development of all transport modes. The Clinker Grinding Facility will utilise Port Infrastructure to transport materials via conveyor to the site which will then leave the site via truck along major transport routes across Victoria. The siting of the Facility at the Port will remove numerous truck movements from the local road network providing a better infrastructure outcome for all.

Noise minimisation and air quality requirements have been considered and the objectives of the Air Quality and Noise Abatement at Clause 13 will be met as detailed in the Noise Assessment (Appendix H) and Air Quality Assessment (Appendix I) provided as part of this application.

The objectives of Clause 12.01 – 'Biodiversity' have been taken into account and vegetation loss has been minimised. A small patch of native vegetation (0.133ha) is proposed to be removed from the south-east corner of the site to allow for the covered Clinker Storage tank (85,000t). The removal of the vegetation will not result in a net loss to Victoria's Biodiversity, as it complies with DELWP's offset requirements, detailed in the Biodiversity Assessment (Appendix G).

Regard has been had for Clause 15.03-2 – 'Aboriginal Cultural Heritage. The *Aboriginal Heritage Act 2006* has been considered in the Preliminary Cultural Heritage Study (Appendix F) which has determined that a Cultural Heritage Management Plan will not be required as the land has been disturbed by previous industrial uses.

The proposed development is consistent with the objectives of the above State Planning Policies in Victoria.

6.2 LOCAL PLANNING POLICY

Municipal Strategic Statement

The introduction to Greater Geelong's Municipal Strategic Statement and Local Planning Policy Framework draws from Greater Geelong's vision:

> *'Geelong, coast country and suburbs is the best place to live through prosperity and cohesive communities in an exceptional environment'*

The **Municipal Strategic Statement** for Greater Geelong is informed largely by Greater Geelong's Sustainable Growth Framework, which is outlined at **Clause 21.02, City of Greater Geelong Sustainable Growth Framework.** The Framework sets out the key principles for ensuring all actions and development undertaken in the City of Greater Geelong meets the needs of the present community, without compromising the ability of future generations to meet their needs. The Framework has four key elements. They are:

1. Managing Urban Growth
2. Building Sustainable Infrastructure
3. Encouraging Diversity in Industry
4. Reducing Greenhouse Gas Emissions.

Element 3 **- Encouraging Diversity in Industry** is of particular relevance to this application. The Framework outlines that Council will:

- Support existing businesses and employers in Greater Geelong to achieve sustainable outcomes.
- Encourage the growth of new and sustainable industry sectors.
- Look for innovative ways to engage with the private sector.
- Encourage the development of collaborative, interdependent industry clusters.
- Provide a diverse range of high quality industrial and commercial land.

Clause 21.03 and 21.04 – 'Objectives, Strategies and Implementation and the Municipal Framework Plan' details the place-based planning frameworks set out within the Greater Geelong Planning Scheme that give planning direction for specific places and towns within the municipality, including the **Geelong Port at Clause 21.12**. It is also structured around four key land use themes at Clause 21.05, which are detailed below:

Clause 21.05 – '**Natural Environment'** details the key environmental issues and influences facing the municipality and identifies the need to protect and enhance the natural environments and the flora and fauna that they sustain. The Geelong region is also formed by an extensive coastline which is at once an important natural feature, but it is also vulnerable to urban development, climate change and natural processes.

In considering this, there are two clauses of relevance to this application and its possible impact on the Greater Geelong environment. They are:

Clause 21.05-2 – 'Waterways' which seeks to preserve and enhance its water system through the following objectives:

- *To protect, maintain and enhance waterways, rivers, wetlands and groundwater.*
- *To protect connectivity between waterways and wetlands.*
- *To reduce the amount of runoff from urban development and improve the quality of stormwater runoff entering waterways, estuarine and marine waters.*

Clause 21.05-4 – 'Coastal Environments' which seeks to protect and manage Geelong's coastal areas through these two following objectives:

- *To protect, maintain and enhance the coast, estuaries and marine environment.*
- *To respect and manage coastal processes.*

Clause 21.07 – 'Economic Development and Employment' makes specific reference to the important role of industry in the Geelong region, and particularly highlights the role of Geelong Port. There is a need to provide a diverse range of appropriately located, well serviced industrial land in Geelong that does not impact on the amenity of residents and non-industrial businesses. While traditional manufacturing industries will continue to be key economic and employment drivers in the Geelong region, the City's economy will also need to adapt to emerging industry sectors and the particular demands they place upon the planning and development of industrial areas.

Clause 21.07-2 – 'Industry' provides for the following objectives:

- *To provide an adequate supply of appropriately located industrial land that meets the needs of different industries.*
- *To direct different types of industrial development to appropriate locations.*
- *To facilitate well designed and serviced industrial development that provides a high level of amenity for workers and visitors.*
- *To minimise land use conflicts.*

Clause 21.12 – 'Geelong Port' which refers to the '*Port of Geelong- Development Strategy (2013)*. The Port is vitally important to the City's economy yet faces specific development issues so that it can operate, provide for development and expand alongside a largely residential/urban interface. The Strategy highlights that as a major asset of the Victorian community, the port generates over $400 million worth of economic activity annually as the State's most important bulk cargo port, and as such access to and maintenance and development of Geelong Port are of critical importance to the City of Greater Geelong and Victoria at large. The LPPF maintains the following objective to support the role that Geelong Port plays in a local, state and national context:

- *To provide for the continued growth and development of Geelong Port as a key economic resource to the Victorian community.*
- *To maintain and enhance the efficiency of the port.*
- *To safeguard the port as a focal point for infrastructure development and economic prosperity within south-west Victoria.*
- *To ensure that development in the port area is environmentally sustainable.*
- *To give appropriate weight to the needs of a working port having regard to the amenity of the land uses at the port interface.*

To ensure that use and development applications in the Port Zone are port related and port dependent, and will not infringe on the port's current and future economic importance to the City of Greater Geelong, the following strategies are to be implemented and followed:

- *To ensure that future development of the port and surrounding industrial land is linked and opportunities protected.*
- *Protect the port area from encroachment by non-compatible land uses or developments.*
- *Ensure that sufficient land is available for future port-related developments by discouraging non-port related land use and development.*
- *Facilitate increased throughput at the port through the development of extended berths at Corio Quay North and South and Lascelles Wharf.*
- *Facilitate and advocate for growth of the development of the port.*
- *Discourage further fragmentation of land holdings in the port area where this threatens to close off strategic development options for the port.*
- *Secure a dual gauge rail connection to Lascelles Wharf and appropriate road connections to the Geelong Ring Road Employment Precinct and the Geelong Ring Road.*
- *Ensure that appropriate mechanisms are in place to protect the operation of the port and minimise potential conflicts with surrounding land uses.*

RESPONSE TO LOCAL POLICIES

The proposed Clinker Grinding Facility will be located in the Lascelles Wharf Port area and will be fed by the proposed Belt Conveyor (outside of application site) from the Port demonstrating the connectivity between the Port and the site and highlighting the advantages that can be made through co establishment with the Port. Therefore, it is considered that the use of Port facilitates for this operation directly will enhance the efficiency and growth of the Port to ensure the broader Geelong Port remains a key economic resource to the Victorian community, which is consistent with the objectives of Geelong Port Policy at Clause 21.12.

The proposed facility will be located in the Port Zone adjoining a broader industrial area and will not conflict with the existing industrial operations adjoining the site. Due to the nature of the Clinker Grinding Facility operation, the location of the site adjoining the Port will ensure an efficient use of existing and future Port infrastructure making the placement of this development in the context of the broader appropriate and therefore consistent with the Industry, Economic Development and Employment Policies contained within Clause 21.07.

Due to the site's location approximate to the existing Lascelles Wharf Port area, the proposed development will not have any impact on non-port coast in the broader Geelong coastal area. The proposal does not include any works along the coastal shore and includes a detailed constructed wetland system to manage stormwater runoff demonstrating consistency with the Waterways Policy at Clause 21.05-2 and the Coastal Environments Policy at 21.05-4 which seek to protect, maintain and enhance the coast, estuaries and marine environment.

The removal of native vegetation has been minimised where possible on site as outlined in Section 6.1 of the report and will provide offset as per DELWP's requirements. The proposal will not result in removal of vegetation outside of the site or along the Geelong Coastline which is consistent with the Natural Environment Policy at Clause 21.05.

Given the above, the proposed development is consistent with the objectives of the above Local Planning Policies in Victoria.

6.3 ZONE

The subject site is located within the Port Zone, see Figure 6-10. The purpose of the Port Zone is:

- *To implement the State Planning Policy Framework, Port Development Strategies and the Local Planning Policy Framework.*
- *To recognise the significant transport, logistics and prime maritime gateway roles of Victoria's commercial trading ports in supporting Victoria's economy.*
- *To provide for shipping, road and railway access and the development of each of Victoria's commercial trading ports as key areas of the State for the interchange, storage and distribution of goods.*
- *To provide for uses which derive direct benefit from co-establishing with a commercial trading port.*
- *To provide for the ongoing use and development of Victoria's commercial trading ports that support the relevant port development strategy prepared pursuant to the Port Management Act 1995.*

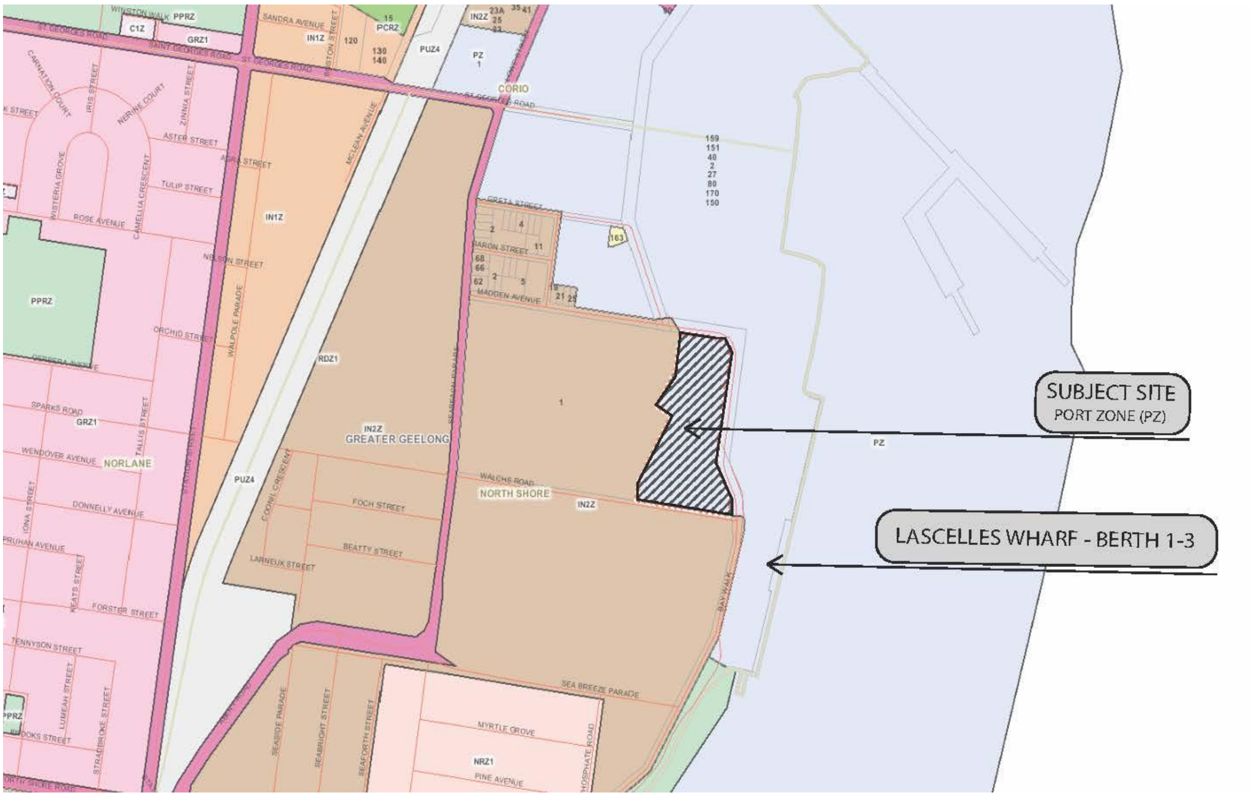

Figure 6-1: Zoning- Site and Surrounds

The proposed Clinker Grinding Plant is an 'Industry' as defined in Clause 74 of the Greater Geelong Planning Scheme. For the reasons outlined in Section 5.1 of this report, a planning permit is not required to use land for Industry under the Port Zone given that all of the Section 1 Use Conditions are satisfied.

Similarly, a planning permit is not required under Clause 37.09-4 for buildings and works, because a works approval and licence will be required for the Clinker Grinding Plant under the *Environment Protection Act 1970*.

While a planning permit is not required under the Port Zone for either the use or development of the Clinker Grinding Plant, this section nevertheless demonstrates that the proposal emphatically complies with the purposes and decision guidelines of the Zone.

The proposed Clinker Grinding Plant is to be located adjacent to the Port and will utilise the future Belt Conveyor (not part of this application) to take full advantage of the co-establishment reducing vehicular movements, emissions and time in taking products from the Port to the facility. Furthermore, the proposed development will achieve reductions in traffic movements and emissions by siting the proposed plant adjacent to the Port which is consistent with the purpose of this zone.

Clause 37.09-5 outlines the Advertising Signage requirements within the Port Zone. The zone is in Category 2. The requirements of Category 2 are provided in the Particular Provisions section of this submission.

Decision Guidelines – Buildings and Works	
Guideline:	**Response:**
Whether the proposed development is consistent the relevant port development strategy, particularly the port precincts, prepared pursuant to the Port Management Act 1995.	The purpose of the Port Zone is to provide for uses which derive direct benefit from co-establishing with a commercial trading port. The proposed Clinker Grinding Plant is to be located adjacent to the Port to take full advantage of the co-establishment reducing vehicular movements, emissions and time in taking products from the port to the facility. The Port Structure Plan identifies existing conflict points with rail and road crossings around the Port that are likely to be exacerbated if Port operations increase. This proposed Clinker Grinding Plant will assist in reducing traffic movements in and around the Port by directly transporting goods form the Port to the site via the proposed conveyor across The Esplanade. The development of the site for storage of gypsum, slag and limestone utilizing direct delivery of these materials from the Port is consistent the aims within the Structure plan to support for growth around the Port for non-hazardous bulk and break bulk goods and for the growth and development of the Port as an important economic resource to the State of Victoria.
The effect on environmental values of adjoining land and port waters.	The development has been designed to provide a number of environmental management activities that will ensure that there will be no detrimental impact on the environmental values of adjoining land or the Port waters.
Built form.	The built form has been designed so as to provide a sense of arrival at the main office and lab on The Esplanade and for the trucks at the amenities area off Madden Drive. All buildings will be clad in Colorbond materials as outlined in the materials and colour schedules on the submitted plans.
Interface with non-port area.	The site interfaces with Industrial 2 zoned land to the west and south, and Port zoned land to the East and north. The proposed development has been designed to respond to the existing surrounds with the larger build form concentrated in the south of the site where abutting properties also comprise large structures. Larger setbacks are provided to the north.
Parking and site access.	Parking will be provided in two locations: Parking off The Esplanade in front of the admin and lab and parking off Madden Avenue. Two new crossovers are proposed on to Madden Avenue. One will provide access to the light vehicle carpark only, the other will provide the heavy vehicle entrance. Truck parking will be provided in a separate location internal to the site. The existing crossover on The Esplanade will provide access to the light vehicle carpark area and a new heavy vehicle exit point is proposed further north.
Loading and service areas.	The whole operation involves loading and unloading. These areas are identified on the Port and site plan GEL-G-SLT-0001-01 and Traffic Movement Plan GEL -C-SLT-0008-1
Outdoor storage.	Storage areas are to be covered and surrounded with retaining walls on three sides.
Lighting.	External lighting will be appropriately baffled.
Storm water drainage.	A Storm water Management Plan has been prepared by thyssenkrupp and proposes the creation of a Free Water Surface (FWS) constructed wetland system in order to treat contaminated water on site before it enters the drainage system. Details of the FWS are provided within the storm water management plan provided at Appendix M.
Traffic implications on the surrounding road network.	The proposed development is anticipated to generate 33 inbound and 28 outbound movements in the AM peak, and 31 inbound and 26 outbound movements in the PM peak, equivalent to approximately one vehicle movement every two minutes in each direction. This is considered low in traffic engineering terms, and is considered unlikely to impact on the function of the surrounding road network.

Table 6-2: Decision Guidelines - Buildings and Works

6.4 OVERLAYS

The subject site is covered by the **Design and Development Overlay – Schedule 20 (Industrial 1, 2 and 3 Zones).** The purpose of the Design and Development Overlay is:

- *To implement the State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.*

- *To identify areas which are affected by specific requirements relating to the design and built form of new development.*

Pursuant to Clause 43.02-2 a planning permit is required to construct a building or construct or carry out works. Figure 6-11 shows the overlays that apply to the site and surrounding areas.

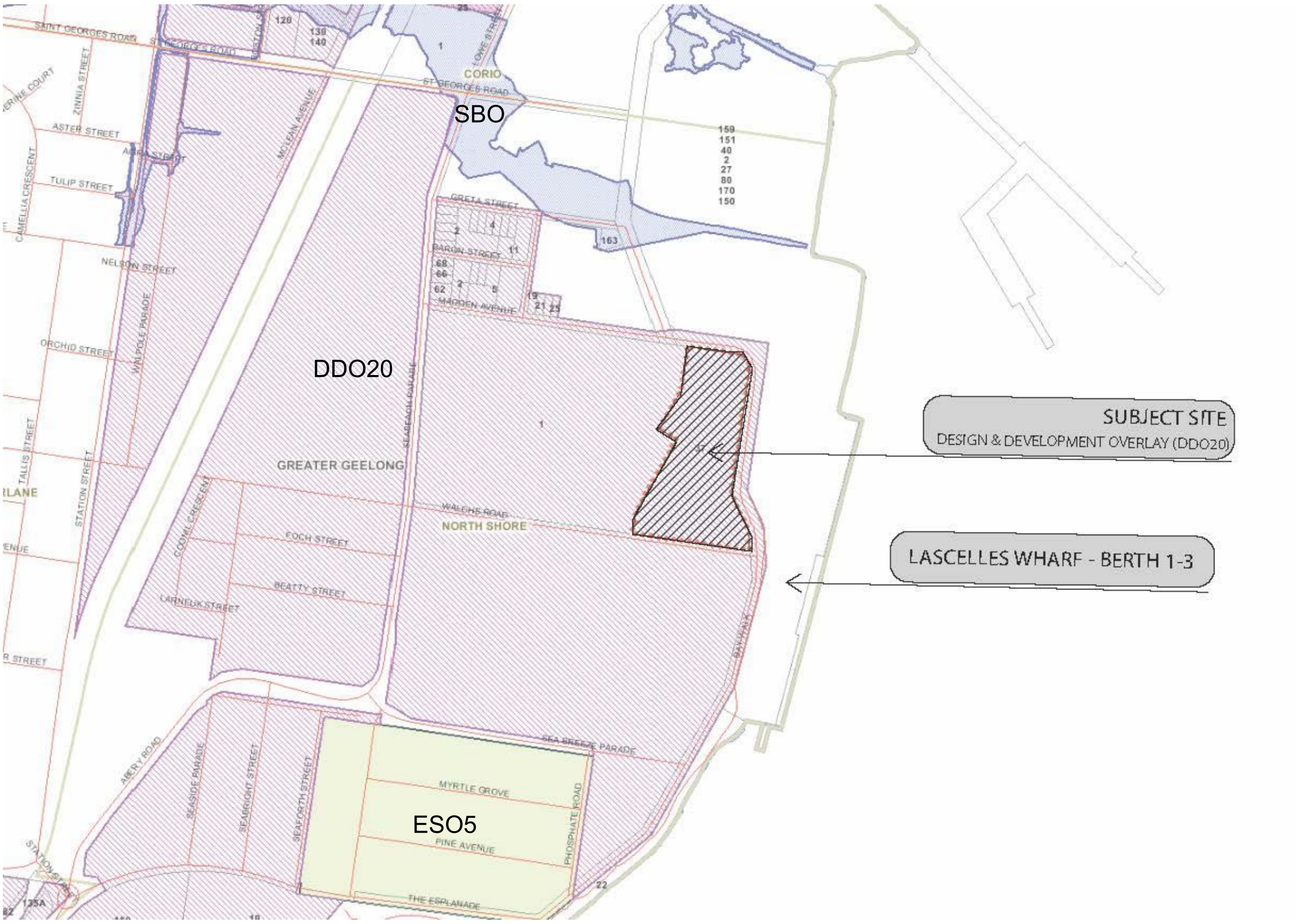

Figure 6-2: Area Overlays

Schedule 20 to the Overlay stipulates the design objectives and specific requirements. The design objectives for the overlay are:

- *To improve the visual appearance and image of industrial areas through well designed site responsive developments.*
- *To facilitate economic development through efficient and functional industrial development.*

- *To provide a high level of amenity for workers and visitors to industrial areas. To minimise the potential for negative off-site effects to occur.*
- *To promote best practise storm water quality and reuse measures.*

The Overlay also contains a number of requirements for Buildings and Works at Section 2.0, and this application is relevant to many of these. They relate to Front and Side (fronting a street) Fences, Site Layout and Design, Infrastructure, Car parking and Access, Landscaping, Signage and Stormwater Quality and Re-Use. A detailed response to the objectives is provided in the following Table 6-3:

Buildings and Works – Schedule 20 to the Design and Development Overlay	
Requirement:	**Response:**
Front and Side (fronting a street) Fences • *Fencing should be constructed of materials other than unpainted galvanised steel and wire.* • *Fencing should be constructed of materials that complement the building and surrounding area and should be painted a muted colour.* • *Wherever possible, fencing should be softened and screened by vegetation planting.*	The existing site is fenced with high 2.4 metre chain mesh fencing which is proposed to be retained or replaced with like materials where required. This is consistent with the surrounding industrial area.
Site Layout & Design • *The front setback of new buildings should be consistent with the setbacks of existing buildings in the area and should be set aside for landscaping and car parking.* • *Buildings should address the street frontage by including the following elements in the design;* • *Front facades that include design elements that add visual interest.* • *Locating office components in a visible location at the front of the building.* • *Incorporating facades that address both frontages where the site is located on a corner.* • *Clearly delineated visitor access points to the building.* • *Buildings, works, plant and machinery should be constructed, housed and maintained in a manner that minimises the visual impact.* • *Potential conflict between pedestrian and vehicle movement should be addressed through the design of the site, including provision of pedestrian links through car parking areas.*	The facility is proposed to contain an administration and lab building located close to the frontage of the site. Car parking will be located to the front of these buildings which will provide a clear sense of address and arrival for any visitors to the site. The siting of buildings within the site will provide an address to both frontages which will activate the space and plant and machinery have been located such that the larger elements such as the covered gypsum stockpile are located adjacent to properties that have larger elements within their built form such as silos etc. A traffic flow and pedestrian and vehicle movement plan have been provided. Safety is of the utmost importance to Boral's operations and under no circumstances will the development create conflict between traffic and pedestrian movements. Colourbond materials are proposed for the cladding of all buildings and structures. Specific details are shown on the Clinker Grinding Plant layout plan and the raw materials site layout plans. The colour palette includes Mangrove, surfmist, light grey and white which will see the facility sit well within the existing environment.

Buildings and Works – Schedule 20 to the Design and Development Overlay	
• *Larger buildings should address bulk and massing issues through using a range of building materials, finishes and colours.*	
Infrastructure • *Physical infrastructure such as water, power, reticulated sewage and constructed sealed roads should be available to new buildings.*	The existing site is well serviced by infrastructure as a result of the previous use. Upgrades will be provided where necessary.
Car parking and Access • *Car parking should be provided at the front of the site.* • *All vehicle crossings, accessways and parking areas should be sealed with an all-weather coat.* • *Lighting should be provided to car parking areas where required.* • *If more than 10 car spaces are provided the design should incorporate landscaped island beds to break up the hard surface area and improve visual amenity.*	Car parking has been provided in two locations within the site and includes the provision of disabled parking. Visitor and staff parking is provided to the front of the administration building and also to the north off Madden Avenue. These areas will be sealed with an all-weather seal coat. The car parking will be provided with appropriate lighting and landscaped island beds will be provided where required to improve visual amenity.
Landscaping • *Existing vegetation should be retained where practical.* • *The front of the site should be set aside for landscaping.* • *Landscaping should be provided along boundaries which adjoin a sensitive land use or environmental feature (such as creek or reserve) or where the site is visually prominent.* • *Landscaping areas should be designed to be low maintenance, including selection of hardy landscape species that require minimal ongoing maintenance and have low water usage. Where practical and consistent with this requirement, landscaping species should be locally indigenous or native.* • *Landscaped areas should be protected from vehicle damage by incorporating protective design features.* • *The quality and quantity of landscaping should reflect the scale of the building and car park area in order to address screening and softening of visual bulk.*	A landscape plan will be provided to the satisfaction of the Responsible Authority. It is requested that the landscape plan be provided as a condition of the Permit. Notwithstanding the above, the removal of native vegetation has been kept at a minimum to allow for the construction of the various buildings that form part of the development. The requirements for landscaping along the boundaries, front of the site, and car parking areas will be incorporated in the landscape plan.

Buildings and Works – Schedule 20 to the Design and Development Overlay	
Signage • *Signage should be co-located on sites which have more than one tenant so as to avoid sign clutter.*	Four Business Identification Signs (2m x 1.5 m) at each of the entrance points (four in total). It is considered reasonable to include one sign at each entry/ exit point due to the site's interface with three roads and overall size and will avoid sign clutter as the signs have a sufficient separation distance.
Storm water Quality and Re-Use • *Best practice storm water quality and reuse measures should be considered as part of the design for larger developments and on sites where it is practical to implement.* • *In order to reduce the potential for contaminated runoff loading bays should be covered, active work areas should be contained internally within buildings and waste disposal areas should be appropriately located.*	A Storm water Management Plan has been prepared by thyssenkrupp and is included at Appendix M. The plan provides recommendations for the development of a Free – Water Surface constructed wetland system designed to treat potentially contaminated storm water from entering the external catchment.

Table 6-3: Building and Works - Schedule 20 to the Design and Development Overlay

Whilst this land is not subject to **ESO5 – (Port of Geelong Environs),** it is of relevance to this application. This overlay covers a residential area of approximately 18ha that is entirely surrounded by the industrial zone of the Geelong Port. The Statement of Environmental Significance outlines the purpose of this schedule as being:

'The overlay manages potential conflicts between land in the port environs and the adjoining Port of Geelong. Land within this overlay should not be developed for any purpose that might compromise the long term protection and expansion of port operations, infrastructure and associated storage facilities.'

As such, the objectives to be achieved are to:

- *Minimise the potential for future land use conflicts between the port and port environs.*
- *Ensure that any use and intensity of development in the overlay area does not constrain the ongoing operation and development of the commercial port.*

Although the subject site is not covered by ESO5, there is potential that development within the residential area that is covered by this overlay will represent an encroachment into the day-to-day operations of the port. This is pertinent to this application as the subject site in this application is located approximately 500 metres north of the residential area.

Whilst this proposal has been prepared to best manage potential off-site amenity impacts, it should also be acknowledged that surrounding areas, particularly residential, also play a role in facilitating the development and operations of Geelong Port.

6.5 PARTICULAR AND GENERAL PROVISIONS

6.5.1 CLAUSE 52.05 – ADVERTISING SIGNS

The purpose of this clause is:

- *To regulate the display of signs and associated structures.*
- *To provide for signs that are compatible with the amenity and visual appearance of an area, including the existing or desired future character.*
- *To ensure signs do not contribute to excessive visual clutter or visual disorder.*
- *To ensure that signs do not cause loss of amenity or adversely affect the natural or built environment or the safety, appearance or efficiency of a road.*

Response

The site is zoned Port Zone which is in Category 2 under Clause 52.05-8 (Office & Industrial). The application proposes four 2m x 1.5 m (3sqm) business identification signs for an overall advertising area of 12sqm. Category 2 outlines that Business Identification Signs are under Section 1 (Permit not required) if they comply with the condition that specifies the following:

"The total advertisement area of all signs to each premises must not exceed 8sqm".

Given that the overall advertising area of the four signs is 12sqm a planning permit is required.

Each of the four signs will be located at four entrance gates on Madden Avenue to the north and The Esplanade to the east. Due to the small size of the signs their setback from adjoining roads, they are not considered to result in a visual distraction to any drivers/ motorists. Furthermore, it is considered that the signs will integrate well with the height and scale of the built form of the buildings in proposed facility.

In addition to the above, the size and location of the proposed signs will ensure that they do not cause loss of amenity or adversely affect the natural or built features of the site and surrounding properties.

As such, the proposed signs are considered to be consistent with the requirements under Clause 52.05 of the Scheme.

6.5.2 CLAUSE 52.06 – CAR PARKING

The purpose of this clause is:

- *To ensure that car parking is provided in accordance with the State Planning Policy Framework and Local Planning Policy Framework.*
- *To ensure the provision of an appropriate number of car parking spaces having regard to the demand likely to be generated, the activities on the land and the nature of the locality.*
- *To support sustainable transport alternatives to the motor car.*
- *To promote the efficient use of car parking spaces through the consolidation of car parking facilities.*
- *To ensure that car parking does not adversely affect the amenity of the locality.*
- *To ensure that the design and location of car parking is of a high standard, creates a safe environment for users and enables easy and efficient use.*

Response

Forty car parking spaces will be provided on site as part of the proposed Clinker Grinding Plant. Clause 52.06 of the Geelong Planning Scheme does not specifically refer to parking requirements for a Clinker Grinding Plant, therefore an adequate number of car spaces must be provided to the satisfaction of the City of Greater Geelong.

As such, a Car Parking Demand Assessment has been undertaken to assess the adequacy of the proposed provision of on-site parking which is included in the Traffic and Transport Assessment (Appendix J).

The Traffic and Transport Assessment concludes that the provision of 40 spaces is considered sufficient to accommodate the anticipated staff parking demand of 34 spaces and will allow between 6 and 11 spaces to be available for visitors to the site at any given time.

6.5.3 CLAUSE 52.07 – LOADING AND UNLOADING OF VEHICLES

The purpose of this clause is to set aside land for loading and unloading commercial vehicles to prevent loss of amenity and adverse effect on traffic flow and road safety. A permit may be granted to reduce or waive these requirements if either the land area is insufficient or adequate provision is made for loading and unloading vehicles to the satisfaction of the responsible authority.

There are specific requirements to be met as per this clause. They are:

No building or works may be constructed for the manufacture, servicing, storage or sale of goods or materials unless:

- *Space is provided on the land for loading and unloading vehicles as specified in the table below.*
- *The driveway to the loading bay is at least 3.6 metres wide. If a driveway changes direction or intersects another driveway, the internal radius at the change of direction or intersection must be at least 6 metres.*
- *The road that provides access to the loading bay is at least 3.6 metres wide.*

Response

Essentially a large part of the site will be utilised as a loading and unloading area and therefore the requirements of Clause 52.07 are met and exceeded as illustrated in the proposed development plans at Appendix D.

Access to and from the loading area is provided in excess of the minimum requirements.

6.5.4 CLAUSE 52.10 – USES WITH ADVERSE AMENITY POTENTIAL

The purpose of this provision is to define the types of industries (and warehouses) which may pose unacceptable risks to the neighbourhood if it is not appropriately designed.

There are specific requirements for threshold distances from any part of the land of the proposed use or buildings and works to land (not a road) in a residential zone, Capital City Zone or Docklands Zone, land used for a hospital or an education centre or land in a Public Acquisition Overlay to be acquired for a hospital or an education centre that are required to be met for particular uses.

Response

There is a distinction between a Cement Manufacturing Facility and a Clinker Grinding Plant (proposed in this application), reflected in the *Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 (Scheduled Premises Regulations)* and the *Recommended Separation Distances for Industrial Residual Air Emissions, (Publication No.518, March 2013) (EPA Guidelines).* A detailed description of the differences between the two abovementioned uses is provided in the Herbert Smith Freehills letter dated 23 November 2016 to Mr Roger Munn (Council) and is attached in Appendix L.

Given the distinction, it is important to reiterate that 'cement manufacturing' will not occur on this site and therefore it is considered that the requirements of Clause 52.10 (Uses with Adverse Amenity Potential) of the Scheme do not apply to this application.

Notwithstanding the above, the subject site is located approximately 500 metres north of the nearest residential area which is considered to be a sufficient buffer when considering mitigation measures that will be implemented (as detailed in Appendices F and G) to avoid amenity impacts. The EPA guidelines for separation distance for industrial premises only requires a 250-500m buffer for this type of industry, and makes a clear distinction between clinker grinding and cement manufacturing.

6.5.5 CLAUSE 52.17 – NATIVE VEGETATION

The purpose of the Native Vegetation provision contained within all Victorian planning schemes is:

To ensure permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. This is achieved through the following approach:

- *Avoid the removal of native vegetation that makes a significant contribution to Victoria's biodiversity.*
- *Minimise impacts on Victoria's biodiversity from the removal of native vegetation.*
- *Where native vegetation is permitted to be removed, ensure that an offset is provided in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.*
- *To manage native vegetation to minimise land and water degradation.*
- *To manage native vegetation near buildings to reduce the threat to life and property from bushfire.*

Response

This provision requires planning permission to remove, destroy or lop native vegetation, including dead native vegetation.

The subject site comprises largely planted vegetation which has been assessed and confirmed to have been planted in the report prepared by Ecology and Heritage Partners at Appendix F.

The assessment did however identify a small patch of native vegetation (0.133ha) which is proposed to be removed from the south east corner of the site to allow for the development of the Clinker Grinding Plant. The vegetation has been identified as Coastal Alkaline Scrub regrowth (Seaberry Saltbush) which is greater than 10 years old and therefore triggers a permit for its removal.

An application to remove, destroy or lop native vegetation must be classified as one of the following risk-based pathways: low, moderate or high, as defined in the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment and Primary Industries, September 2013). The application requirements and decision guidelines included in this clause must be applied in accordance with the classified pathway.

The report prepared by Ecology and Heritage Partners describes the site as being highly modified from previous disturbances due to the site's long history of intensive industrial and agricultural use. Aerial photos from 1930 show the site as being cleared. It is therefore assumed that native vegetation on the site was planted for screening and amenity purposes, and as such are not remnant species but have rather regrown since other landscaping works. Nevertheless, the report prepared by the biodiversity consultants considers this 'regrowth' as being older than 10 years and therefore planning approval is required

In considering the above, this application is to follow the Low-Risk-based pathway through removing 0.133 hectares of native vegetation on site. There are no scattered trees on site. As such, the offset requirement for native vegetation removal is 0.017 General Biodiversity Equivalence Units (BEU). Summary is provided in Table 6- & Table 6- from the Ecology and Heritage Partners Report:

Permitted Clearing Assessment:

Risk-based pathway	Low
Total Extent	0.133
Remnant Patch (ha)	0.133
Scattered Trees (no.)	0
Location Risk	A
Strategic Biodiversity Score	0.207

Table 6-4: Permitted Clearing Assessment

Offset targets:

General Offsets Required	0.017 General BEUs
Specific Offsets Required	n/a
Vicinity (catchment / LGA)	Corangamite CMA / City of Greater Geelong
Minimum Strategic Biodiversity Score*	0.166

Table 6-5: Offset Targets

The proposed removal of native vegetation on this site will not have a significant impact on any matter of NES and, consequently, referral of the project to the Commonwealth Environment Minister under the *EPBC Act* is not required.

The Biodiversity Assessment Report (Appendix G) prepared by Ecology and Heritage Partners provides further detail in relation to the offset targets and general mitigation measures.

6.5.6 CLAUSE 65 – DECISION GUIDELINES

The decision guidelines for development are contained in general provision Clause 65. The decision guidelines include:

Approval of an application or plan

Before deciding on an application or approval of a plan, the responsible authority must consider, as appropriate:

- The matters set out in Section 60 of the Act.
- The State Planning Policy Framework and the Local Planning Policy Framework, including the Municipal Strategic Statement and local planning policies.
- The purpose of the zone, overlay or other provision.
- Any matter required to be considered in the zone, overlay or other provision.
- The orderly planning of the area.
- The effect on the amenity of the area.
- The proximity of the land to any public land.
- Factors likely to cause or contribute to land degradation, salinity or reduce water quality.
- Whether the proposed development is designed to maintain or improve the quality of storm water within and exiting the site.
- The extent and character of native vegetation and the likelihood of its destruction.
- Whether native vegetation is to be or can be protected, planted or allowed to regenerate.
- The degree of flood, erosion or fire hazard associated with the location of the land and the use, development or management of the land so as to minimise any such hazard.

Response

The proposed Clinker Grinding Plant is generally consistent with the intent of the Port Zone and the purpose of DDO20 and the surrounding industrial land uses and is therefore provides for a development that is in keeping with the orderly planning of the area.

The site's location being more than 500 metres from the nearest existing residential area to the south and the implementation of noise measures in attached reports (Appendixes H) will greatly reduce any risk of material detriment to the surrounding area. Further, the existing Scheme recognizes the need the activity in this area and contemplates an impact on the amenity of the surrounding area through the implementation of ESO5 which requires (amongst other objectives) that any use and intensity of development in the overlay area does not constrain the ongoing operation and development of the commercial port.

The native vegetation proposed to be removed on site is of low significance and will not result in an unreasonable change of character of the broader area or the degradation of the surrounding vegetation outside of the site. The vegetation will be offset as detailed in the Biodiversity Assessment (Appendix G).

The storm water management plans outline the works that will take place on the site that will improve the quality of storm water exiting the site.

6.6 ADDITIONAL CONSIDERATIONS

6.6.1 GEELONG PORT STRUCTURE PLAN

Introduction

The purpose of the Port Zone and Clause 18.03-1 – Planning for Ports requires that planning gives regard to any approved Port Development Strategy. The Geelong Port Structure Plan (City of Greater Geelong, 2007), Port Development Plan (Department of Infrastructure, 2009) and the Port of Geelong - Development Strategy (Victorian Regional Channels Authority, 2013) are three strategies that have been prepared to guide the future planning and development of the Port of Geelong.

Geelong Port Structure Plan

The Geelong Port Structure Plan was adopted by the City of Greater Geelong in October 2007. The structure plan, however, was not progressed to be included in the planning scheme. Nevertheless, as the plan was developed to guide future land use and development of land within and adjacent to the Geelong Port and it remains an adopted document, the Strategy is considered in this application.

The purpose of the structure plan is to identify the key strategic planning issues facing the port, including industry needs, community aspirations and to articulate the preferred future directions, including the location of current and future development opportunities and infrastructure investment for the Port.

The vision of the Geelong Port Structure Plan (2007) is:

> *"Geelong Port is an important economic precinct to Geelong and the Geelong region. The Port area (both land and sea) is well supported through effective provision of transport and land use facilities to service the Port in a safe, healthy and amenable environment"*

The strategy contains a number of key findings, of which have been summarised into a series of key influences. A summary of the relevant policies is listed below:

Policy Context

- The Port of Geelong needs to acknowledge that it sits within an urban context in which interface issues with adjoining urban uses and environmental assets (notably Corio Bay) must be addressed and managed.
- Some Council policy, notably the Environmental Management Strategy seeks to restrict the expansion or growth of hazardous chemical storage around Corio Bay.

Port Economic Role and Function

- The continued use of land in and around the Port through appropriate provision of industrial land is supported by state and local policy and reinforced through recent planning decisions to maintain appropriate buffers between the port and non-industrial uses.

Health and Safety

- Council continues seek to work in a collaborative approach between the community, operators of the Port, DHS, EPA and Worksafe to ensure the health and safety of the community of greater Geelong.

Transport

- Provision of safe, accessible and frequent public transport for workers and residents in the area should be considered in further detail as part of ongoing Council transport planning and as part of the Norlane Renewal project.

Physical Infrastructure

- There is adequate provision of physical services to the Port.
- Greater efficiencies in port related use of Geelong's potable water supply is required. Opportunities exist for some Port related industries to utilise recycled water and contribute to the supply of recycled water to adjacent residential areas.

The Structure Plan also makes specific reference to Lascelles Wharf, the precinct of the Geelong Port where the subject site is located. The Structure Plan makes the following Objectives for this precinct:

- *To support the future expansion of Lascelles Wharf for dry bulk handling, particularly for nonhazardous goods.*
- *To reduce the amenity conflicts between existing industrial and port uses with nearby residential areas, acknowledging that both uses have right to co-exist into the future.*

The relevant strategies to implementing the objectives for the Lascelles Wharf are:

- *Support expansion of Lascelles wharf facilities including application of Special Use zone 6. Geelong Port and DOI to ensure appropriate consultation with the North Shore community to ensure any amenity impacts associated with a southern extension are properly managed.*
- *Investigate traffic management treatments to discourage heavy vehicle movements along The Esplanade and through the residential area of North Shore.*

Response

The subject site is identified as being located within Precinct 2 – Lascelles in the Structure Plan. The Precinct 2 Plan on Page 23 of the document identifies the subject site as a potential area for wharf expansion and rezoning to Special Use Zone – Schedule 6. Since the adoption of this document in 2007, a rezoning of this site has not occurred and the Port Zone is retained.

The proposed development of a Clinker Grinding Plant for this application does not propose any additional buildings or infrastructure in the Port and therefore will not negatively impact on any future expansion plans for the Lascelles Wharf Port. The Port has agreed to construct the necessary infrastructure to provide for the conveyor from Berth 1 to the site crossing over The Esplanade (necessary approvals will be obtained by the Port). The conveyor is similar to that already servicing the Incitec Pivot site to the south.

Traffic management treatments including the careful placement of entry and exit points on site will ensure that heavy vehicle movements on The Esplanade exiting the site will not have a negative impact on the residential area of North Shore to the south.

The development of the site for the Clinker Grinding Plant is in line with the objectives for this precinct as it will be located adjacent to the Port to take full advantage of the co-establishment reducing vehicular movements, emissions and time in taking products from the Port to the facility and will not be detrimental to the potential for expansion of the wharf to the south and east of the site in the future.

A letter has been provided by Geelong Port Pty Ltd confirming that the Port will be responsible to all approvals and maintenance in relation to the proposed conveyor from the Port to the subject land. A copy of this letter is provided at Appendix K.

6.6.2 ABORIGINAL HERITAGE ACT 2006 AND ABORIGINAL HERITAGE REGULATIONS 2007

The site is located within an area of Cultural Heritage Sensitivity under the *Aboriginal Heritage Act 2006*. *The Aboriginal Heritage Act 2006* and *Aboriginal Heritage Regulations 2007* provide the provisions in which areas of cultural heritage sensitivity must abide. Cultural Heritage Management Plans are required to be developed and approved prior to the land being disturbed, though there are some instances when these Plans are not required.

Ecology and Heritage Partners have undertaken a Cultural Heritage Review of the site which concludes that the entire site has been subject to significant ground disturbance under r. 4 of the Aboriginal Heritage Regulations 2007 associated with the former use of the site for industrial purposes. The report also discusses that the entire northern end of the site up until the middle of the 20th century was within the sub tidal zone. The Cultural Sensitivity of the study area is therefore voided in accordance with Regulation 28 (2) and a Cultural Heritage Management Plan is not required to issue a permit for the development.

7 CONCLUSION

The proposed Clinker Grinding Plant provides a unique opportunity to co-locate an industrial type use with the existing Port. This is in line with the State and Local Planning Policy Framework which provide directions that encourage growth in Port activities. Further, the purpose of the Port Zone includes providing for uses which derive direct benefit from co-establishing with a commercial trading port.

The Port Structure Plan and State and Local Planning Policy framework seek to move away from the siting of hazardous materials along the Port area and replacing these with dry bulk handing such as that proposed for the Clinker Grinding Plant.

The proposed Clinker Grinding Plant delivers on the policy direction within the State and Local Planning Policy Framework and purpose of the zone. The plant is to be located adjacent to the Port to take full advantage of the co-establishment reducing vehicular movements, emissions and time in taking products from the Port to the facility. The benefits in both time and traffic movements are significant given that it currently takes 5-7 days to unload and truck materials to the Waurn Ponds facility with 24-hour campaign of trucks movements impacting the surrounding area.

In keeping with the existing arrangement between Incitec Pivot and Geelong Port, the proposed Belt Conveyor from the Port (outside of the application site) facilitates the connectivity between the Port and the site and demonstrates the advantages that can be made through co establishment with the Port. The Belt Conveyor and the proposed development will provide a viable opportunity to duplicate and maximise the use of this infrastructure in the Port area. Furthermore, the proposed development will achieve reductions in traffic movements and emissions by siting the proposed plant adjacent to the Port.

The buildings and works proposed have been sited to respond to the existing uses occurring in and around the Port. The stockpiles have been sited to the south of the site well away from the existing industrial uses to the north. The buffer distance requirements for Industry are also met.

Traffic generated from the site has been spilt into two areas which separates light and heavy vehicles and disperses the movements of heavy vehicle with entry off Madden Avenue and exit onto The Esplanade.

All required environment management measures have been applied to the siting, design and operation of the facility. Stockpiles are covered to reduce dust emission

It is considered that the proposed Clinker Grinding Plant provides for an acceptable outcome having regard to the State and Local Planning Policy Framework and facilitates the type of development sought around Lascelles Wharf consistent with the Geelong Port Structure Plan.

APPENDICES

Appendix G

24 Pages

Stormwater Management Plan – Thyssenkrupp (21 March 2017)

thyssenkrupp

Technical Note

Document No.: **TN-26015-01-PR-001**

Document Title: **Stormwater Management**

Project No.: **26015-01**

Project Name: **Pacienter Project**

Client: **Boral Cement Limited**

Rev **0** Date: **21/03/2017**

0	Issued for FEED	21/03/17	CXM	21/03/17	AJH	21/03/17	AJH
Rev	Description	Date	Initials	Date	Initials	Date	Initials
		Prepared		Checked		Approved	

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Table of Contents

1. Executive Summary

The Lascelles Wharf site water consumption will be limited to few minor users with no water emissions from the process itself. The main source of water discharge from the site is stormwater collected over the site catchment area.

This report provides a strategy for the management of stormwater emanating from the site catchment areas in order to protect Corio Bay. An assessment of the design requirements of a sedimentation pond system (consisting of an inlet pond and a settling pond) for the Geelong cement grinding plant is summarised in Table 1.1.

Table 1.1. Sedimentation Pond System Sizing Summary

Section	Parameter		Value	Units
Inlet Pond	Extended Detention Level	Width	24.2	m
		Length	24.2	m
		Depth	2.6	m
	Surface Area (Permanent Pool Level)		505.4	m^2
	Extended Detention Zone Volume		129.8	m^3
Settling Pond	Extended Detention Level	Width	14	m
		Length	156	m
		Depth	2.6	m
	Surface Area (Permanent Pool Level)		2110	m^2
	Extended Detention Zone Volume		530.7	m^3
Overall (Sedimentation Pond System)	Surface Area (Permanent Pool Level)		2616	m^2
	Extended Detention Zone Volume		660.5	m^3

The allocated plot area for the sedimentation pond system, the North-Eastern corner of the site, is approximately 3600m^2, of which 2616m^2 (73%) is required for the proposed sedimentation pond system design. The excess area, in addition to the sedimentation pond system requirement, allows for exclusion zones from the surrounding site (i.e. car park, return loop road, perimeter fence) and allows for the provision of construction and/or maintenance access areas. A plot plan of the proposed sedimentation pond system location is provided in Appendix D.

The sizing basis of the sedimentation pond system was to match the settling velocity of a target sediment size (GP Cement). In addition, a detention zone (i.e. a storage provision beyond the normal water level) capable of storing the captured stormwater volume in a 100 year ARI storm event.

Routine measurement of the effluent streams will be required once the site commences operation in order to ensure that all stormwater discharges are within the specifications compliant with the EPA, with particular focus on the pH, TDS and turbidity of the effluent water.

2. Abbreviations

Acronym	Phrase
ARI	Average Recurrent Interval
ARR	Australian Rainfall and Runoff
ARRB	Australian Road Research Board
AS	Australian Standard
BOD	Biochemical Oxygen Demand
BOM	Bureau of Meteorology
DC	District of Columbia
DN	Nominal Diameter
EES	Environmental Effects Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (USA)
	Environmental Protection Authority (Aus.)
FP	Final Product
FWS	Free-Water Surface
IFD	Intensity, Frequency and Duration
NDPES	National Pollutant Discharge Elimination System
PAR	Photosynthetic Active Radiation
pH	Potential of Hydrogen
SEPP	State Environmental Planning Policy
TDS	Total Dissolved Solids
TSS	Total Suspended Solids

Unit	Description
s	Second
min	Minute
h	Hour
d	Day
µg	Microgram (10^{-6} g)
mg	Milligram (10^{-3} g)
kg	Kilogram (10^{3} g)
Mtpa	Mega-tonne (10^{6} t) per annum
m	Metre
mm	Millimetre (10^{-3} m)
m^2	Square metre
ha	Hectare (10^{4} m^2)
ml	Millilitre (10^{-3} L)
L	Litre
m^3	Cubic metre
°C	Degrees Celsius
%	Percentage
NTU	Nephelometric Turbidity Unit

3. Introduction

3.1 Project Background

Boral is seeking to replace its Waurn Ponds grinding facility with a dedicated cement grinding and distribution plant. The considered site is located at the Port of Geelong, directly adjacent to the Lascelles Wharf precinct, where Boral currently receives clinker shipments unloaded through Berth 1.

The project's primary objective is to deliver an import facility for the supply of cementitious material into the Victorian market. A nominal capacity of 1.3 Mtpa will be needed to meet forecast demand, and the plant will be required to achieve peak seasonal demands of 1.2 times the nominal capacity.

The grinding facility and ongoing operations will need to comply with all relevant statutory requirements, as well as Boral standard operating procedures and performance criteria. Key compliance areas include the production of the following cement types:

- General Purpose Cement
- High Early Strength Cement
- Neat Slag (Ground Blast Furnace Slag) Cement

The new facility is planned to be able to meet increasing market share and consumer demand by a staged implementation of additional grinding capacity.

3.2 Scope

Water consumption on the Lascelles Wharf site will be limited to the following users:

- A closed circuit cooling system, requiring water make-up due to evaporation losses;
- Process water (requirement for the cement grinding mill);
- Dust suppression water spray system to control fugitive dust from open stockpiles, and;
- Potable water (e.g. ablutions, truck wash station).

There are no water emissions from the process itself with the main source of water discharge from the site being rainwater collected over the site catchment area. Whilst some of the collected rainwater will be absorbed into the ground, the remaining run-off water may pick up some solid material which will require treatment prior to discharge in order to protect Corio Bay.

The primary treatment objective will be to reduce the solids content of the run-off water (i.e. TSS), based on the following principles (Ref. 15):

- Source control: Limit changes to the quality of stormwater at or near the source (e.g. land management, operator education and awareness), and;
- Structural Control: Use structural measures, such as treatment techniques or detention basins, to appropriately segregate and treat all potentially contaminated water, such that discharges to the environment will comply with the relevant statutory requirements.

A sedimentation pond system will be used as the water treatment facility for the site to minimise the environmental impact of the plant from water discharges to Corio Bay as well as minimising operator intervention and maintenance.

3.3 Purpose

This report will identify the proposed strategy for management, both treatment (both source and structural) and disposal, of the stormwater, detailing the:

- Stormwater hydrology study;
- Proposed source control practices, and;
- Proposed structural control (i.e. sedimentation pond system design).

4. Stormwater Hydrology Study

4.1 Peak Stormwater Flow Determination

Estimation of the rainfall discharge can be achieved using a number of different methods, including probabilistic methods (e.g. rational method) or, more detailed fluid modelling (e.g. runoff-routing) software. Given the size of the catchment area (~5 ha) and the development status of the catchment (urban), the rational method was deemed appropriate (Ref. 5). The rational method expresses the relationship between rainfall characteristics (Intensity, Frequency and Duration, IFD) and catchment area as independent variables and the peak flood discharge resulting from the rainfall as the dependent variable (Ref. 7).

4.1.1 Rainfall Frequency

The frequency of rainfall is based on an Average Recurrence Interval (ARI). The frequency of rainfall varies for the different sizing basis of the stormwater system. The following rainfall frequencies are required to be considered:

- ❑ 1 year ARI event
- ❑ 20 year ARI event
- ❑ 100 year ARI event

4.1.2 Rainfall Duration

The time of concentration represents the time at which all areas of the catchment are contributing to the peak flood discharge. Given that the primary basis for the sizing of the sedimentation pond system (§5.2.4) is based on the settling velocity of the suspended solids, a rainfall time of concentration of 5 minutes, which correlates to the highest intensity rainfall recorded on the rainfall intensity chart (refer to §4.1.3 below), has been used as the basis for the hydrology study.

4.1.3 Rainfall Intensity

The rainfall intensity of a storm event is based on a design rainfall intensity chart, using statistical data combined with contemporary statistical analysis and techniques (Ref. 1). The rainfall intensity value was derived based on a time of concentration of 5 minutes (as specified in §4.1.2).

Coordinates of 38.100S 144.375E (approximate coordinates of Corio Quay) were used as the basis for the rainfall intensity chart (Appendix B) from which the rainfall intensity value was derived.

4.1.4 Catchment Area

The catchment area is based on the site plot which is separated into zones for the purposes of the piped stormwater drainage system (Appendix A). Any existing site stormwater drainage (including the existing Triple Interceptor Stormwater Pit) will not be utilised as catchment for the sedimentation pond system.

Table 4.1. Catchment Area Summary (Designation and Description)

Catchment Area Designation (Appendix A)		Catchment Area Surface Description
A	Raw Material Storage / FP Loadout (East)	Partially paved (Clinker Storage)/gravel
B	Raw Material Storage	Gravel
C	Raw Material Storage	Gravel
D	Mill Circuit	Paved
E	FP Loadout (West)	Paved
F	Site Entry	Paved
G	Grassed Area (including pond)	Grass

Catchment Area Designation (Appendix A)		Catchment Area Surface Description
H	Offices	Paved

The volumetric runoff coefficient used for the determination of the overland flow is based on the ARI and the "fraction impervious (f)" of the surface type (Ref. 5, 12). The coefficient used for the site areas are detailed in Table 4.2 below.

Table 4.2. Runoff Coefficient Summary Table (Appendix A)

Surface Type	Catchment Area Designation (Table 4.1)	Fraction Impervious (Ref. 12)	Runoff Coefficient (Ref. 5)		
			100 Year ARI	20 Year ARI	3 Month ARI
Paved	A (Partial), D, E, F, H	0.9 (IN1Z)	0.99	0.86	0.7
Gravel	A (Partial), B, C	0.6 (IN3Z)	0.7	0.62	0.59
Grass	G	0.3 (IN3Z)	0.42	0.37	0.3

4.2 Water Quality Characterisation

The stormwater flowing over the site will pick up some suspended solids and hence control of solids will be the primary focus of water quality characterisation. Stormwater characterisation, with respect to solids (both turbidity and TSS), has been sourced from discharge monitoring reports captured over a period of six months from a plant handling similar materials to those onsite. The results of the monitoring were then used to define the design criteria for the expected influent water quality (Ref. 9, Table 3).

Additional water quality indicators considered include:

- ❑ BOD: BOD concentrations in urban stormwater are typically around 20mg/L (Ref. 17) which satisfy the EPA Act 1970 (Ref. 16. Part VIII, Schedule F7, Table 2).
- ❑ Oils: There are a number of motor drives onsite requiring lube oil supply and corresponding lube oil drains. Bunding of the storage area and the use of a lube oil recovery tank will be used to prevent excessive oil contamination of the stormwater.
- ❑ Other: Due to the presence of a variety of vehicles onsite (front-end loaders, forklifts, cement tankers/ trucks) there will be numerous potential sources of waste oils, solvents and other related waste materials. The on-site vehicles will be regularly maintained to ensure no oil leaks. The cement tankers will also be in road-worthy condition with no oil leaks.

5. Stormwater Treatment Philosophy

5.1 Source Control

In addition to the utilisation of a sedimentation pond system for stormwater treatment, there are a number of practices that can be implemented onsite to prevent or reduce the amount of pollution generated by nonpoint sources. Examples of such practices (Ref. 15) are:

- Handling/storage of materials:
  - Potential use of dust suppression systems (e.g. water spray);
  - Maintenance of dust collection systems;
  - Bunding of chemicals and fuel (in accordance with EPA/AS requirements).
- Cleaning:
  - Clean-up program (i.e. housekeeping such as regular sweeping of paved surfaces);
  - Immediate clean-up of any spills (e.g. loadout spillage).
- Education of site personnel (both Operations and drivers):
  - Procedure development (i.e. management of stormwater collection/discharge, maintenance);
  - Appropriate signage.
- Infrastructure: Grate/inlet screens/traps to prevent gross pollutants from entering the stormwater drainage system.

5.2 Structural Control – Sedimentation Pond System

5.2.1 Technology

The sedimentation pond system should treat water to the standards necessary for disposal, as per the requirements of the EIS-EES (Discharge to Waters, State Environment Protection Policy, Waters of Victoria, and Schedules B & E). The design of the water treatment system shall meet all requirements for waste water management, even during the wettest years as required by the statutory regulations and guidelines.

The sedimentation pond system will allow for the following treatments:

- Solids settling;
- Contaminated water detention, and;
- Final disposal.

5.2.2 Morphology

5.2.2.1 Online and Offline Systems

Due the nature of the catchment surfaces (i.e. a high proportion of the catchment is impervious, such as paved areas and roads) and the potential contaminants (i.e. primarily soluble materials, fine dusts and silts that are easily mobilised) that are effectively continuously present (e.g. open stockpiles) onsite, stormwater will always need to be treated prior to discharge from site. Therefore, the sedimentation pond system has been designed as an online system, where the pond is located within the drainage line with both base flow and high flows (i.e. storm events) passing through the system. An offline system, where a proportion of the flow bypasses the pond, is not considered a viable option due to the continuous treatment required for stormwater prior to discharge from site.

5.2.2.2 Flow Path

The sedimentation pond system consists of the following:

- Inlet pond, and;

- ❑ Settling pond.

The inlet pond receives flow from the stormwater drainage system which shall be directed via a gross pollutant trap into the pond using a flow spreader to dissipate the inflowing energy and minimise re-entrainment of settled solids within the sediment chamber where the majority of the larger sediment particles (i.e. ≥125μm) will be captured. The system shall then discharge into the settling pond via a rocky weir, designed to restrict flow and reduce flow velocities to a suitable level.

The settling pond is a narrowed channel designed to capture the smaller sedimentation particles (i.e. ≤125μm). At the end of the settling pond, the treated stormwater will then be discharged into Corio Bay via the existing stormwater easement. A riser outlet structure will be utilised to maintain a permanent pool in the settling pond and provide a sufficient hydraulic residence time.

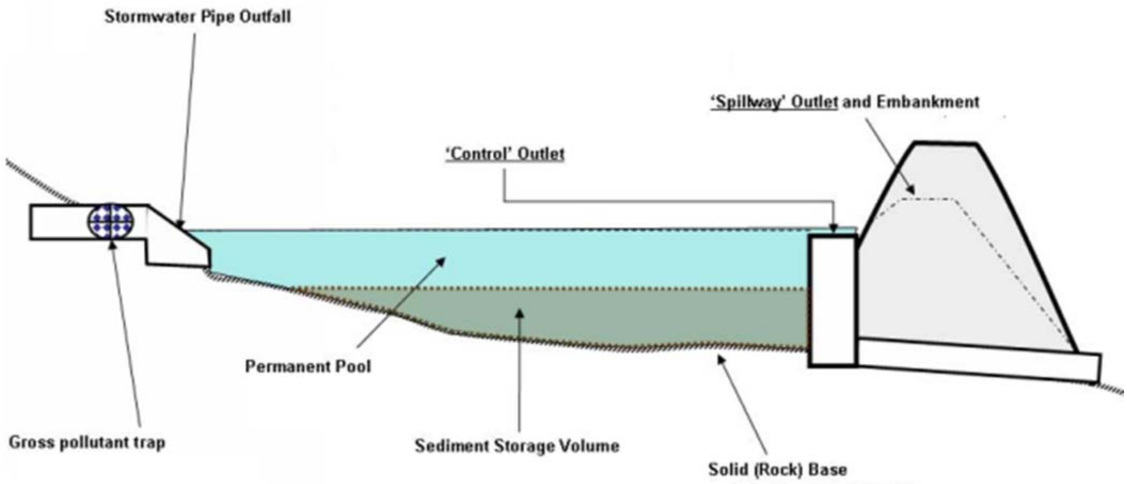

Figure 5.1. Typical Inlet Pond Schematic (Ref. 21)

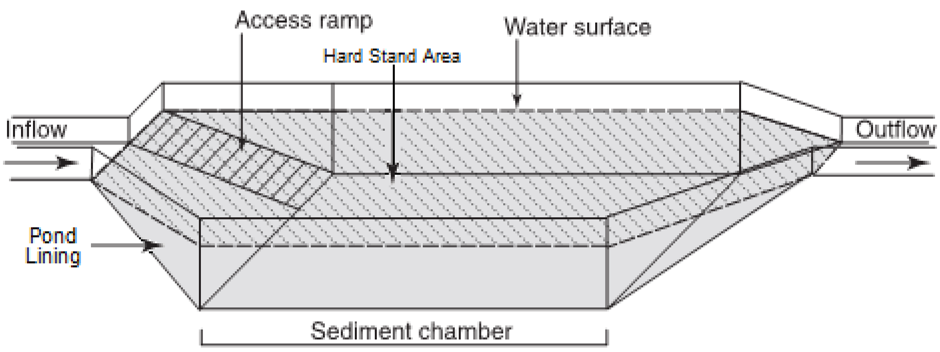

Figure 5.2. Typical Inlet Pond Schematic (Ref. 15)

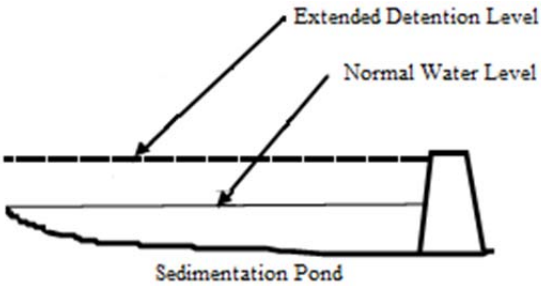

Figure 5.3. Sedimentation Pond System Level Schematic

The pond design consists of two distinct water levels (refer to *Figure 5.3* above):

- Normal water level: Intended principally for sedimentation
- Extended detention level: designed to enhance the hydraulic residence time of the sedimentation pond system in the event of a storm event to improve coarse particulate sedimentation.

5.2.3 Other Requirements

5.2.3.1 Pond Lining

The sedimentation pond system should be lined with an impermeable membrane, as recommended by the EPA. The lining will control soil hydraulic conductivity to <10^{-9}m/s as well as reducing the possibility of the sedimentation pond system drying out during periods of low rainfall.

5.2.3.2 Maintenance Requirements

Both the inlet pond and the settling pond will have a means to isolate and drain to allow maintenance activities. Given that the sedimentation pond system will likely collect solid matter (in particular the inlet pond), it shall be designed so that the solid matter can be removed without damage to the pond liner. An access ramp (1:8) and tracks to a hard stand areas (at least 3m wide) will be provided for the inlet pond, capable of supporting a 20 tonne excavation plant for scheduled maintenance (typically every 5 years). For unplanned maintenance (e.g. after a severe storm event), suitable access must be provided for a vacuum truck to remove solid matter, using the concreted/rock base of the pond as the suction point to avoid damage to the pond lining.

5.2.3.3 Water Quality Testing

Procedures and consumables shall be supplied for the commissioning and the first 12 months of operation, to enable routine measurement of the stormwater discharge, in order to ensure that they are within the design specifications and comply with EPA requirements. Onsite testing equipment will be provided for analytes such as pH, TDS and clarity. Other parameters such as BOD, turbidity, TSS and settleable solids will be determined by sampling and analysis by a contract laboratory. The complete list of water sample analytes for water quality testing, combined with associated EPA objectives, are detailed in Table 5.1.

In order to ensure a representative sample is taken, samples will be taken close to the site discharge point. A monthly sample frequency is proposed in order to allow for the seasonal variations throughout the year and to provide suitable annual data distribution. Regular sampling enables monitoring of the impacts of potential sources of water quality variation such as rainfall intensity and temperature. Composite flow-weighted samples shall be used to determine the pollutant loading of the stormwater, consisting of multiple spot samples (Ref. 20).

Table 5.1. Water Sample Analytes (Environmental Quality Indicators)

Indicator	Units	Objective
Dissolved Oxygen	% Saturation	>90 *
pH		
Variation		N ± 0.5 *
Range		7.5 – 8.5 *
Temperature (Range)	°C	N ± 1 *
Transparency (Secchi Disk Depth)	m	>3 *
Attenuation of Photosynthetic Active Radiation (PAR), Annual 90th Percentile	1/m	0.45 *
Toxicants		
General		<T *
Arsenic	µg/L	<3 *
Chromium	µg/L	<5 *
Zinc	µg/L	<5 *
Salinity (Variation)	mg/L	N ± 5% *
Chlorophyll-a		
Annual Median	µg/L	1.5 *
Annual 90th Percentile	µg/L	2.5 *
Bacteriological Organisms (E. coli)		
42 day (geometric mean)	Organisms/100mL	<200 *
42 day (80th percentile)	Organisms/100mL	<400 *
Taints (maximum)	µg/L	TC *
Turbidity		
Annual 50th Percentile	NTU	<20 #
Annual 90th Percentile	NTU	<50 #
Non-Filterable Residue (Suspended Solids)		
Annual 50th Percentile	mg/L	<25 #
Annual 90th Percentile	mg/L	<60 #

Notes:

"N" = No variation from the background level of water quality

"T" = Toxicant. Refer to Table 3.4.1 of the Australian and New Zealand Water Quality Guidelines for Fresh and Marine Water Quality (2000)

"TC" = Potential Taint. Where a chemical element is listed as both T and TC, the lower value is the environmental quality objective.

* Ref. 16. Part VIII, Schedule F6, Table 2

Ref. 16. Part VIII, Schedule F7, Table 2

5.2.3.4 Health and Safety

The presence of a sedimentation pond system onsite may introduce a number of health and safety hazards as detailed in Table 5.2.

Table 5.2. Health and Safety Hazards and Associated Control Measures

Hazard	Possible Causes	Potential Control Measures
Slips, trips and falls	❑ High water velocities (up to 5 m/s at the inlet to the inlet pond from the piped stormwater drainage system); ❑ Sloped banks	❑ Provide safety rails or barriers; ❑ Signage.
Presence of mosquitos (Ref. 15)	❑ Poor management of pond system.	❑ Management of water depth, particularly during summer (mosquitos usually breed in water less than 40cm deep); ❑ Evenly graded side slopes will minimise the potential for localised ponding; ❑ Minimising litter input to the pond, as mosquitoes can breed in litter.

5.2.4 Sedimentation Pond System Sizing

The design of the sedimentation pond system is based on the stormwater flow rate and the water quality (both influent and effluent). Two methods of calculation have been utilised for the sizing of the sedimentation pond system, namely:

- ❑ Melbourne Water Guidelines (Ref. 10)
- ❑ Brisbane City Council Engineering Guidelines (Ref. 21);

The design criteria for the sedimentation pond system are defined in *Table 5.3* below.

Table 5.3. Sedimentation Pond System Design Criteria

Guideline	Design Parameter	Design Criteria
Melbourne Water	Volume	1. Extended detention volume sized the match the cumulative rainfall during a 100 year ARI event for the storm event duration (sizing basis as per the piped stormwater drainage system).
	Velocity	2. Sized to satisfy the sedimentation scour (i.e. re-entrainment of settled solids) threshold velocity during the 100 year ARI event.
	General	3. The extended detention depth is no greater than 350mm.
Brisbane City Council	Velocity	4. Sized to match the settling velocity of a target sediment size of Slag Cement, median particle size ~15µm (Ref. 22, Section 9 – Particle Sizing), during a 20 Year ARI (as per the sizing basis of the stormwater drainage system). $A = \frac{Q \cdot n}{v_s} \cdot \frac{(d_e + 1)}{(d_e + d_p)} \cdot \left[(1 - R)^{-\frac{1}{n}} - 1\right]$ Where A = Required Sedimentation Pond System Surface Area (m^2) R = Target Sediment Removed (Fraction) v_s = Target Settlement Settling Velocity (mm/s) Q = Volumetric Flow Rate (m^3/s) n = Turbulence Parameter d_e = Extended Detention Depth above Permanent Pool (m) d_p = Permanent Pool Depth (m)
	General	5. Pond depth sized to ensure that the volume (and depth) of accumulated solids over 5 years does not exceed half the permanent pool depth (in particular the inlet pond).

The calculated sedimentation pond system volume shall also allow for the retention of contaminated firewater emanating from fire fighting within the site boundaries (the fire water effective volume is 185 m^3, Ref. 23). The detention volume shall allow for the worst case scenario of a complete discharge of the fire water volume (in accordance with AS 1940).

6. Results

6.1 Hydrology Study

The stormwater flow determination calculations are provided in Appendix C. A summary of the results is provided in Table 6.1 and Figure 6.1 below.

Table 6.1. Hydrology Study Summary (Appendix C)

Parameter	Units	Storm Event		
		1 Year ARI	20 Year ARI	100 Year ARI
Volumetric Flow Rate	L/s	400	1262	2190
	m^3/s	0.4	1.3	2.2
Storm Duration	min	5 (refer to §4.1.2)		
Cumulative Volume	m^3	120	379	657

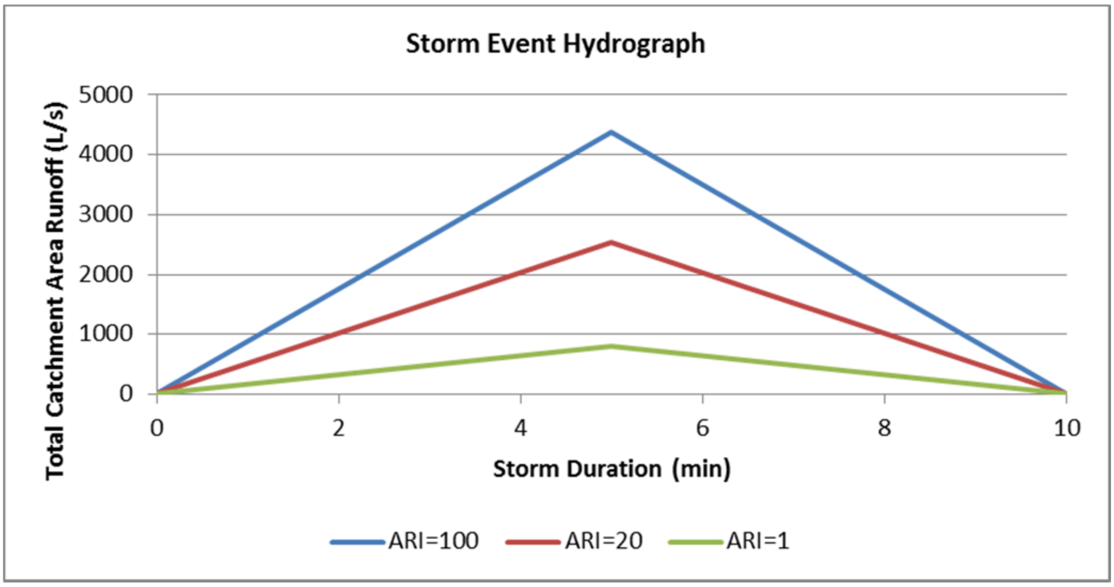

Figure 6.1. Storm Event Hydrograph

6.2 Sedimentation Pond System Sizing

The sedimentation pond system has been sized as per the basis outlined in §5.2.4. The calculation for sizing of the inlet pond and settling pond is outlined in Tables 6.2 to 6.4.

Table 6.2. Inlet Pond Sizing

<table>
<tr><th colspan="2">Parameter</th><th>Value</th><th>Unit</th><th>Remarks</th></tr>
<tr><td colspan="5">Inputs</td></tr>
<tr><td colspan="2">Inlet Line Size</td><td>750</td><td>DN</td><td>Stormwater drainage discharge line size.
Appendix A. Pipe Section P11 to Sedimentation Pond.</td></tr>
<tr><td colspan="2">Inlet Volumetric Flow Rate</td><td>2.2</td><td>m³/s</td><td>Based on a 100 Year ARI Event (required for velocity determination, Ref. 10).
Refer to Appendix C.</td></tr>
<tr><td colspan="2">Batter (Slope)</td><td>5</td><td>-</td><td>Ref. 10.</td></tr>
<tr><td colspan="2">Pond Volume (Permanent Pool Level)</td><td>379</td><td>m³</td><td>Based on a 20 Year ARI Event, as per the piped stormwater drainage system (Ref. 10).
Refer to Appendix C.</td></tr>
<tr><td colspan="2">Max. Allowable Velocity</td><td>0.5</td><td>m/s</td><td>Based on a 100 year ARI Event (Ref. 10).</td></tr>
<tr><td colspan="2">Extended Detention Zone Depth (Maximum)</td><td>0.35</td><td>m</td><td>Ref. 10.</td></tr>
<tr><td colspan="5">Outputs</td></tr>
<tr><td colspan="2">Cross-Sectional Area (Inlet Line)</td><td>0.44</td><td>m²</td><td>Based on DN750 line size (refer to Appendix A).</td></tr>
<tr><td colspan="2">Fluid Velocity (Stormwater Drain Discharge)</td><td>4.96</td><td>m/s</td><td>Based on a 100 Year ARI Event (Ref. 10).
Exceeds velocity criteria. Inlet to be designed with suitable diffusion to prevent sedimentation scouring/entrainment.</td></tr>
<tr><td rowspan="5">Permanent Pool Level</td><td>Minimum Width</td><td>12.5</td><td>m</td><td>Minimum width required to satisfy maximum allowable velocity during a 100 Year ARI (Ref. 10).</td></tr>
<tr><td>Length</td><td>22.5</td><td>m</td><td rowspan="3">Dimensions based on square pyramid geometry.</td></tr>
<tr><td>Width</td><td>22.5</td><td>m</td></tr>
<tr><td>Depth</td><td>2.2</td><td>m</td></tr>
<tr><td>Area</td><td>505.4</td><td>m²</td><td></td></tr>
<tr><td rowspan="4">Extended Detention Level</td><td>Length</td><td>24.2</td><td>m</td><td rowspan="3">Dimensions based on square pyramid geometry.</td></tr>
<tr><td>Width</td><td>24.2</td><td>m</td></tr>
<tr><td>Depth</td><td>2.6</td><td>m</td></tr>
<tr><td>Detention Zone Volume</td><td>129.8</td><td>m³</td><td>Allows for detention of a 1 Year ARI Event.</td></tr>
</table>

Table 6.3. Sedimentation Pond System Area Determination

Parameter	Value	Unit	Remarks
Inputs			
Inlet Volumetric Flow Rate (Q)	1.3	m^3/s	Based on a 20 Year ARI Event (as per the design basis of the stormwater drainage system).
Influent Concentration	120	mg/L	Ref. 9, Table 3.
Effluent Concentration	60	mg/L	TSS Environmental Quality Indicator, Annual 90th Percentile (Ref. 16. Part VIII, Schedule F7, Table 2).
Target Sediment Removed (R)	50%	-	Based on the required removal to satisfy the effluent concentration.
Hydraulic Efficiency (λ)	0.90	-	Based on pond geometry (Ref. 21, Configuration E).
Turbulence Parameter (n)	10.0	-	$n = \frac{1}{1-\lambda}$
Target Sediment Settling Velocity (v_s)	0.18	mm/s	Based on approximate 50th Percentile particle size for Slag Cement fineness, 4500 cm^2/kg.
Permanent Pool Depth (d_p)	2.2	m	As per the Inlet Pond permanent pool depth (refer to *Table 6.2*).
Sediment Retention Depth (d*)	1.0	m	Ref. 21.
Contributing Catchment Area (A_c)	5.9	ha	Refer to Appendix C.
Sediment Loading Rate (L_o)	3.3	$m^3/ha/y$	Ref. 21.
Desired Cleanout Frequency (F_c)	5	y	Ref. 10.
Outputs – Velocity Criteria			
Required Sedimentation Pond System Surface Area, A (Permanent Pool Level)	2616	m^2	Calculated based on *Table 5.3*, Design Criteria 4.
Sediment Storage Volume Required (V_s)	49.3	m^3	$V_s = R \cdot A_c \cdot L_o \cdot F_c$
Sediment Storage Depth	1.1	m	Approximately 50% of the permanent pool depth (satisfies *Table 5.3*, Design Criteria 5).

Table 6.4. Settling Pond Sizing

Parameter		Value	Unit	Remarks
Inputs				
Required Sedimentation Pond System Surface Area, A (Permanent Pool Level)		2616	m^2	As calculated in Table 6.3.
Inlet Pond Surface Area		505.4	m^2	As calculated in Table 6.2.
Extended Detention Level	Width	14	m	To allow maintenance access from the top of bank (to de-silt the pond).
	Depth	2.6	m	As per the Sedimentation Pond depth.
Outputs				
Batter		3	-	The batter required to achieve the same pond depth as the inlet pond for the given width. Fencing required (Ref. 10).
Permanent Pool Level	Area	2110	m^2	Difference between the required sedimentation pond system surface area and the inlet pond surface area.
	Width	12	m	
	Depth	2.2	m	
	Length	156	m	Approximate length required to achieve the required surface area (2110 m^2), dependent on flow path/layout.
Extended Detention Zone Volume		530.7	m^3	Allows for detention of a 20 Year ARI Event.

7. Stormwater Recycling

The collected stormwater could be recycled for make-up to the water consumers (cooling water, dust suppression water spray, process water).

A more detailed cost-benefit analysis of stormwater recycling will be undertaken during the detail design phase of the project considering the potential advantages and disadvantages, including those list in Table 7.1.

Table 7.1. Stormwater Recycling Qualitative Assessment

Advantages	Disadvantages
❑ Reduced mains water consumption; ❑ Reduced stormwater discharge.	❑ Reduced water levels due to consumption will reduce the effectiveness of particulate sedimentation within the pond (potentially leading to increased TSS in effluent); ❑ Requirement for additional treatment (filtration and chemical dosing) if used for cooling water and fire water services; ❑ Increased complexity of cooling water make-up control (balance between stormwater recycle and town mains); ❑ Increased capital expenditure (pump set and piping); ❑ Increased operating expenditure (pump, chemical dosing); ❑ Increased maintenance requirements (pump set, instrumentation and piping).

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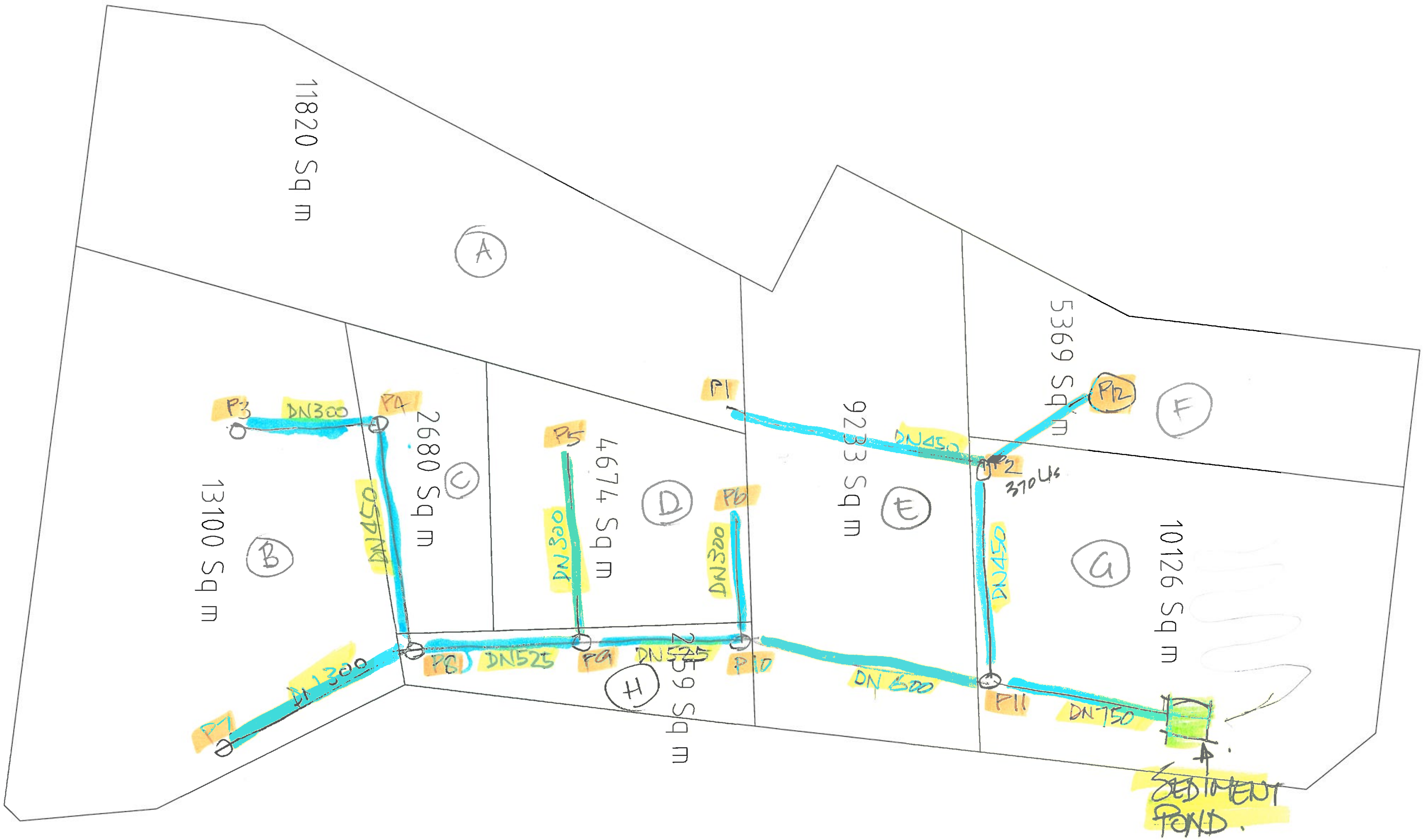
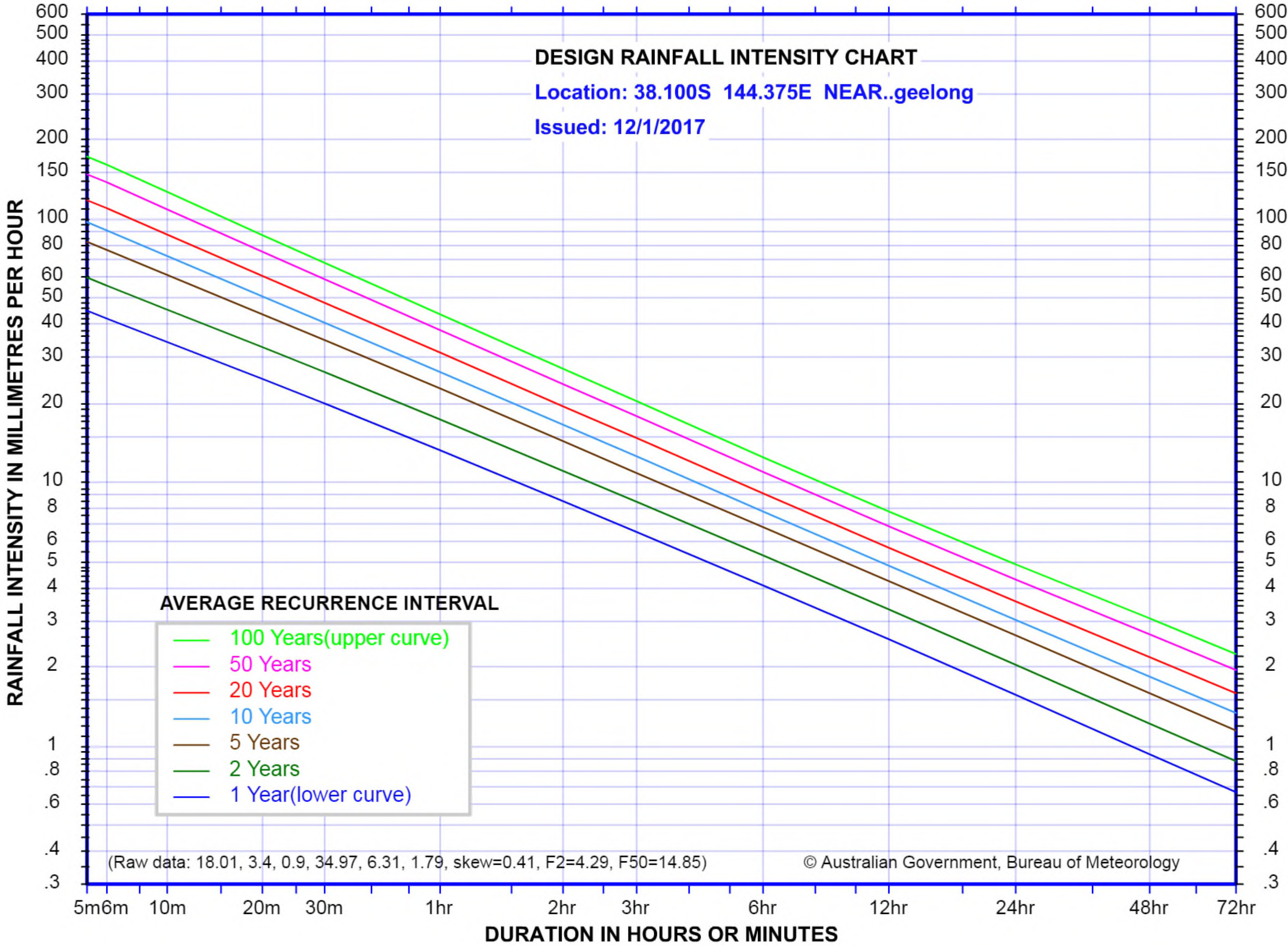
21. Water Sensitive Urban Design (WSUD) Engineering Guidelines – Chapter 4: Sedimentation Basins, Brisbane City Council, August 2005
22. tkISA Seminar, Materials and Instrument Analyses in the Cement Industry, Melbourne 17/18 November 2016
23. Fire Fighting Philosophy, SPEC-26015-01-PR-001

9. Appendices

A. Site Catchment Area and Stormwater Drainage Plot
B. Design Rainfall Intensity Chart
C. Stormwater Flow Determination
D. Site Plot Plan (including Sedimentation Pond System location)



11820 Sq m
A
13100 Sq m
B
2680 Sq m
C
4674 Sq m
D
9233 Sq m
E
5369 Sq m
F
10126 Sq m
G
H
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
DN300
DN450
DN525
DN600
DN750
370L/s
SEDIMENT POND.

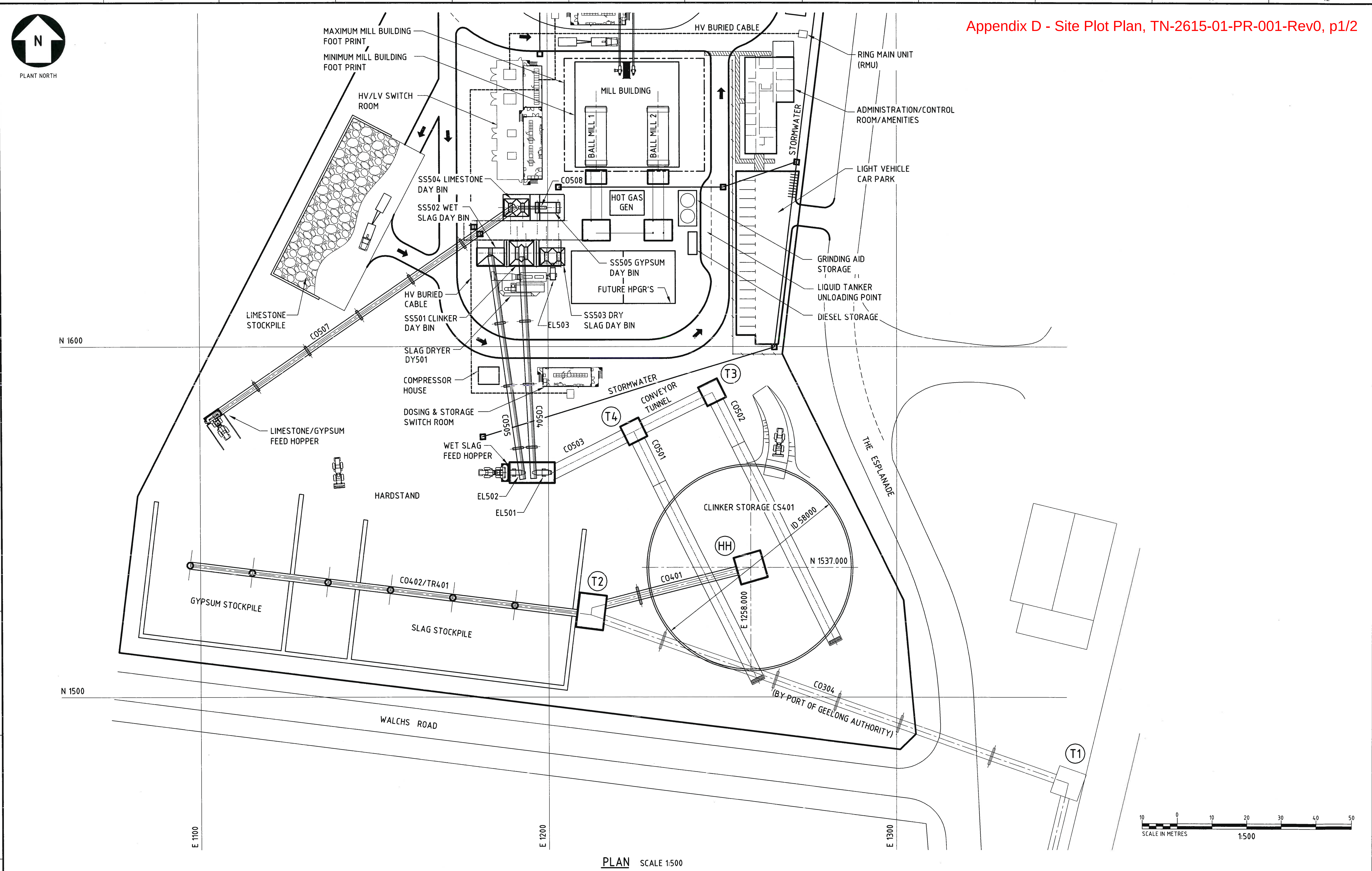


Appendix B - Site Plot Plan, TN-2615-01-PR-001-Rev0, p1/1

Appendix C - Stormwater Flow Determination, TN-2615-01-PR-001-Rev0, p1/1

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		Sub-Area Component			Rainfall Intensities In for Progressive Storm Duration in total Upstream Catchment				Runoff coefficient			Cumulative Mainline Flows from Total Upstream Catchment Qn=(CA)n*In*1/0.36 L/s		
2	Catchment	Entry Point	Description	Surface Classification	N=100 years	N=20 years	N=1 year	Area (ha)	C_{100}	C_{20}	C_{1}	Qn N=100 years L/s	Qn N=20 years L/s	Qn N=1 year L/s
3	A	P1	Raw Material Storage	Gravel	175	115	45	1.18	0.7	0.62	0.5	402	234	74
4	A	P2	FP Loadout (east)	Paved	175	115	45	0.47	0.99	0.86	0.7	226	129	41
5	B	P3	Raw Material Storage	Gravel	175	115	45	0.66	0.7	0.62	0.5	225	131	41
6	B	P7	Raw Material Storage	Gravel	175	115	45	0.66	0.7	0.62	0.5	225	131	41
7	C	P4	Raw Material Storage	Gravel	175	115	45	0.26	0.7	0.62	0.5	88	51	16
8	D	P5	Mill Circuit	Paved	175	115	45	0.24	0.99	0.86	0.7	116	66	21
9	D	P6	Mill Circuit	Paved	175	115	45	0.24	0.99	0.86	0.7	116	66	21
10	E	P10	FP Loadout (west)	Paved	175	115	45	0.23	0.99	0.86	0.7	111	63	20
11	E	P11	FP Loadout (west)	Paved	175	115	45	0.23	0.99	0.86	0.7	111	63	20
12	F	P12	site entry	Paved	175	115	45	0.54	0.99	0.86	0.7	260	148	47
13	G		Grassed Area	Grass	175	115	45	1.01	0.42	0.37	0.3	207	120	38
14	H	P9	Offices	Paved	175	115	45	0.22	0.99	0.86	0.7	106	60	19
15								5.94						
16				Time of Concentration (min)				Stormwater Sizing				ARI=100	ARI=20	ARI=1
17								Cumulative Flow				2190	1262	400
18				5				Total Volume				657	379	120

Appendix D - Site Plot Plan, TN-2615-01-PR-001-Rev0, p1/2



DRAWING No.	REFERENCE DRAWING TITLE
-01-ME-007	HEAVY VEHICLE TURNING PATHS
-01-ME-006	CANCELLED
-01-ME-005	RAW MATERIAL RECLAIM - LONGITUDINAL SECTIONS
-01-ME-004	RAW MATERIAL STOCK PILE - LONGITUDINAL SECTIONS
-01-ME-003	PLOT PLAN - NORTH
-01-ME-001	OVERALL PLOT PLAN

REV	DATE	REVISION DESCRIPTION	DRAWN	CHK	DESIGN	ENG CHK	DES APP	TK PM	CLIENT
0	16/03/17	ISSUED FOR FEED	PGL	AFM				KH	

CLIENT: thyssenkrupp

BORAL Boral Cement ABN 62 008 528 523 Engineering Services

PROJECT:

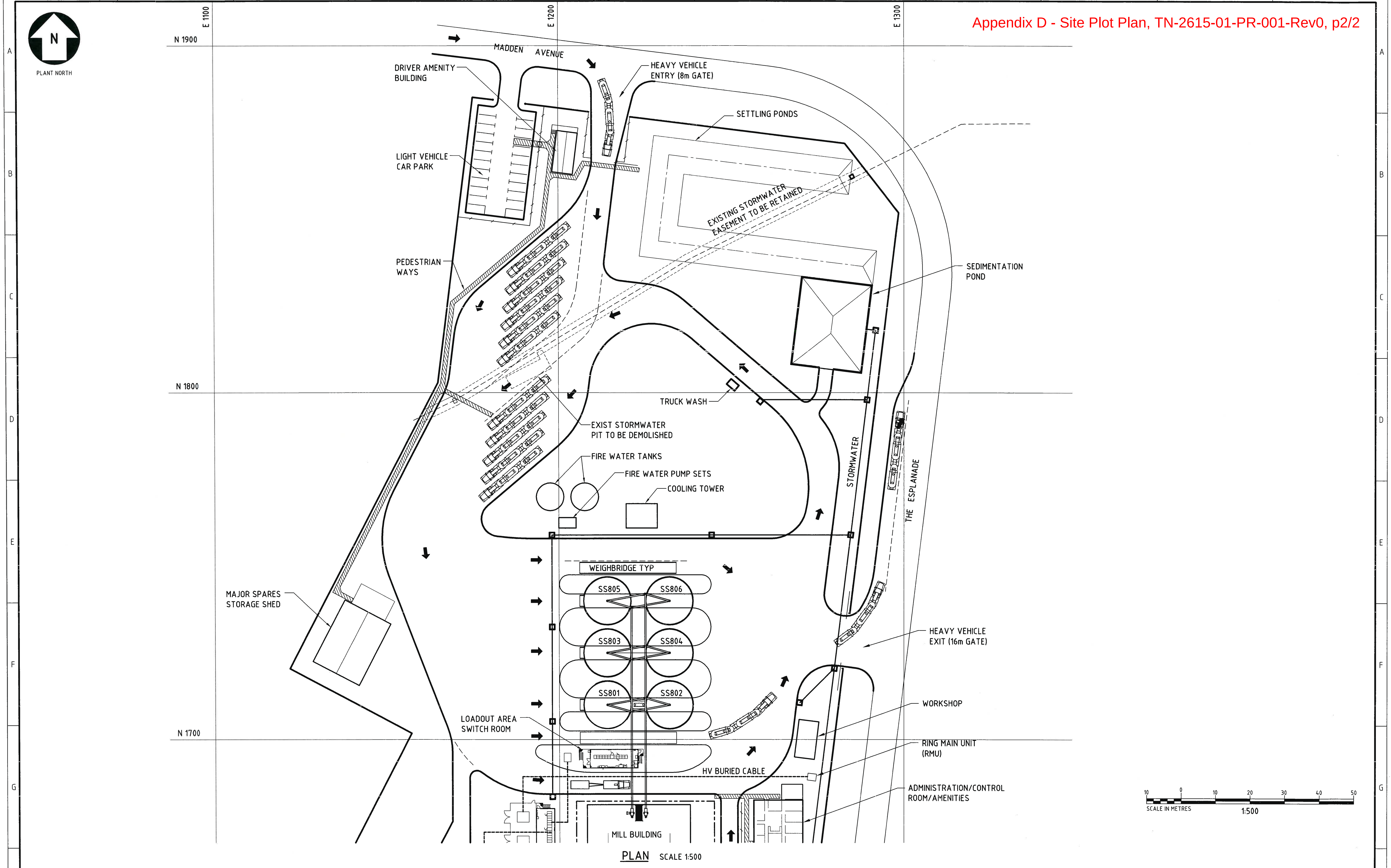
SCALE: 1:500

TITLE
BORAL CEMENT LIMITED PACIENTER PROJECT
PLOT PLAN - SOUTH

DRAWING NUMBER: DWG-26015-01-ME-002

REV.: 0

Appendix D - Site Plot Plan, TN-2615-01-PR-001-Rev0, p2/2



PLAN SCALE 1:500

DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DRAWN	CHK
-01-ME-009	CONSTRUCTION LAYDOWN PLAN - NORTH					
-01-ME-008	CONSTRUCTION LAYDOWN PLAN - SOUTH					
-01-ME-007	HEAVY VEHICLE TURNING PATHS					
-01-ME-002	PLOT PLAN - SOUTH					
-01-ME-001	OVERALL PLOT PLAN	0	16/03/17	ISSUED FOR FEED	PGL	AFM

DESIGN | ENG CHK | DES APP | TK PM: AJH | CLIENT

CLIENT: thyssenkrupp; Boral Cement ABN 62 008 528 523 Engineering Services

PROJECT:

SCALE: 1:500

TITLE
BORAL CEMENT LIMITED PACIENTER PROJECT
PLOT PLAN - NORTH

DRAWING NUMBER: DWG-26015-01-ME-003

REV.: 0

Appendix H
31 Pages

Traffic and Transport Assessment – Cardno (23 January 2017)

Traffic and Transport Assessment

Geelong Victoria Clinker Grinding Facility

CG150989

Prepared for
Boral Property Group

23 January 2017

Cardno®
Shaping the Future

Document Information

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Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
F02	23/01/17	Hugo Nicholls		Matthew Ballard	

Table of Contents

Appendices

Tables

Figures

1 Introduction

Cardno has been engaged by Boral Property Group to undertake a Traffic and Transport Assessment of the proposed Clinker Grinding Facility located in the Port of Geelong at 37-65 Walchs Road, North Shore.

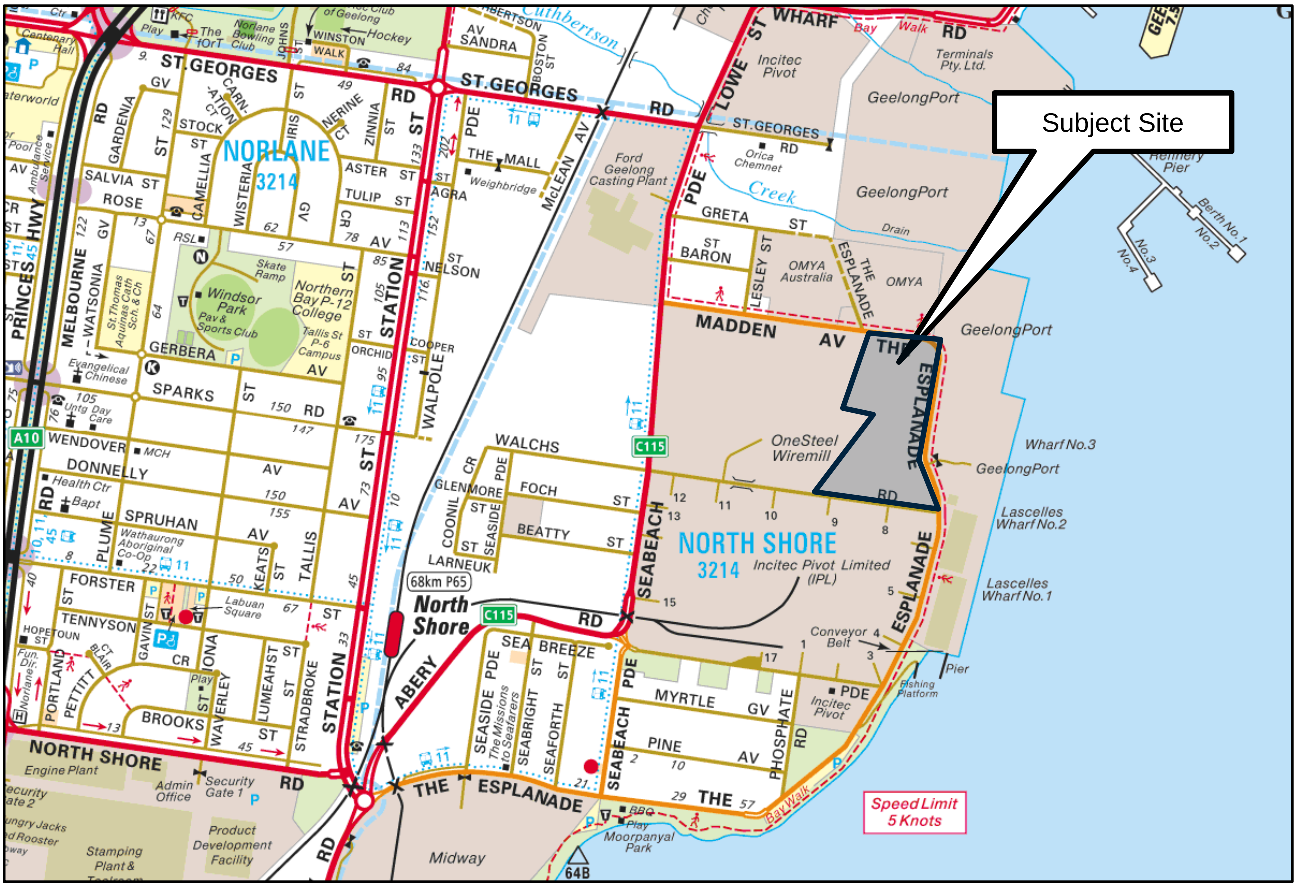
In the course of preparing this assessment, the subject site and its environs have been inspected, plans of the development examined, plant operation schedules reviewed, and all relevant traffic data collected and analysed.

2 Background & Existing Conditions

2.1 Location and Land Use

The subject site is part of an irregularly shaped parcel of land which is located between Madden Avenue and Walchs Road abutting The Esplanade at Geelong Port. The parcel of land has a frontage to Madden Avenue of approximately 100 metres, to Walchs Road of approximately 230 metres and to The Esplanade of approximately 350 metres. The site has an approximate area of 60,000sqm (6.0 ha). A locality plan is shown Figure 2-1.

Figure 2-1 Site Location

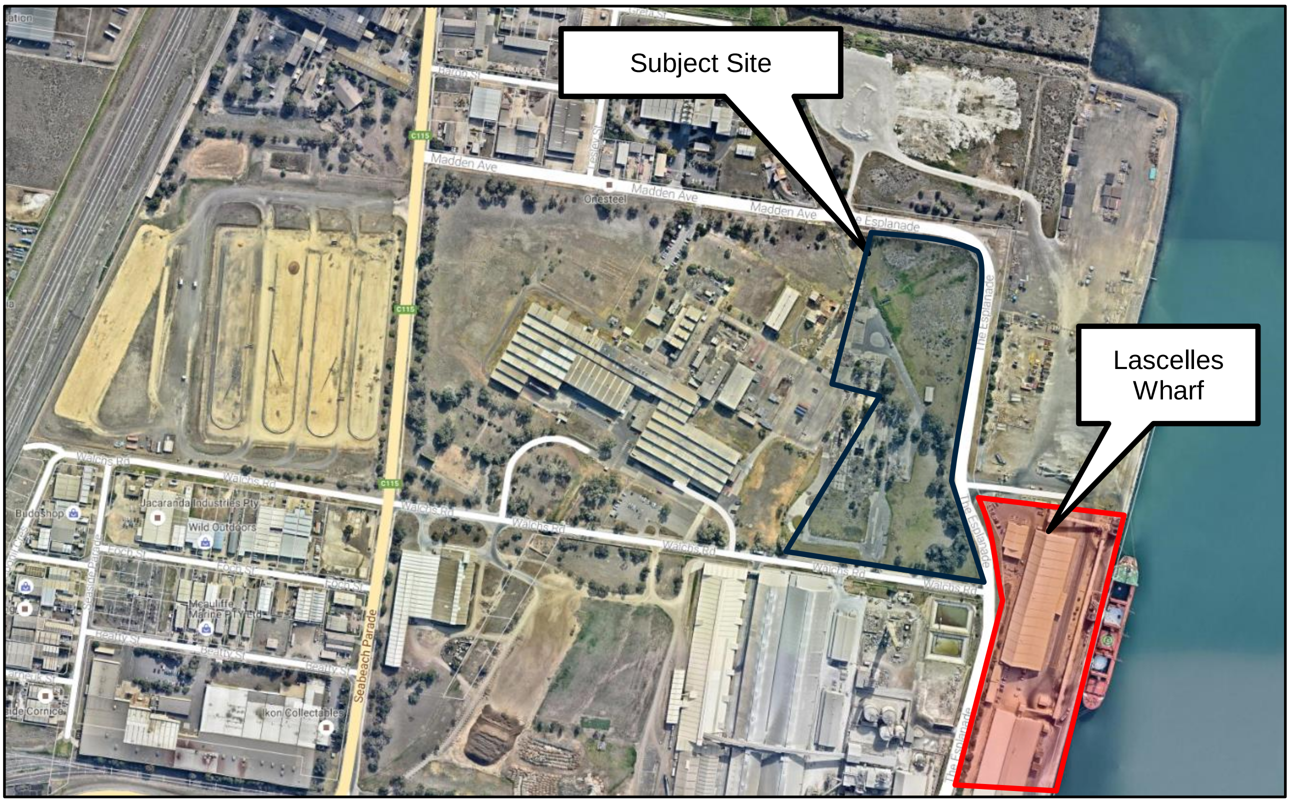


Copyright © Discway Maps

The subject site is currently unoccupied and is only occasionally utilised for container storage for the adjacent site to the west. It is understood that the site has been previously utilised by BHP as an industrial facility operating a steel mill. Primary access to the site is currently provided via an existing crossover to The Esplanade at the eastern boundary of the subject site.

An aerial view of the subject site in the context of the surrounding environs is shown in Figure 2-2.

Figure 2-2 Aerial Photo



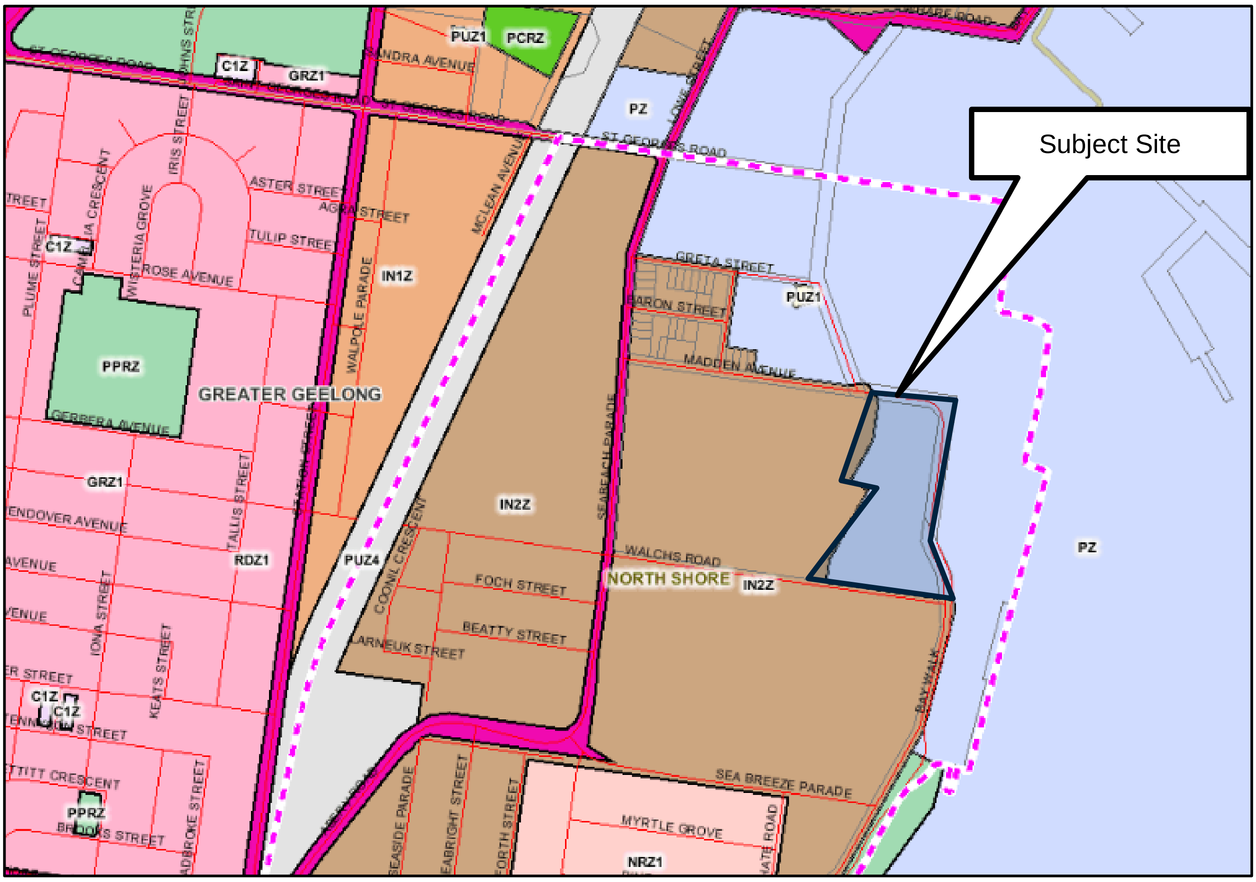
Imagery supplied by nearmap, April 2016

The site is located in close proximity to the shipping berth at Lascelles Wharf which is critical to Boral's operation of importing clinker and other materials.

2.2 Planning Zones

Figure 2-3 shows the location of the site and the Greater Geelong Planning Scheme Zones.

Figure 2-3 Planning Scheme Zones



The site is located within Port Zone (PZ) and has a Design and Development Overlay – Schedule 20 (DDO20) applicable to the land.

Land uses in the area are generally industrial, with residential premises located further west of the site, across the railway line generally separating the industrial port area and residential developments.

2.3 Road Network

2.3.1 Walchs Road

Immediately abutting the site to the south, Walchs Road is generally a two lane undivided road aligned approximately east to west between the Geelong rail line to the west and The Esplanade to the east. Walchs Road provides an 11 metre wide sealed pavement, with a traffic lane and a two metre wide shoulder in each direction, and is a designated road approved to accommodate B-doubles and higher mass limit vehicles. The speed limit on this section of Walchs Road is 60km/h in the vicinity of the site.

The following figures show Walchs Road looking towards the west and east from the subject site respectively.

Figure 2-4 Walchs Road Looking West Adjacent to the Subject Site

Figure 2-5 Walchs Road Looking East Adjacent to the Subject Site

2.3.2 The Esplanade

Marking the eastern boundary of the site, The Esplanade is generally a two lane undivided road aligned approximately north to south between Madden Avenue (continuation) to the north and Abery Road/Corio Quay Road (C115) to the south. The Esplanade provides an 11 metre wide sealed pavement, with a traffic lane and a two metre wide shoulder in each direction, and is a designated road approved to accommodate B-doubles and higher mass limit vehicles. The Esplanade has a posted speed limit of 60km/h in the vicinity of the site.

The following figures show The Esplanade looking towards the west and east from the subject site respectively.

Figure 2-6 The Esplanade Looking North Adjacent to the Subject Site

Figure 2-7 The Esplanade Looking South Adjacent to the Subject Site

2.3.3 Madden Avenue/The Esplanade

The northern boundary of the site is marked by Madden Avenue, generally a two lane undivided road aligned approximately east to west between The Esplanade (continuation) to the east and Seabeach Parade (C115) to the west. Madden Avenue provides a nine metre wide sealed pavement, with a traffic lane and a one metre wide shoulder in each direction, and is a designated road approved to accommodate B-doubles and higher mass limit vehicles. The speed limit on this section of Madden Avenue, in the vicinity of the site, is 60km/h.

The following figures show Madden Avenue looking towards the west and east from the subject site respectively.

Figure 2-8 Madden Avenue Looking West Adjacent to the Subject Site

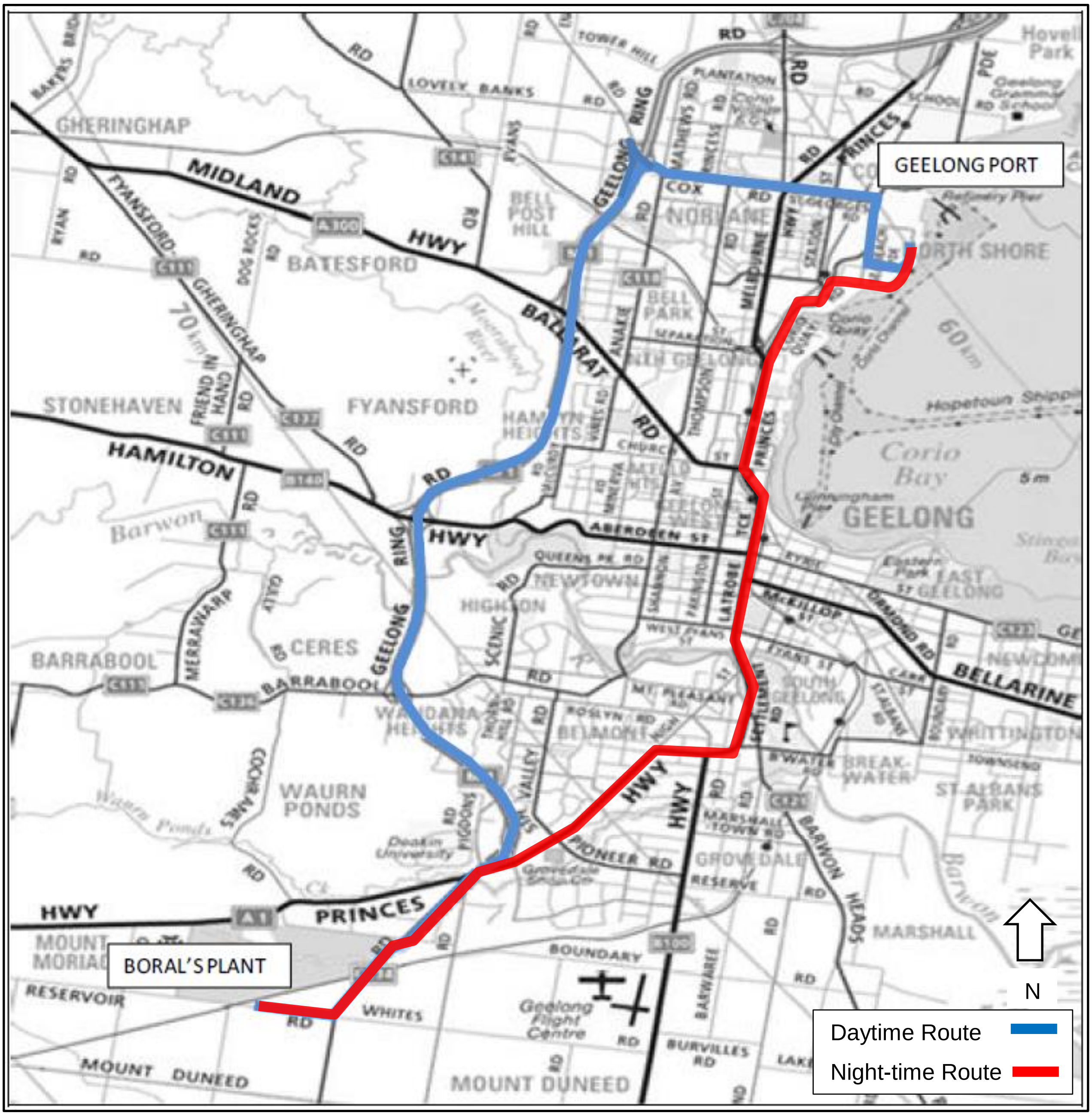
Figure 2-9 Madden Avenue Looking East Adjacent to the Subject Site

2.4 Existing Boral Operations at Port of Geelong

Currently clinker is imported through Lascelles Wharf at the Port of Geelong and transported 30km to the existing Boral cement plant at Waurn Ponds. Materials arriving at the port need to be transported immediately from the ship to the cement plant, due to a lack of temporary holding yard or storage facility close to the berth. This is a significant logistics exercise and requires extensive pre-planning for round-the-clock clinker transport. As a result of this, the traffic volumes in the surrounding streets often experience a short-term spike (especially heavy vehicles) when a ship is berthed.

Figure 2-10 shows the current, typical haulage routes from the Port of Geelong to Waurn Ponds during both day- and night-time shifts.

Figure 2-10 Typical Haulage Routes – Port of Geelong to Boral Waurn Ponds.



2.5 Existing Traffic Volumes

Traffic volume counts (using pneumatic tube) were undertaken by Nationwide Traffic Surveys on behalf of Cardno Pty Ltd between Friday 4th December 2015 and Wednesday 16th December 2015 at the following locations:

> Seabeach Parade just south of St Georges Road;

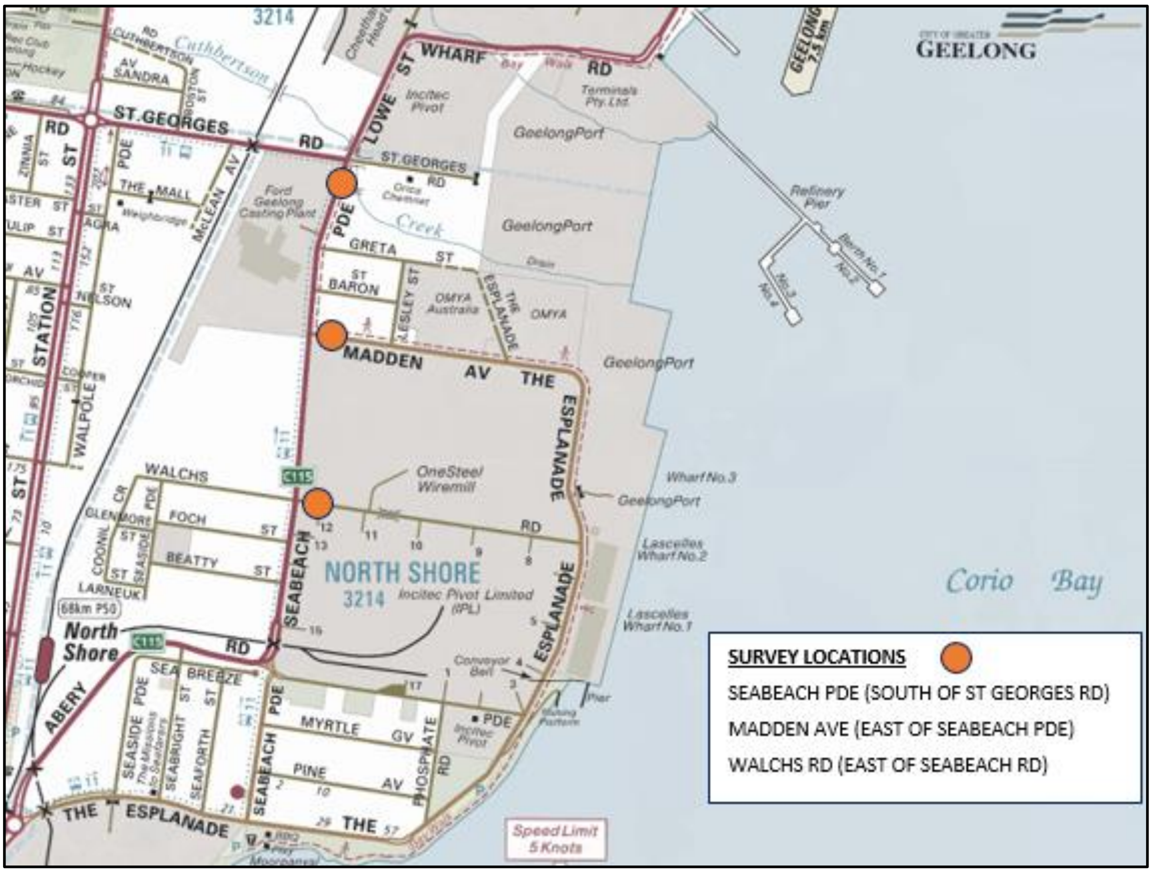
> Madden Avenue, just east of Seabeach Parade; and

> Walchs Road, just east of Seabeach Parade.

The survey times were specifically chosen to coincide with the arrival of a ship carrying clinker for Boral on the 10th December 2015, and then transported by road to Boral's Waurn Ponds facility.

Figure 2-11 shows the locations of the pneumatic tubes.

Figure 2-11 Survey Locations



2.5.2 <u>Survey Summary</u>

A comparison of the survey results prior to the ship's arrival and during clinker unloading is summarised below in Table 2-1 to Table 2-3.

Table 2-1 Recorded Traffic Volumes - On Seabeach Parade

Average Volumes (Combined Directions)	Prior to Clinker Arrival (5^{th} Dec to 9^{th} Dec)		During Clinker Unloading (10^{th} Dec to 15^{th} Dec)		Difference	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Cars (vpd)	3,220	2,758	3,372	2,363	152	-395
Heavy Vehicles (vpd)	750	28	951	483	201	455
Total (vpd)	**3,970**	**2,786**	**4,323**	**2,846**	**353**	**60**

Table 2-2 Recorded Traffic Volumes - On Madden Avenue

Average Volumes (Combined Directions)	Prior to Clinker Arrival (5th Dec to 9th Dec)		During Clinker Unloading (10th Dec to 15th Dec)		Difference	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Cars (vpd)	409	365	494	358	85	-7
Heavy Vehicles (vpd)	130	97	222	185	92	88
Total (vpd)	**539**	**462**	**716**	**543**	**177**	**91**

Table 2-3 Recorded Traffic Volumes - On Walchs Road

Average Volumes (Combined Directions)	Prior to Clinker Arrival (5th Dec to 9th Dec)		During Clinker Unloading (10th Dec to 15th Dec)		Difference	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
Cars (vpd)	278	100	369	147	91	47
Heavy Vehicles (vpd)	157	34	553	491	396	457
Total (vpd)	**435**	**134**	**922**	**638**	**469**	**504**

The survey results indicate that there was an evident increase in the traffic volumes along the key clinker transfer route following the arrival of the ship on 10th December 2015. It was noted that during clinker transport, the AM peak was identified to be approximately 6:00 – 8:00am, while the PM peak was identified to be approximately 2:00pm – 4:00pm.

2.6 Sustainable Transport

2.6.1 Public Transport

The site has access to public transport via a bus route operating on Seabeach Parade providing connections to Corio Shopping Centre; the nearest stop located approximately 1 kilometre to the southwest. Train services are also available from North Shore station located approximately 2 kilometres to the southwest. The full public transport service map is shown in Figure 2-12 and summarised in Table 2-4.

Figure 2-12 Public Transport Map

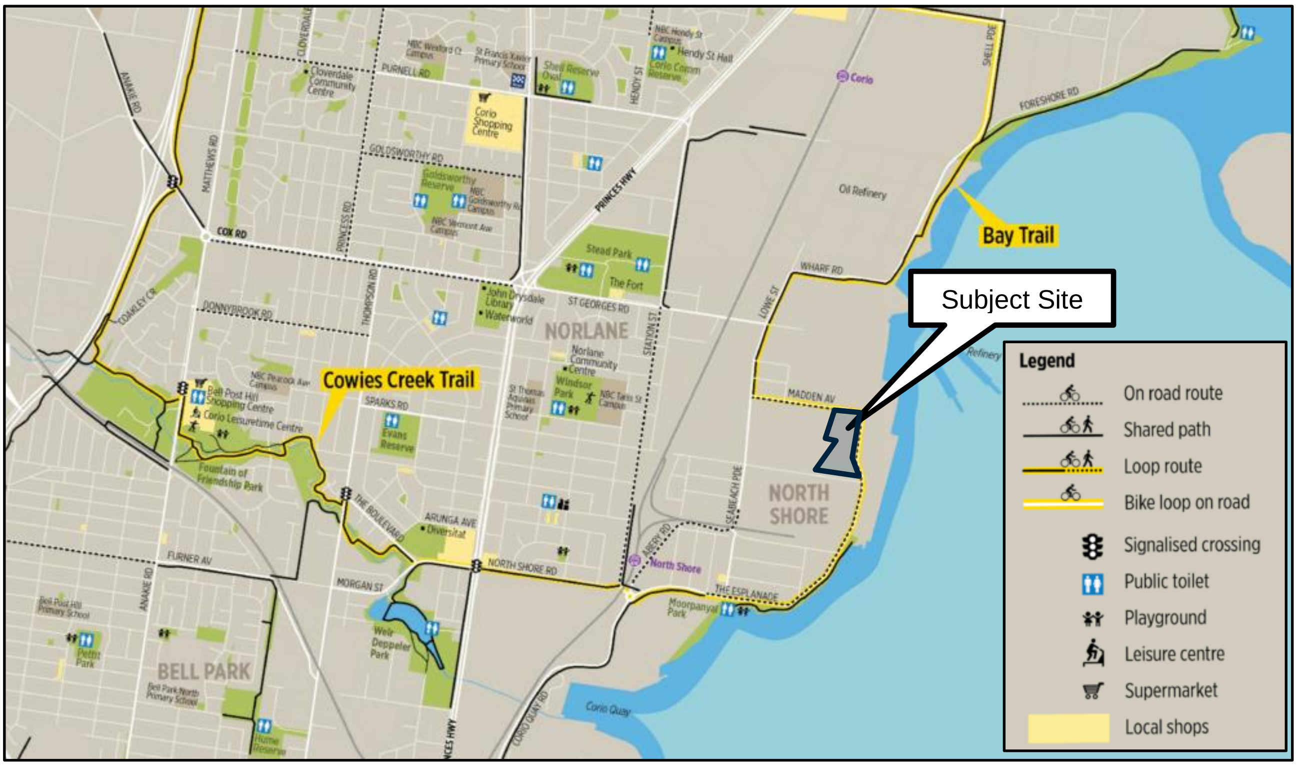
Table 2-4 Public Transport Services

Service	Route No's	Route Description	Nearest Stop
Bus	1	North Shore Station to Deakin University via Geelong City	North Shore Station
	22	Geelong Station to Geelong Station via Anakie Road	North Shore Station
	23	Corio Shopping Centre to North Shore Station	Seabeach Parade
Train	Geelong Line		North Shore Station

2.6.2 Bicycle Network

The site has bicycle access via the Bay Trail, with an on-road section aligned with The Esplanade to the east of the site. This provides further bicycle links along the coastline to the north and south, as well as connections to a shared path route along North Shore Road and on to Cowies Creek Trail.

Figure 2-13 Bicycle Network Map



3 Proposed Development

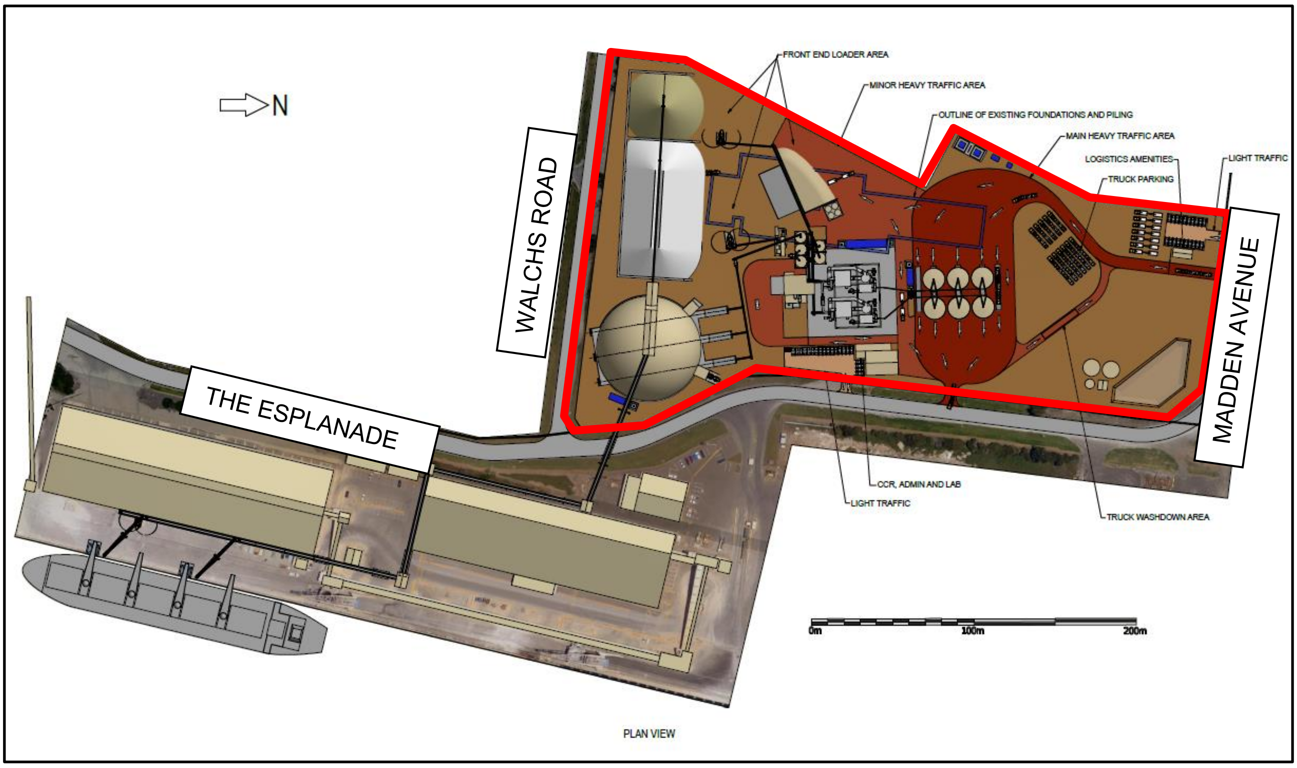
3.1 General

Based on the plans prepared by Boral, it is proposed to redevelop the subject site for the purposes of a Clinker Grinding Facility to complement the existing clinker receiving port located to the southeast, as shown in Figure 3-1, with a site area of approximately 60,000 square metres.

The development will include a conveyor system for the transfer of material from berthed ships and across The Esplanade to on-site stockpile areas.

The conveyor and storage systems at the plant will remove the need for high activity transfer of materials by truck from Geelong Port and Waurn Ponds when ships arrive at Lascelles Wharf. As such, significant improvements in logistical planning will be observed, and spikes in truck volumes associated with the unloading of product from Geelong Port will be removed.

Figure 3-1 Proposed Development



3.2 Proposed Operation

Cardno has been advised of the following with regards to the facility's proposed operation:

> The plant will operate 24 hours per day, 365 days per year;

> Cement dispatch will occur 24 hours per day, 365 days per year; however 90% of dispatch will occur from Monday to Friday, and 80% will occur between the hours of 5:00am and 8:00pm;

> Limestone deliveries will take place over 12 hours per day from Monday to Friday only;

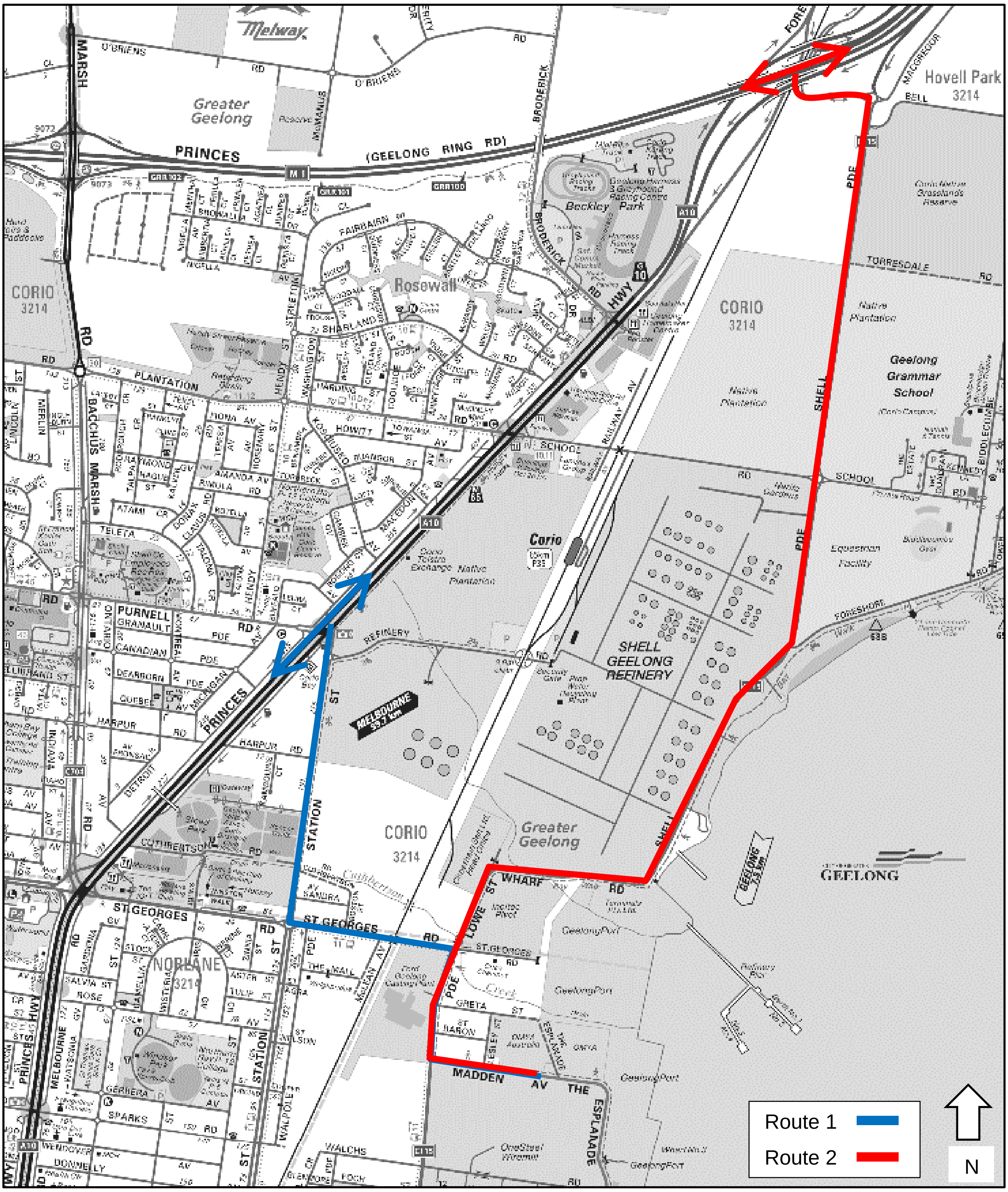
> The largest vehicles accessing the site will be 40-tonne B-double trucks;

> Staff typically arrive on-site between 6:00am-9:00am and leave between 2:00pm-6:00pm (depending on workloads);

> A maximum of 32 staff, comprising 12 plant staff and 20 drivers, will be on site during the daytime shift, with night-time shift staff numbers reducing to a maximum of 24, comprising 4 staff and 20 drivers; and

> The proposed haulage routes for the Clinker Grinding Facility are as indicated in Figure 3-2.

Figure 3-2 Proposed Haulage Routes – Proposed Clinker Grinding Facility to Princes Freeway



These routes have been selected based on existing truck curfews and to minimise travel through residential areas near to the proposed Clinker Grinding Facility.

3.3 Parking, Access and Circulation

3.3.1 Parking

A total of 40 car spaces are proposed to be provided on-site for staff and visitors. Primary site parking access for light vehicles will be provided for logistics team drivers via a crossover on Madden Avenue, west of the heavy vehicle entry point; and for production plant operators via a crossover on The Esplanade, south of the heavy vehicle exit point.

3.3.2 Access & Circulation

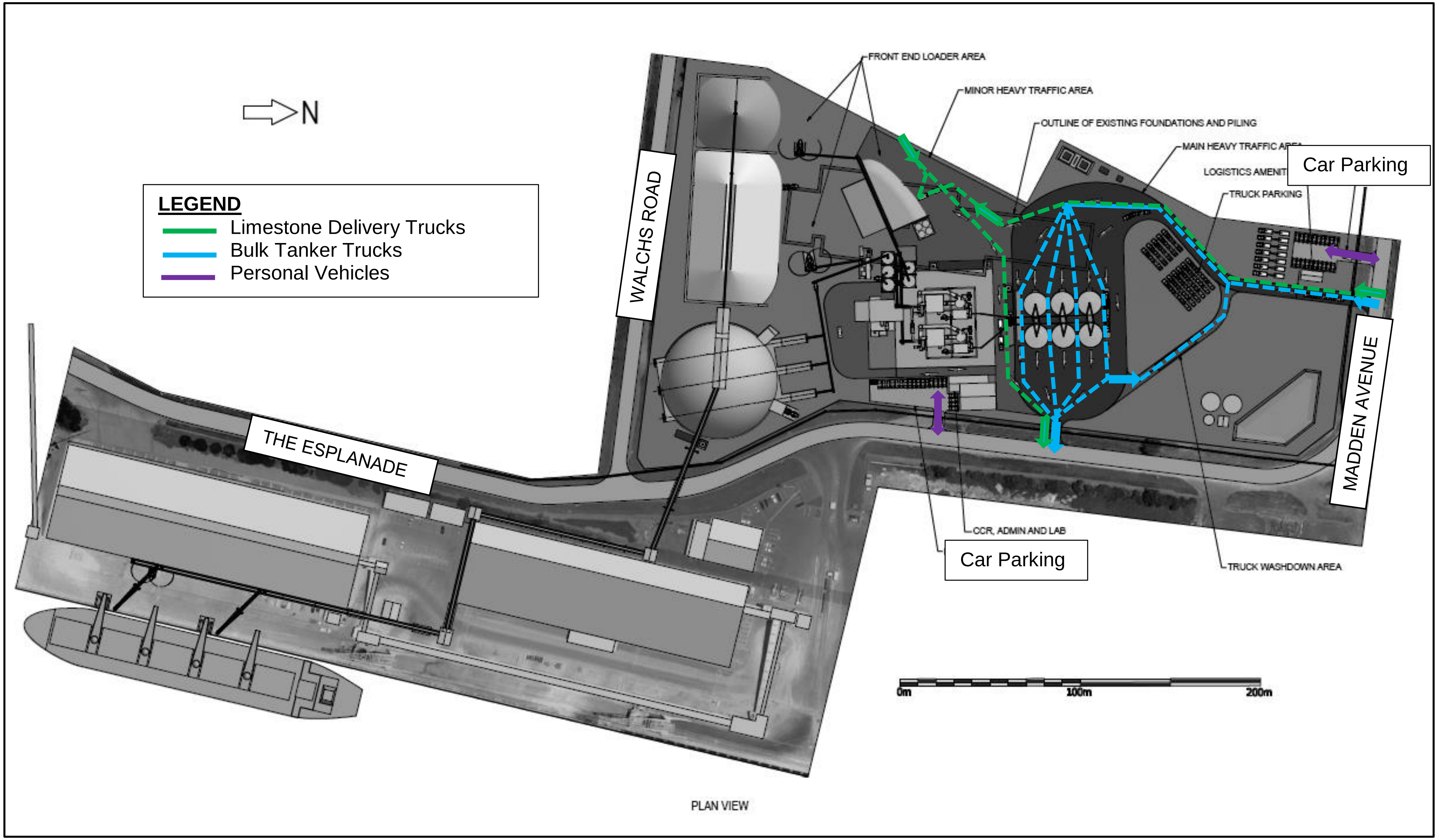
Primary site access for heavy vehicles will be provided via a Madden Avenue crossover. Vehicles will then circulate the site, load / unload materials (as required) before exiting via a crossover to The Esplanade.

Cement collection will be located in the northern part of the site, near to the cement silos. A turnaround facility is provided to allow trucks to loop the site, should a silo be empty or the truck require additional cement. As such, cement collection trucks will mostly use this section of the site, entering via Madden Avenue and exiting via The Esplanade.

Limestone delivery will be located southwest of the cement collection area, near to the limestone stockpile. T&D delivery vehicles will enter via Madden Avenue, circulate south of the cement silos, before exiting via The Esplanade.

A plan illustrating site circulation, access and car parking locations is shown in Figure 3-3.

Figure 3-3 Proposed Site Circulation



4 Design Considerations

4.1 Car Parking and Access

Car parking has been proposed within the site at the northern and eastern boundaries, to provide for logistics team and production plant drivers respectively.

The northern car park can be accessed via a two-way crossover to Madden Avenue. Car spaces have been designed in accordance with Australian Standards (AS/NZS 2890.1:2004) with all spaces at least 2.4m wide, 5.4m long and accessed from an aisle in excess of 5.8m.

The southern car park can be accessed via a two-way crossover to The Esplanade. Again, car spaces and aisle widths have been designed in accordance with the relevant Australian Standards as presented above.

Disabled bays has been designed in accordance with Australian Standards (AS/NZS 2890.6:2009) with the space being 2.4m wide, 5.4m long with an adjacent shared area of the same dimensions.

4.2 Truck Access

The proposed development is to accommodate B-Double trucks. Access has been tested by undertaking a swept path simulation as shown in Appendix A. The simulation demonstrates that a B-Double truck will be able to enter and exit the site in a satisfactory manner.

5 Car Parking Considerations

5.1 Statutory Car Parking Requirements

Clause 52.06 of the Geelong Planning Scheme does not specifically refer to parking requirements for a clinker grinding facility or a use of a similar nature. Therefore, an adequate number of car spaces must be provided to the satisfaction of the responsible authority.

As such, a Car Parking Demand Assessment has been undertaken to assess the adequacy of the proposed provision of on-site parking, which includes an assessment of the following:

> Any empirical assessment or case study.

5.2 Car Parking Demand Assessment

A parking demand profile has been created based on previous Cardno assessments completed for Boral, to estimate the parking demand likely to be generated by the proposed development at various operation times. A profile for a typical 24 hour plant operation is shown in Table 5-1.

Table 5-1 Anticipated Parking Demand Profile – 24-Hour Plant Operation

	Time	Light Vehicle In	Light Vehicle Out
AM Peak	6:00am-7:00am	29%	14%
	7:00am-8:00am	43%	29%
	8:00am-9:00am	29%	43%
PM Peak	2:00pm-3:00pm	0%	14%
	3:00pm-4:00pm	29%	14%
	4:00pm-5:00pm	43%	29%
	5:00pm-6:00pm	29%	43%

Based approximately on the above, a first principles assessment has been undertaken to assess the anticipated parking demands. Information provided by Boral indicates there will be a maximum of 32 staff on-site at any one time, including 12 staff and 20 drivers; for the purposes of a conservative assessment, this maximum staffing occupancy has been adopted.

Journey to Work Data from the 2011 Australian Bureau of Statistics Census indicates that for the City of Greater Geelong, 84.1% of journeys were completed by car as a driver. For the purposes of a conservative assessment, it has been assumed that up to 90% of trips to the subject will be made by car as a driver. It is therefore anticipated that 29 staff members will require access to a car space whilst on-site.

The projected daily arrivals and departures are shown in Table 5-2.

Table 5-2 Onsite Parking Demand

Time	Light Vehicle In		Light Vehicle Out		Total Vehicles Onsite
	%	#	%	#	
5:00am-6:00am	0%	0	14%	4	25
6:00am-7:00am	28%	8	14%	4	29
7:00am-8:00am	45%	13	28%	8	34
8:00am-9:00am	28%	8	45%	13	29
9:00am-10:00am	0%	0	0%	0	29
10:00am-11:00am	0%	0	0%	0	29
11:00am-12:00pm	0%	0	0%	0	29
12:00pm-1:00pm	0%	0	0%	0	29
1:00pm-2:00pm	0%	0	0%	0	29
2:00pm-3:00pm	0%	0	14%	4	25
3:00pm-4:00pm	28%	8	14%	4	29
4:00pm-5:00pm	45%	13	28%	8	34
5:00pm-6:00pm	28%	8	45%	13	29
6:00pm-7:00pm	0%	0	0%	0	29

Based on the foregoing, it is anticipated that the proposed Clinker Grinding Facility would generate a peak parking demand for approximately 34 spaces during periods of shift changeover.

5.3 Adequacy of Proposed Car Parking Provision

The proposed provision of 40 spaces is considered sufficient to accommodate the anticipated staff parking demand of 34 spaces, and will allow between six and 11 spaces to be available for visitors to the site at any given time.

6 Traffic Considerations

6.1 Traffic Generation

Data has been provided by Boral in relation to the proposed dispatch and delivery operations at the Geelong plant. Profiles of a typical weekday showing vehicle movements to/from the site and total movements have been prepared and shown in Figure 6-1.

The following assumptions have been made with regards to the traffic generation at the site, based on information provided by Boral:

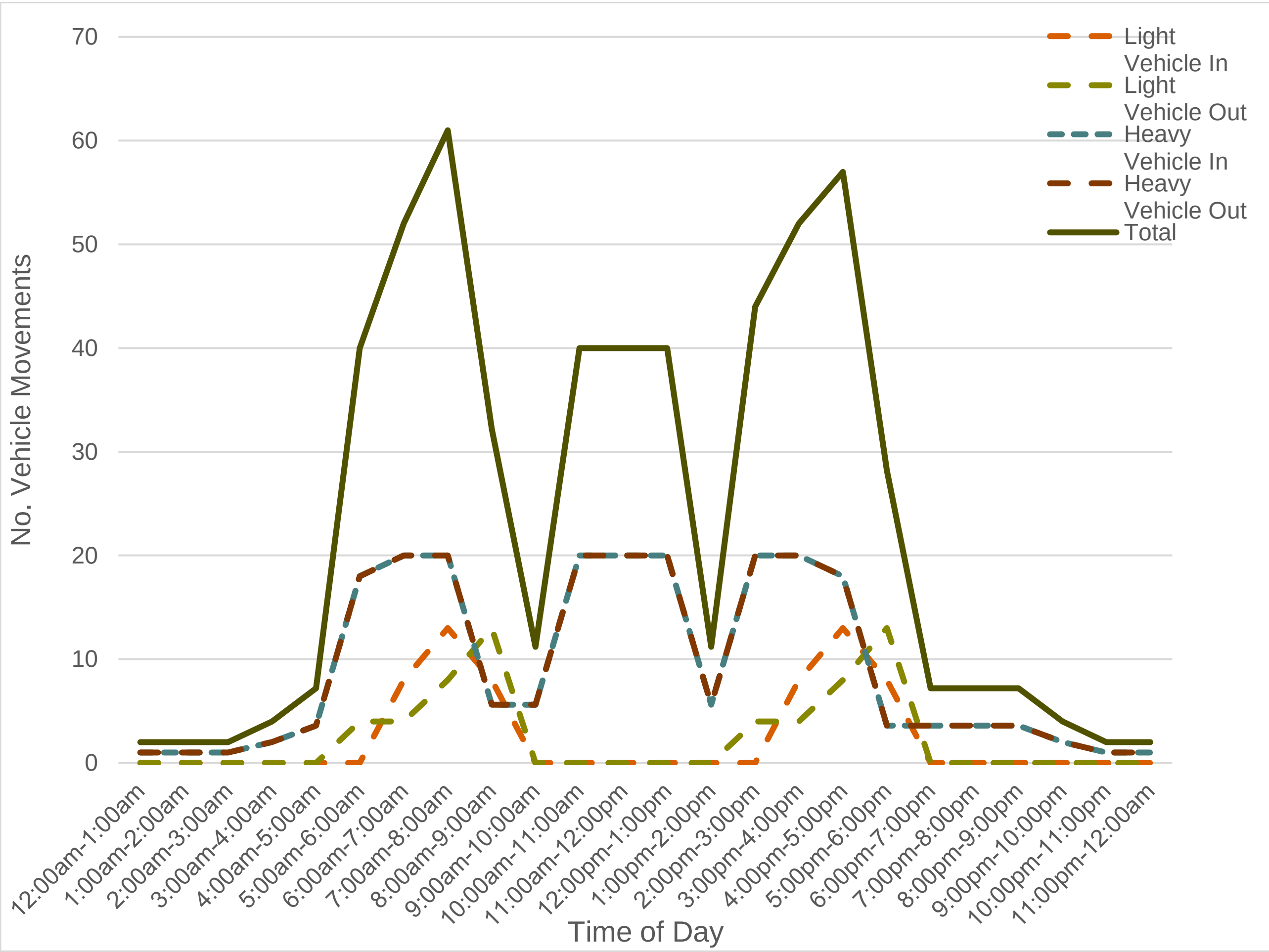
> A peak cement collection truck flow of 18 trucks per hour is anticipated to occur during three peak periods of three hours each, being 5:00am – 8:00am, 10:00am – 1:00pm and 2:00pm to 5:00pm. This represents 80% of total cement collections;

> The remaining 20% of cement collections are distributed from:

- 4:00am – 5:00am and 5:00pm – 8:00pm at an average flow of 3.6 trucks per hour;
- 3:00am – 4:00am and 9:00pm – 10:00pm at a flow of two trucks per hour; and
- 10:00pm to 3:00am at a flow of one truck per hour.

> Limestone deliveries are anticipated to occur at a flow of 2 trucks per hour from 6:00am – 4:00pm.

Figure 6-1 Proposed Traffic Generation Movements



The profile above indicates that the peak AM traffic period will occur between 7:00am-8:00am. This peak period will include both production and logistics team staff arrivals and heavy vehicle movements. Evidently, three periods of high heavy vehicle activity contribute to the number of deliveries and dispatches across the day, before the number of movements drops off at around 7:00pm-8:00pm.

The profile also indicates the peak PM traffic period will occur between 4:00pm-5:00pm. This peak period will be largely production and logistics team staff and drivers departing the site due to shift change and/or the decline is dispatches for the remainder of the day.

A summary of the anticipated weekday daily and peak hour traffic movements is provided in Table 6-1 and Table 6-2.

Table 6-1 Anticipated Typical Daily Traffic Movements – Summary

Product/Service	Type of Vehicle	No. Inbound Movements per Day	No. Outbound Movements per Day	No. Total Movements per Day
Cement	Single Bulk Tank Truck	200	200	400
Limestone	Truck & Dog Closed Tipper Trailer	20	20	40
Production/Logistics Team	Car	58	58	116
Total Heavy Vehicle (HV) movements per day				440
Total Light Vehicle (LV) movements per day				116
Total Movements per day				**556**

Table 6-2 Anticipated Typical Peak Hour Traffic Movements – Summary

	AM Peak (7:00am-8:00am)			PM Peak (4:00pm-5:00pm)		
	In	Out	Total	In	Out	Total
Heavy Vehicles	20	20	40	18	18	36
Light Vehicles	13	8	21	13	8	21
Total	**33**	**28**	**61**	**31**	**26**	**57**

6.2 Traffic Distribution

The abovementioned traffic generated was distributed across the surrounding road network. For the purposes of this assessment, the following assumptions have been made:

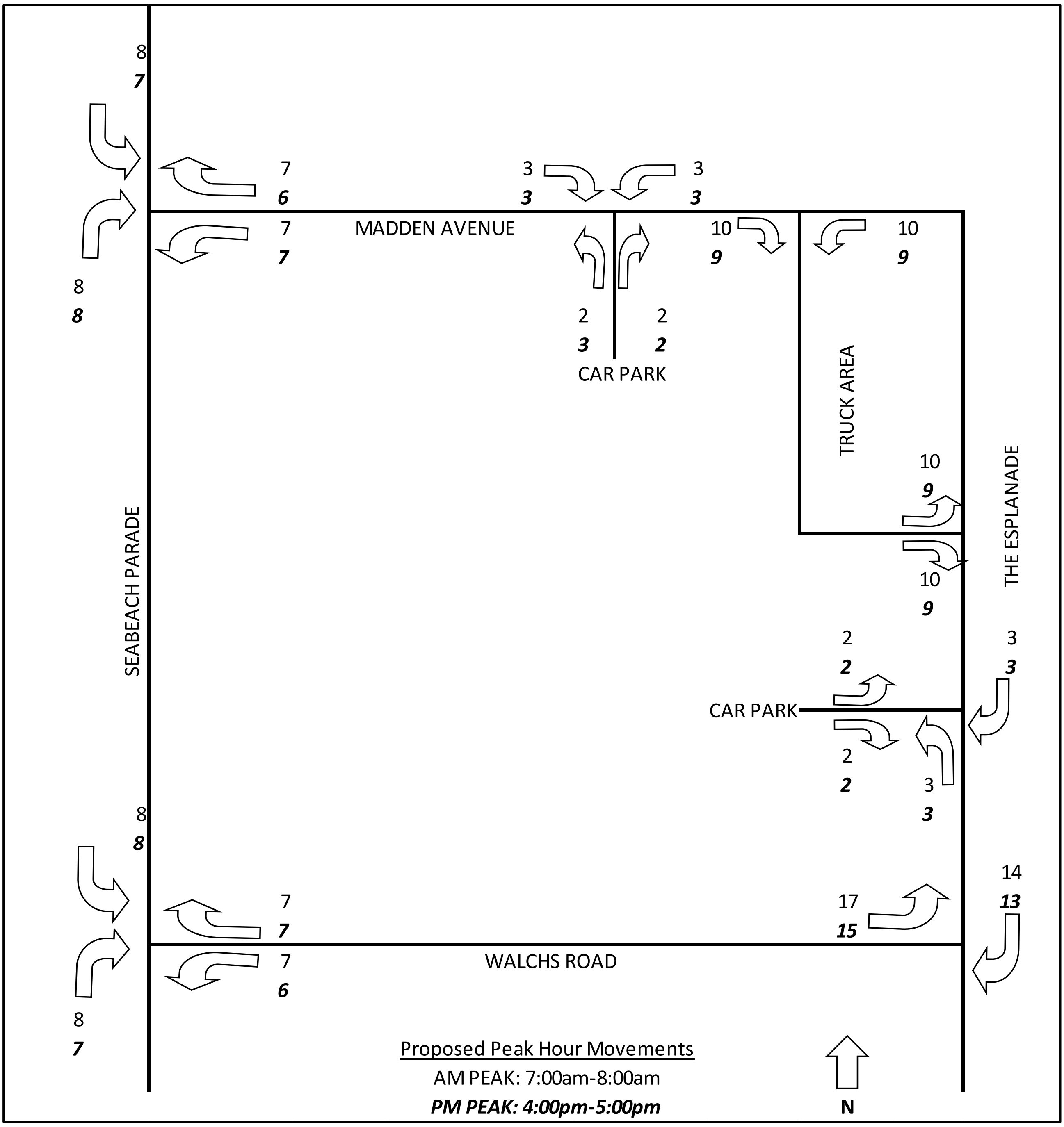
> All vehicle movements will be evenly distributed to/from the north and south, between Madden Avenue and Walchs Road;

> No vehicles will continue south along The Esplanade; and

> Approximately 85% of vehicle movements are heavy vehicle movements.

The proposed traffic distribution is shown in Figure 6-2.

Figure 6-2 Proposed Traffic Distribution

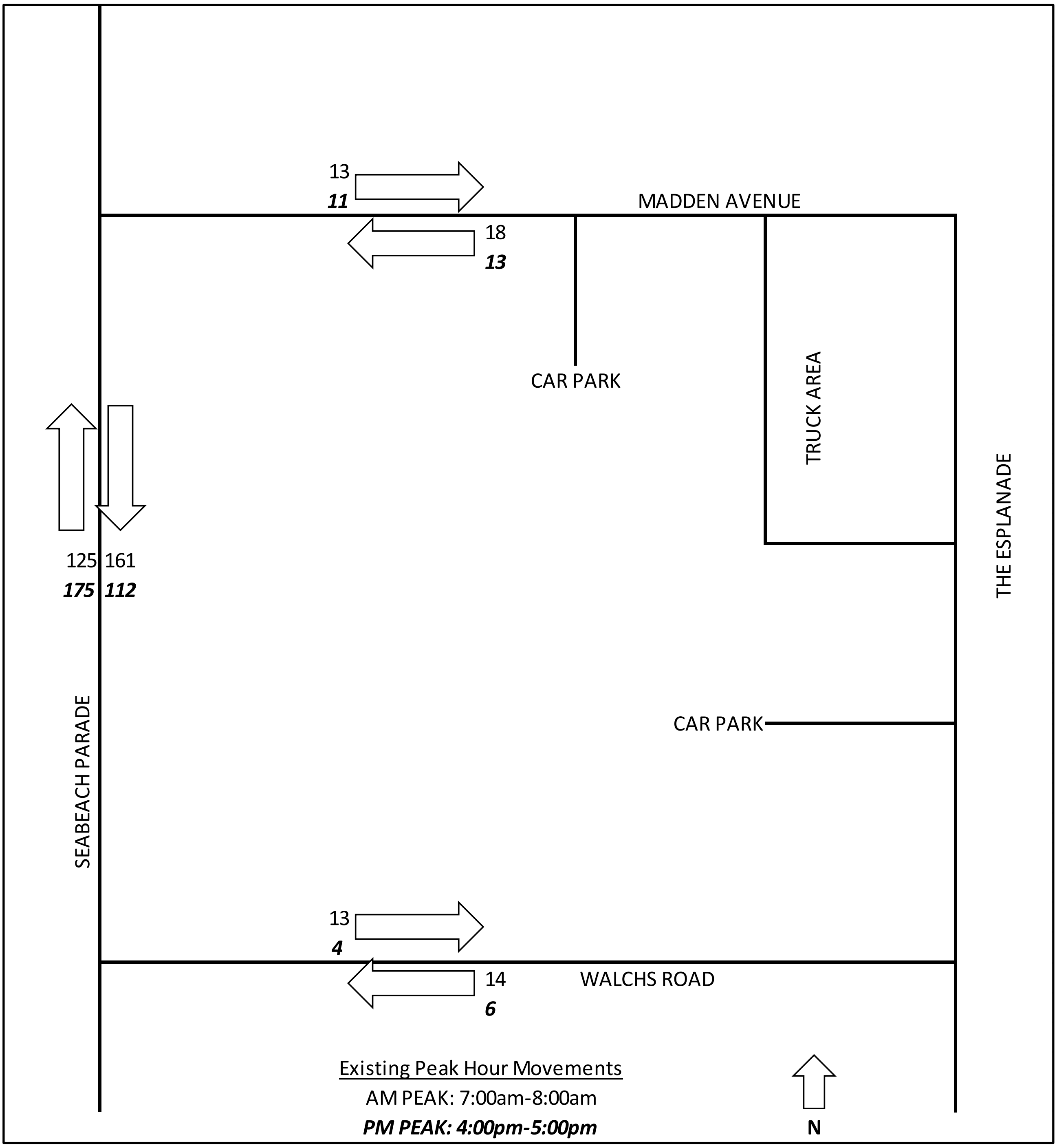


As shown, the subject site is expected to generate a peak level of traffic movement during the morning peak at the corner of Walchs Road and The Esplanade with 17 inbound movements and 14 outbound movements. The peak afternoon traffic movements were located at the corner of Walchs Road and the Esplanade with 15 inbound movements and 13 outbound movements.

Overall, it is anticipated that the development will generate 33 inbound and 28 outbound movements in the AM peak, equivalent to approximately one vehicle every two minutes in each direction, and 31 inbound and 26 outbound movements in the PM peak, again equivalent to approximately one vehicle movement every two minutes in each direction

The existing road network peak volumes corresponding to the proposed facilities' peak hours above are provided in Figure 6-3.

Figure 6-3 Existing Peak Hour Traffic Volumes – Weekday Average Prior to Clinker Arrival



The traffic volumes prior to clinker arrival, representative of base-case volumes, demonstrate that the surrounding road network currently operates with low volumes at the anticipated peak times for the subject site's generated traffic. Both Madden Avenue and Walchs Road traffic volumes correspond to less than one vehicle movement every minute (combined east-west volumes) in the morning and afternoon peaks. Seabeach Avenue combined volumes indicate one movement approximately every 15 seconds in the morning and afternoon peaks.

6.3 Traffic Impact

It is understood that the proposed development is intended to replace the current, high-intensity traffic patterns as a result of the required immediate transfer of clinker to Waurn Ponds upon arrival. As such, any traffic generated by the development is intended to be spread across the day, reducing the existing traffic impact on the surrounding road network.

The proposed development is anticipated to generate 33 inbound and 28 outbound movements in the AM peak, equivalent to approximately one vehicle every two minutes in each direction, and 31 inbound and 26 outbound movements in the PM peak, again equivalent to approximately one vehicle movement every two minutes in each direction. This is considered low in traffic engineering terms, and is considered unlikely to impact on the function of the surrounding road network.

Furthermore, it is anticipated that the proposed development will minimise and distribute previous high-activity volumes across a number of days and hours of the day. Given that the current site generated regular high-activity traffic volumes, the abovementioned traffic generation is considered to improve current operating conditions.

7 Conclusions

It is proposed to redevelop the subject site at 37-65 Walchs Road, North Shore for the purposes of a Clinker Grinding Facility, with a site area of approximately 60,000 square metres.

The development will utilise a conveyor system for the transfer of material from berthed ships across The Esplanade to on-site stockpile areas, removing the need for high-activity transfer of materials by truck from Lascelles Wharf to Waurn Ponds. As such, significant improvements in logistical planning will be observed, and spikes in truck volumes during unloading periods will be minimised.

Based on the foregoing analysis it is concluded that;

- The proposed provision of 40 spaces will accommodate the projected peak parking demands of 34 spaces;
- The overall operation of the Clinker Grinding Facility is expected to be consistent with the operating conditions at other Boral plants;
- Access and circulation throughout the site has been tested for vehicles up to and including a B-Double Truck and is considered to be satisfactory;
- The proposed development is expected to generate in the order of 61 and 56 vehicle movements inbound and outbound during the respective AM and PM peak periods, distributed evenly across Walchs Road and Madden Avenue; and
- The heavy and light vehicle traffic generated by the proposed subject site is expected to be readily accommodated by Walchs Road, The Esplanade, Madden Avenue and Seabeach Parade, whilst resulting in an improvement over current operating conditions.

Geelong Victoria Clinker Grinding Facility

APPENDIX A

SWEPT PATH DIAGRAMS

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BY: tahera.rahimi

DATE PLOTTED: 17/10/2016 12:39:08 PM

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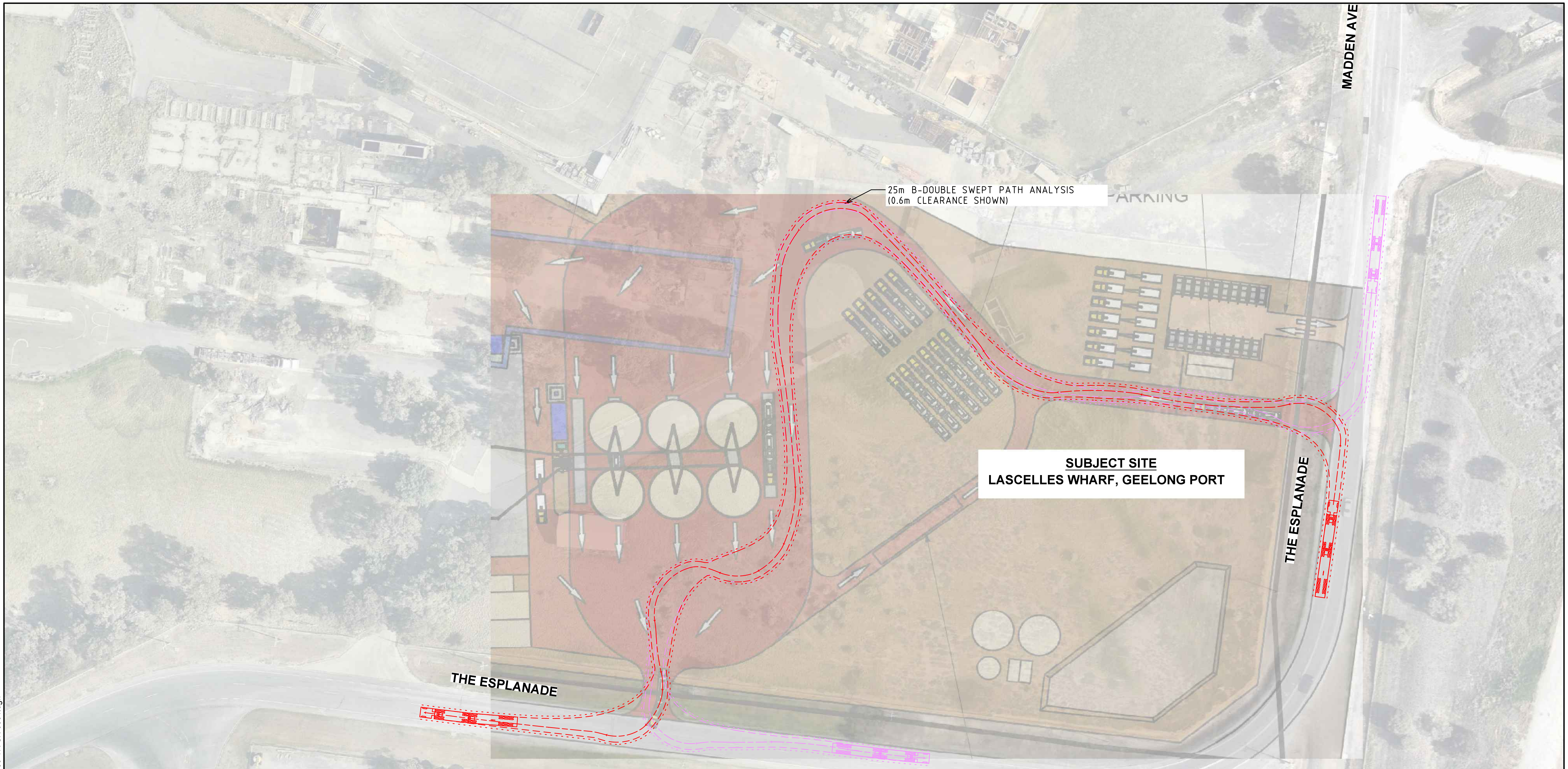

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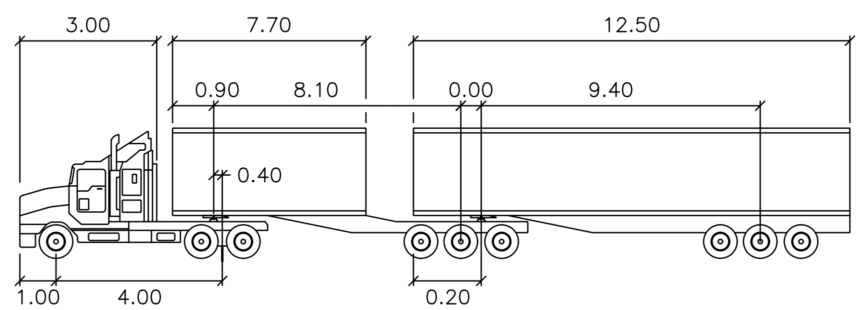
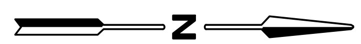


B-DOUBLE 25M   meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 20.7
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		



MELWAY MAP REF 442 f1

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BORAL CEMENT
BORAL GEELONG CEMENT PLANT
LASCELLES WHARF, GEELONG PORT
25m B-DOUBLE SWEPT PATH ANALYSIS
(0.6m CLEARANCE SHOWN)

Drawn/Check	Date	Scale	Size
TR/SGM	17.10.2016	1:1000	A3

Drawing Number	Revision
CG150989-TR-SK-0001	1

BY: User:tahera.rahimi

DATE PLOTTED: 17/10/2016 12:37:50 PM

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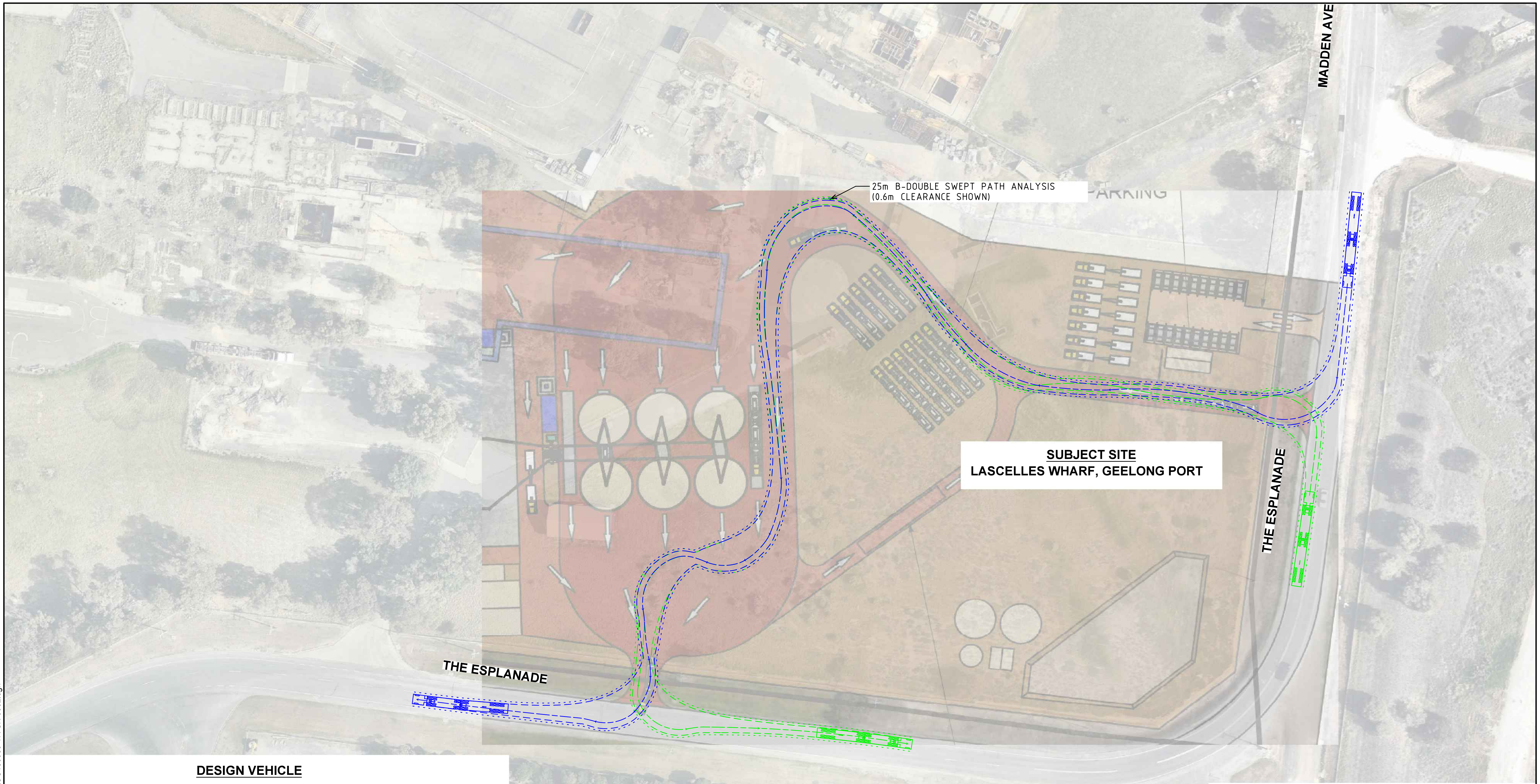

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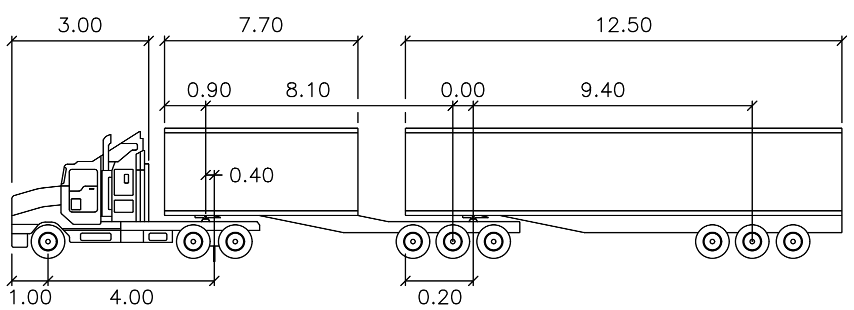

B–DOUBLE 25M meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 2.50	Steering Angle	: 20.7
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 2.50		

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MELWAY MAP REF 442 f1

Cardno
Shaping the Future

BORAL CEMENT
BORAL GEELONG CEMENT PLANT
LASCELLES WHARF, GEELONG PORT
25m B-DOUBLE SWEPT PATH ANALYSIS
(0.6m CLEARANCE SHOWN)

Drawn/Check	Date	Scale	Size
TR/SGM	17.10.2016	1:1000	A3

Drawing Number	Revision
CG150989-TR-SK-0002	1

Appendix I

87 Pages

Preliminary Cultural Heritage Study – Ecology and Heritage Partners (26 April 2016)
Biodiversity Assessment – Ecology and Heritage Partners (April 2016)

ecology & heritage partners

Final Report

Preliminary Cultural Heritage Study: Proposed Grinding Plant and Import Terminal, Lascelles Wharf, North Shore, Victoria

Prepared for:

Boral Cement Limited

26 April 2016

Ecology and Heritage Partners Pty Ltd

Author:

Rick Bullers

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- Boral Cement Limited;
- The Office of Aboriginal Affairs Victoria; and
- Heritage Victoria.

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DOCUMENT CONTROL

Activity	Proposed Grinding Plant and Import Terminal, Lascelles Wharf
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Project number	7693
Project manager	Rick Bullers
Report author(s)	Rick Bullers
Report reviewer	Oona Nicolson
Other EHP staff	N/A
Mapping	Monique Elsley
File name	P:\7600\7693\Reports\7693_EHP_LascellesWharf_PCHS_Final_RB_26042016.docx
Client	Boral Cement Limited
RAP	Wathaurung Aboriginal Corporation
CMA	Corangamite
Council	City of Greater Geelong

Report versions	Comments	Comments updated by	Date submitted
Draft v1	Draft for QA Review	Rick Bullers	18.04.2016
Draft v2	Draft to Client for Comment	Rick Bullers	19.04.2016
Final	Final Report to Client	Rick Bullers	26.04.2016

Protocols for Handling Sensitive Information

Some of the information contained within this Cultural Heritage Management Plan (CHMP) is culturally sensitive. Before releasing the contents of this CHMP to the public, permission should be sought from the relevant authorities and communities.

EXECUTIVE SUMMARY

Ecology and Heritage Partners was commissioned by Boral Cement Limited to prepare this Preliminary Cultural Heritage Study (PCHS) for the proposed Grinding Plant and Import Terminal at Lascelles Wharf in North Shore, Victoria (City of Greater Geelong). The purpose of the assessment was to identify Aboriginal and historical cultural heritage values that may be present within the study area. Information gathered throughout the assessment was used to determine potential legislative implications (associated with cultural heritage values) for the proposed facility.

Aboriginal Cultural Heritage

With regard to Aboriginal archaeological heritage, the preliminary assessment indicates that under the *Aboriginal Heritage Regulations 2007* the proposed activity is considered a high impact activity. The specific high impact activity is:

- the construction of a building or the construction or carrying out of works for a specified use, namely 'an industry' (r. 43 [1][b][xii]).

The study area is notionally located within an area of cultural heritage sensitivity under the *Aboriginal Heritage Regulations 2007*. The specific area of cultural heritage sensitivity is:

- located within 200 m of the high water mark of the coastal waters of Victoria or any sea within the limits of Victoria (r.28).

However, the majority of the study area has been subject to significant ground disturbance under r. 4 of the *Aboriginal Heritage Regulations 2007*, associated with the former industrial use of the site as a Wire Production Mill. It is also clear that the entire northern end of the site was, until the middle of the 20th century, within the sub-tidal zone, before land reclamation works were carried out. Due to the extensive disturbance, Aboriginal cultural heritage materials are unlikely to remain within the study area. Thus, it is the finding of this assessment that previous development of the study area is consistent with the definition of significant ground disturbance. As such the cultural sensitivity of the study area is voided and the following Regulation applies:

> Regulation 28(2):
>
> *If part of part of the land specified in subregulation (1)*[i.e. land within 200 m of the high water mark of the coastal waters of Victoria…] *has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.*

Given r. 28(2) applies to the study area, a mandatory Cultural Heritage Management Plan under the *Aboriginal Heritage Act 2006* is not required to issue a planning permit for the development.

Historical Heritage

With regard to historical archaeological heritage, this assessment concludes that although the archaeological remains of the former BHP Wire Mill is present on site, those remains are not considered to meet the thresholds for registration on the Victorian Heritage Inventory. Furthermore, there is no evidence to suggest that significant historical archaeological heritage is likely to be present within the study area and therefore no further historical archaeological investigations are warranted.

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Appendices

Figures

Tables

Maps

1 INTRODUCTION

1.1 Preamble

Ecology and Heritage Partners was commissioned by Boral Cement Limited to prepare this Preliminary Cultural Heritage Study (PCHS) report for the proposed Grinding Plant and Import Terminal at Lascelles Wharf in North Shore, Victoria (City of Greater Geelong), hereafter referred to as the 'study area'.

The purpose of the assessment was to identify Aboriginal and historical cultural heritage values that may be present within the study area. Information gathered throughout the assessment was used to determine potential legislative implications (associated with cultural heritage values) for the proposed development works.

1.2 The Study Area

The study area is located at 37-65 Walchs Road, North Shore, Victoria (City of Greater Geelong). The activity area is approximately 5.9 ha in size and is bounded to the north by Madden Avenue, to the east by The Esplanade, to the south by Walchs Road and to the west by private industrial land.

The study area comprises primarily flay coastal plain landforms with no internal waterways. It is located approximately 1.9 km north east of the Cowies Creek outlet (Corio Quay) and 630 m south of the Rollerama Drain outlet.

The cadstral details of the property are:

- Lot: 2; Title Plan: PS434155; Parish: Moorpanyal; County: Grant.

1.3 The Activity

Boral Cement Limited is proposing to construct a new Cement Grinding Plant and Import Terminal on land adjacent to Lascelles Wharf at North Shore, Victoria. Boral Cement Limited currently imports cement-clinker through the Port of Geelong and transports the product via road truck approximately 30 km west into the existing Waurn Ponds site. The cement-clinker is processed through the grinding facility and various cement products are manufactured that are distributed via road, into the Victorian market.

Boral Cement wishes to improve the current operation to deliver a sustainable business model to produce cementitious products into Victoria for the next 40 years. The company has identified the current study area as a potential location for the construction of a new import and grinding facility that will deliver these efficiencies into the business. The facility will be capable of importing and manufacturing over one million tonnes of cementitious products.

The cement clinker will be unloaded at the berth by ships crane, fed into hoppers and transported to a storage shed via rubber belt conveyor. The conveyor will have dust collection facilities at material transfer points.

The storage shed will be of a capacity nominally 85 kt for the cement clinker, whilst the other raw materials slag (~45 kt), gypsum (~35 kt) and limestone (~10 kt) will all be stored externally.

The slag and gypsum will be imported via ship and utilise the same system as the cement clinker. The limestone will be sourced locally and delivered to site via truck. Raw materials will be transported to the cement grinding section by rubber belt conveyor via storage and feed hoppers of varying capacity up to ~2 kt. Dust collection facilities will be located at material transfer points.

The cement grinding section will comprise a 180 tph cement mill with particle separation and dust collection facilities. The finished cement products will be transported to storage silos of capacities ranging from 5kt to 10kt via mechanical elevator and airslide systems.

The cement will be loaded in truck and distributed into the Victorian market.

1.4 Details of Authors

1.4.1 Ecology and Heritage Partners Pty Ltd Cultural Heritage Division

Ecology and Heritage Partners is a professional cultural heritage and ecological consultancy providing high quality technical services in the field of Aboriginal and historical cultural heritage assessment, Cultural Heritage Management Plans (CHMPs), ecological assessment, research and management. The business provides effective and innovative cultural and natural heritage advice to a range of state and local government authorities/agencies, corporate and private clients.

Ecology and Heritage Partners has an established heritage team of ten people led by Oona Nicolson (Director and Principal Heritage Advisor). All of the team are qualified Cultural Heritage Advisors, specialising in Australian archaeology (including Aboriginal, Historical and Maritime). Three members of the team are based in our Geelong office.

1.4.2 Authors

The author and Cultural Heritage Advisor of this PCHS is Rick Bullers. The quality assurance review was undertaken by Ecology and Heritage Partners Pty Ltd Director/Principal Heritage Advisor Oona Nicolson. The field inspection was undertaken by Ecology and Heritage Partners Pty Ltd Senior Archaeologist/ Heritage Advisor Rick Bullers. Mapping was provided by Ecology and Heritage Partners Pty Ltd GIS Officer Monique Elsley.

Details of the project team are provided in Appendix 1.

1.5 Heritage Legislation

Legislation relevant to the preparation of this PCHS includes the *Aboriginal Heritage Act 2006*, the Commonwealth *Native Title Act 1993*, the Victorian *Planning and Environment Act 1987* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. This legislation is subordinate to the Victorian *Coroners Act 2008* in relation to the discovery of human remains.

2 PROJECT METHODS

2.1 Scope of Works

The following tasks were undertaken as part of the PCHS:

1. A review of available literature was undertaken using resources such as the Office of Aboriginal Affairs Victoria (OAAV) and Heritage Victoria (HV), and the Ecology and Heritage Partners library of reports and knowledge of the area. A desktop study, with all relevant cultural heritage databases and mapping programs, was examined including:
    - the Victorian Aboriginal Heritage Register (VAHR);
    - the Victorian Heritage Register (VHR);
    - the Victorian Heritage Inventory (VHI);
    - the Heritage Overlay of the Greater Geelong Planning Scheme;
    - the National Trust (Victoria) Register;
    - National, Commonwealth and International Heritage Lists; and
    - relevant Commonwealth and State legislation and policies.
2. Provide a brief review of land use for the study area;
3. Conduct a site inspection of the subject site by a qualified cultural heritage advisor to identify any Aboriginal and/or historical cultural heritage within the study area;
4. Provide information in relation to any implications of Commonwealth and State environmental legislation and Government policy associated with the proposed development;
5. Discuss any opportunities and constraints associated with the study area; and
6. Presentation of the results in this PCHS report.

2.2 Limitations

The cultural heritage information used to inform this PCHS is limited to that obtained through desktop assessment and a brief site visit.

The level of assessment undertaken for this site visit is not considered to meet the requirements for a formal archaeological survey in accordance with Heritage Victoria and Office of Aboriginal Affairs guidelines (HV 2008; Duncan et al. 2008; OAAV 2010). Consultation with the local Aboriginal community did not form part of the scope of works. This level of assessment is appropriate for determining the broader potential for Aboriginal and/or historical heritage values to be present in the study area and for making recommendations regarding the need or otherwise for further more detailed investigations.

This report is an opportunity to provide a historical context for understanding the study area and to identify potential areas that may contain Aboriginal or historical sites and to identify relevant legislative implications (Section 5). Aboriginal cultural heritage may occur anywhere in the landscape and it is important to note that the assessment of likelihood is based on the balance of probability; it is our opinion based on an assessment of landforms and the extent of previous ground disturbance, compared to the general archaeological character of the region as assessed via desktop review. It is not a categorical statement that Aboriginal cultural heritage will or will not be present.

3 RESULTS

3.1 Aboriginal Cultural Heritage

The section reviews the Aboriginal context of the activity area and includes an examination of historical and ethnohistorical sources, previously recorded Aboriginal archaeological site types and locations in the geographic region of the activity area, and previous archaeological studies undertaken in the area. Together, these sources of information can be used to formulate a predictive statement concerning what types of sites are most likely to occur in the activity area, and where these are most likely to occur.

Archaeological evidence suggests that Aboriginal peoples had occupied all of Australia's environmental zones by 40,000 years BP. Sites such as Keilor and Bend Road in Melbourne and Box Gully on the northern shore of Lake Tyrell have dates extending back to 30–35,000 BP (Flood 1995: 286, Hewitt and Allen 2010, Richards et al. 2007).

3.1.1 Geographic Region

The geographic region defined for this CHMP is the catchment of the Cowies Creek. The creek catchment is a low energy system that drains southeast into Corio Bay at North Geelong. The landscape is generally undulating volcanic plain, with the Cowies Creek channel incised into the plain.

This geographic region reflects the specific vegetation history and resource availability in the plains catchment and exhibits environmental characteristics that likely influenced Aboriginal occupation. The Cowies Creek catchment geographic region addresses the specific environmental context of Holocene resources available from the activity area. It is also bounded by those significant markers on the landscape that would have influenced the movement of groups across the landscape. Thus the geographic region relates specifically to the tangible and intangible values of the landscape and is highly relevant to any Aboriginal cultural heritage that may be present within the activity area.

More generally, the region (and the activity area itself) forms a part of the Victorian Volcanic Plains Bioregion (DELWP 2016a). This geographic region is relevant to any Aboriginal cultural heritage that may be present within the activity area.

3.1.2 Geology, Geomorphology and Soils

The geology of the activity area comprises the Quaternary (Holocene)-aged fluvial (alluvium) gravels, sands and silts of the Moorabool Viaduct Sand formation (VandenBerg 1997).

The Victorian Western Plains are made up of low-lying undulating plains formed on both volcanic and sedimentary lithologies. The landscapes of this geomorphological unit are formed on some of the youngest rocks of Victoria (DEDJTR 2016a). The sedimentary plains mainly comprise the marine sands deposited by the retreating Pliocene sea and sometimes the older underlying Gellibrand Marl and Port Campbell Limestone is also exposed. These sand plains also appear in 'windows' within the area of the volcanic plains, where they have not been covered by lava flows (DEDJTR 2016b). The undissected sand plains occupy an area south of the volcanic plains and north of the Heytesbury (Hanson Plain, Ross Plain, Duck Hole Plain, Saddlecloth Plain), where they form generally flat landscapes with very gentle low rises. Further east, a remnant of the sedimentary plains forms gently dissected plains north of Anglesea. Associated soil types include sodic and non-sodic mottled texture contrast soils (Sodosols, Kurosols) and pale or grey sandy soils with 'coffee rock' or clay at depth (Podosols) (DEDJTR 2016c).

The geographic region occurs within the Western District-Undulating Plans geomorphic region, ad the original geomorphology for this part of the coast comprised the sedimentary plains of geomorphological unit (GMU 6.2.4), formed by aeolian deposition along the Cowies Creek floodplain, containing brown kandosol soils. Further upstream in the catchment, the geographic area is located within GMU 6.1.3, which is based on basalt lithology (DELWP 2016a).

However, the study area itself occurs within the 'Engineered coast (Port Melbourne)' (GMU 8.7) (DELWP 2016a; Figure 1), indicating that the area has been highly modified by previous land use activities (specifically construction of port facilities) and may lie on partially or wholly reclaimed land. This GMU occurs on fluvial lithology producing rudosol soils.

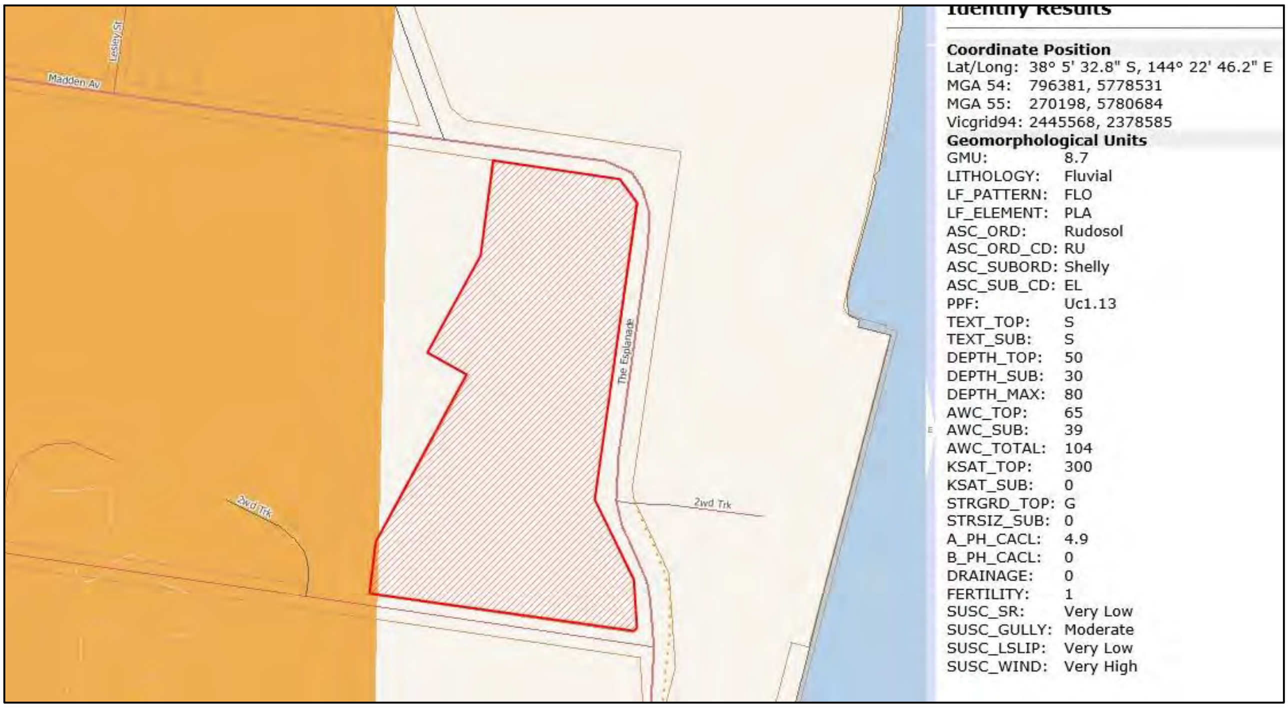

Figure 1: Extent of GMU 8.7 ('Engineered Coast')(Source: DELWP 2016a)

A review of historical aerial photography for the coastline shows that the coast has bee re-engineered and lad has bee reclaimed with the northern section of the study area occurring inn the former subtidal zone (Figure 2).

Figure 2: Oblique aerial photo of the study area c.1938, looking south towards Geelong, showing the former coastline crossing from south east to north west with the former alignment of The Esplanade aligning with one of the internal roads in the study area (Source: SLV H91.160/718)

3.1.3 Ethnohistory

Historically, the activity area lay within the boundaries of the *Wadawurrung* language group. This group consisted of many tribes of Aboriginal people held together by common language and beliefs, and is discussed in detail below.

The *Wadawurrung*/*Watha wurrung* language was one of the five primary languages spoken in south-western Victoria. The *Wadawurrung* people are part of the greater Kulin nation surrounding Port Phillip and Western Port Bays (Clark 1990), with an area that is bounded to the east by the Werribee River, to the south by Port Phillip Bay and Bass Strait, to the west by various watercourses and roadways including Painkallac Creek at Aireys Inlet, Salt Creek at Woorndoo Upper and Fiery Creek to the west of Beaufort and the ridgeline of the Great Dividing Range to the north (J. Young, pers. comm. 7 May 2013).

Linguistically, the *Wadawurrung* were most similar to the *Djadja wurrung* to the north and the *Woi wurrung*, *Bun wurrung* and *Daung wurrung* to the east (Clark 1990: 276). Collectively these five groups form the Kulin Nation, who shared similarities in language, customs, and some traditions. It appears that the *Wadawurrung* were genetically related to the other four Kulin groups, but diverged enough in terms of language, their burial practices and distinctive facial and body markings at corroborees (Clark 1990: 276-277) to be a separate tribal group. Their traditional land includes both coastal and inland environments, and thus the *Wadawurrung* interacted with neighbouring clans along their western boundary (*Gulidjan* and *Djargurd wurrung*), whose speech was essentially the same, as well as various clans belonging to other Eastern Kulin groups, such as the *Woi wurrung* (Wurundjeri), and the Bun wurrung to the east, the *Dja Dja wurrung* to the north.

The *Wadawurrung* and their eastern and northern neighbours shared a patrilineal form of moiety system. The Kulin social world was divided into either one of two moieties; the *Waa* (crow) or B*unjil* (eaglehawk) moieties (Clark 1990: 276). Marriage was always across the moieties, with a *Waa* person having to marry a *Bunjil* person, preferably from a distant clan group (Barwick 1984: 104-105). In some instances, members of the *Wadawurrung* clans intermarried with the matrilineal clans of the *Gulidjan, Djab wurrung*, and the *Djargurd wurrung,* although in many instances, these practices ended in inter-clan hostility.

Land Tenure

The *Wadawurrung* were divided into 25 or 26 clans, each of which was responsible for a specific area of land within the wider *Wadawurrung* territory, with group sizes between 40 to 60 people. According to Clark (1990: 311) and Presland (2010: 28-29), each of these clans occupied a distinctive geographical area and belonged to one of the two moieties. *Wadawurrung* groups that belong to the *Waa* moiety include the *Beerekwart balug* (Mount Emu), *Bengalat balug* (Indented Head), *Carninje balug* (Emu Hill station, Lintons Creek), *Corrin corringer balug* (Carranbulluc), *Moner balug* (Trawalla station, Mount Emu Creek), and the *Tooloora balug* (Mount Warrenheip, Lal Lal Creek, west branch of Moorabool River).

Clans of the *Bunjil* moiety include the *Burrumbeet balug* (Lakes Burrumbeet and Learmonth), *Keyeet balug* (Mount Buninyong), *Marpeang balug* (Blackwood, Myrniong, Bacchus Marsh), *Moijerre balug* (Mount Emu Creek), *Peerickelmoon balug* (near Mount Misery), *Wadawurrung balug* (Barrabool Hills), and the *Wongerrer balug* (head of Woady Yallock Creek).

Clans of unknown moiety association include the *Barere barere balug* (Colac and Mount Bute stations), *Borogundidj* (Yarrowee River), *Carringum balug* (Carngham), *Corrac balug* (Commeralghip station and Kuruc-a-ruc Creek), *Gerarlture* (west of Lake Modewarre), *Neerer balug* (between Geelong and the You Yangs), *Pakeheneek balug* (Mount Widderin), *Woodealloke gundidj* (Wardy Yallock River, south of Kuruc-a-ruc Creek), *Worinyaloke balug* (west side of Little River), and the *Yaawangi* (You Yang Hills).

The clan which would have historically been responsible for the activity area was the *Wadawurrung balug*. This clan was of the *Bunjil* Moiety and is one of the best-known of the *Wadawurrung* clans, due to their close location to the settlement at Geelong.

Nowadays, descendants of a *Wadawurrung* woman named 'Queen Mary' and her son John Robinson (*aka* Robertson) are identified as members of the Wathaurung Aboriginal Corporation (the Wathaurung).

Resources

The mainstays of the Aboriginal diet were plants and roots. One of the most important foods was called Murnong (*Microseris lanceolata*), a tuber that resembled a dandelion, also known as Yam Daisy or Native Dandelion. Other roots that were also cooked by boiling them in hot water include potatoes (Milkmaids: *Burchardia umbellata*), tarook (Blushing bindweed) and puewon (Bulbine lily). In a similar fashion to other Kulin clans, especially the *Wurundjeri*, the *Wadawurrung* used sharp sticks *(karni)* to dig roots out, separate bulbs and aerated the soil. Other commonly utilised plants and fruits included watercress (Boyungkaal: Nasturtium officinal**)**, Warrigal Cabbage (New Zealand Spinach, Captain Cook's Lettuce: *Terragonia tetragoniodes*) and native raspberry (*Rubus parvifolius*), all of which can be eaten either fresh or used as a flavour enhancer. Other plants consumed all over Australia were also utilised by the *Wadawurrung*, including aquatic plants such as the water ribbons (*Triglochin procera*) (Gott and Conran 1991: 9).

The coastal and riverine *Wadawurrung* clans had access to a wide variety of fish, including mullet, whiting, flounder, flathead, salmon, trevally, tommy-rough and many other species were speared and netted, particularly along tidal flats and in estuaries. Shellfish and seafood were also exploited including abalone (*Haliotis* sp.), turbot (gastropod) and pipi shell (*Paphies australis*). Finally, all mammals present were probably target species for hunting. Birds and eggs were also taken, along with lizards and insects.

When the *Wadawurrung* were migrating to the north where there are fewer freshwater streams, women used to collect water from freshwater wells. These wells are natural depressions on rocks, of which there are still some in use, one located near the Werribee River (about a mile from its mouth), and one more located on Big Rock in the You Yangs (Presland 2010: 62-63).

Presumably the *Wadawurrung* along with the *Girai wurrung* clans gathered at Lake Bolac with local *Djab wurrung* clans in early Autumn to take advantage of the annual migratory season of eels (*Anguilla australis*) (Clark 1990: 276).

Conflict

It has been reported that during the 1830s the *Wadawurrung*, particularly the *Wadawurrung balug*, were 'at enmity' with both the *Dgargurd wurrung* and the *Gulidjan* clans as a result of disputes related to marriage arrangements (Robinson journal 7.04.1840, in Clark 1990:275). This 'war' was the result of *Djargurd wurrung* and *Wadawurrung* men competing for *Gulidjan* women. During the early years of the Buntingdale mission, it was reported that the *Wadawurrung* and the *Djargurd wurrung* clashed several times as they competed for superiority within the mission (Clark 1990: 275).

Shortly after the first contact with the Europeans, the clan populations diminished rapidly. Contact between the *Wadawurrung* and European people first occurred in 1802, when Matthew Flinders and his party made their way to the nearby You Yangs. By 1803 contact between European explorers and *Wadawurrung* people had turned violent on at least one occasion, whereby one or two *Wadawurrung* were killed and several others were injured (Clark 1990: 277). Violent encounters between Aboriginal people and settlers continued through the late 1830s and early 1840s. By 1841 some of the clans had rapidly declined and by 1849 one report estimated that the number of Aborigines in the Geelong region had been reduced to 25% of their 1836 population. Restricted access to resources, disease, inter-tribe hostility and European extermination were cited as the main causes (Clark 1990: 308).

Religion

The basic unit of *Wadawurrung* social organisation was the clan, a group based on kinship through the male line with a shared religious identity (Barwick 1984: 105-6). The clan was a land-owning unit whose territory was defined by ritual responsibilities (Barwick 1984: 106). The common spiritual identities resulted in the larger tribal groups also being intimately interconnected. The basis of the *Wadawurrung* religious identity is totemism, which is likened to the Dreamtime – the time of creation when the ancestral being roamed the land, creating people and naming the animals and plants.

Wadawurrung society is divided into two groups, called moieties, each with specific Totemic Beings belonging to it. Every person belongs to one or the other moiety (*Bunjil* the eaglehawk or *Waa* the crow)

(Barwick 1984: 105-6). Clan moiety in *Wadawurrung* society is patrilineal. For the members of this unit, the clan, the totem is a symbol of membership of the unit. It is recognised for the members of this clan and those of other clans. This totem has strong territorial and mythological ties associated with it, and it is believed that it can warn them of approaching danger.

Ritual and Magic

The *Wadawurrung* beliefs system is shared with the other Kulin clans; however, the ethnographic information regarding the *Wadawurrung* is scarce. All Kulin groups believe in black magic and the curative powers of medicine-men or witchdoctors. A peculiar practice by the *Wadawurrung* was to put the rough cones of the She-oak (*Casuarina quadrivalvis*) into a man's fire, so that the smoke might blow into his eyes and blind him (Howitt 2001: 366).

In terms of disposal of the dead, the *Wadawurrung* from the Barrabool Hills (the Wathawurrung balug) and those from around Port Phillip practiced the inhumation of their dead as a symbol of respect. This practice is in sharp contrast to that of neighbouring clans from the *Woi wurrung* (such as the *Gunung willam balug*) who practice cremation (Howitt 2001: 458). Different disposal practices are one of the cultural differences between the *Wadawurrung* and their neighbours that set them apart, as mentioned earlier (Clark 1990: 276-277).

However, being part of the larger Kulin sub-group, the *Wadawurrung* share some ritual practices, included cannibalism. Cannibalistic practices have been documented, including the ceremonial consumption of human flesh and/or blood, not only from enemies, but also from relatives. The connotations of these two practices are different, with the former being more a sign of revenge, and the latter mostly ceremonial. In 1837 some members of the *Wadawurrung* killed an old man and a child and brought with them on the ends of their spears portions of their flesh, which they ate with great exultation (Howitt 2001: 752).

European Settlement

From the 1830s, European settlement of the coast, as well as settlement of the inland by explorers and overlanders from NSW, resulted in Aboriginal people experiencing displacement from their lands and massive changes in their way of life. The encroachment onto Aboriginal land by pastoralists resulted in numerous conflicts, reduction in the availability of food resources and the introduction of new diseases. Despite the upheavals, Aboriginal people tried to maintain some of their traditions, with some ceremonies such as initiations and occasionally corroborees observed by settlers. In many places Aboriginal people became part of the new colonial life, finding work as shepherds, stockriders, shearers, bark cutters and domestic servants.

By the 1850s the *Wadawurrung* had suffered a massive decrease in numbers (Clark 1990: 298). Between 1837 and 1852 the *Wadawurrung balug* population went from 300 people to nine women, seven men and one child as the result of disease and conflict. Many of the clans were also driven away from the heavily settled areas of Geelong and Melbourne to the north and west. Widespread conflict led to a system of official protectorates (1835-1849), reserves and rations depots aimed at providing protection and supplies to displaced Aboriginal people. In 1839 the Aboriginal Protectorate Scheme was introduced in Victoria. Four Assistant Protectors were appointed under a Chief Protector, George Augustus Robinson. The role of the protectorates was to provide food, shelter and medical supplies, record cultural and population information and to indoctrinate Aboriginal peoples in to the western European cultural and economic systems. Aboriginal reserves and stations were established across Victoria and Aboriginal peoples were encouraged to move to them (Clark 1990: 311-329). *Wadawurrung* clans moved to the reserves and stations set up at Wesleyan Mission Station and Buntingdale Station (Clark 1990: 293). The Protectorate was largely unsuccessful and was disbanded in 1849.

The Central Board for the Protection of the Aborigines was founded in 1860 to provide an administrative structure to manage Aboriginal people in Victoria. This involved local reserves and local guardians who operated Honorary Correspondent Depots, distributing food and clothing to local Aboriginal people (Clark 1990: 301). By the end of 1861 three reserves were established for the *Wadawurrung*; Steiglitz, Karngun, and Mt. Duneed (Clark 1990: 300). In addition a rations station was established at Stockyard Hill in 1860, which operated until 1874. Between 1901 and 1906, all three reserves were handed back to the Department of Lands as they were no longer required due to the decrease in Aboriginal population (Clark 1990: 307).

While many Aboriginal people lived on the missions and government stations, a significant number of people worked and lived on farms and pastoral stations. Some Aboriginal people farmed the land on smallholdings, or worked in industries such as fishing, goldmining and logging. People outside the reserves sometimes gathered together in camp sites on the outskirts of towns. They were also involved in sports such as cricket, football and athletics.

Today the descendants of the *Wadawurrung* are represented by the RAP for the activity area, the Wathaurung Aboriginal Corporation.

3.1.1 Register Searches

A search of the Victorian Aboriginal Heritage Register (VAHR) was conducted on 2 December 2015 for sites within the geographic region. Searching an area with this extent ensured that a relevant and representative sample of information was obtained.

The search identified a total of 28 registered Aboriginal sites within the geographic region (Table 3), comprising a total of 29 components (one site comprises two components). No registered Aboriginal archaeological sites are located within the activity area (Table 3; Map 2).

Table 3 shows that isolated stone artefacts or stone artefact scatters of low or higher density account for the majority of site component types in the search area (72%), followed by shell midden sites (21%). It should also be noted that the proportion of isolated finds and artefact scatters is roughly equal, although there are slightly more stone artefact scatters present. It should be noted that the proportion of stone artefact sites to shell midden sites is highly influenced by geography, with shell middens being found exclusively in close association with the coast and stone artefact scatters generally found in the areas farther from the coastline.

A summary of the Aboriginal archaeological site component types appears in Table 3 and a list of all sites in the search area is shown in Table 1.

Table 1: Summary of Previously Identified Aboriginal Site Component Types within the Geographic Region

Site Component Type	Quantity	Percentage (%)
Artefact Scatter	19	65
Low Density Artefact Distribution	2	7
Object Collection	2	7
Shell Midden	6	21
Total	**29**	**100**

3.1.1.1 Local Council

The study area is located within the City of Greater Geelong and is governed by the Greater Geelong Planning Scheme. Planning schemes set out policies and provisions for the use, development and protection of land.

The Heritage Overlay of the Greater Geelong Planning Scheme was examined. No Aboriginal heritage places listed on the Heritage Overlay are present within the study area.

3.1.2 Previous Aboriginal Archaeological Investigations

Localised and regional archaeological investigations have established the general character of Aboriginal sites located within the same geographic region as the activity area. This information, together with an environmental context, histories of land use and, historical and ethnohistorical sources, can be used to form the basis for a site prediction statement.

Below are summarised the most relevant localised archaeological investigations carried out in the region.

- **Cekalovic (2002)** completed an archaeological survey of land adjacent to Cowies Creek. The site prediction model concluded that Aboriginal archaeological sites will be located in moderate to high densities in close proximity to the coast and freshwater sources, particularly where freshwater creeks meet the sea. Two Aboriginal archaeological sites were identified during the survey: an isolated stone artefact and an artefact scatter (site numbers not provided).
- **Marshall (2002)** completed a subsurface testing program on land at Bell Park, where a grass fire had exposed an artefact scatter comprising approximately 100 stone artefacts (VAHR 7721-0506). A total of five additional artefacts were found during the test excavations. The stone artefacts were mostly confined to the ground surface, which suggests that the property had not been ploughed in the past.
- **Weaver (2002)** completed an archaeological survey of vacant land in Bell Park for an industrial estate. One Aboriginal site was identified during the survey. The artefact scatter (VAHR 7721-0507) covers an area of 75 m x 22 m and comprises 29 stone artefacts. The site is located approximately 1 km away from the nearest water source.
- **TerraCulture (2004)** completed an archaeological investigation along the proposed Geelong Bypass (Corio interchange to Midland Highway). The study area crosses Cowies Creek at one point, and ends at the Midland Highway in Batesford, opposite a large gully that represents a channel of the

Moorabool River. A total of 15 Aboriginal sites were identified during the survey (VAHR 7721-0577, 0579 to 0592). None of the sites were considered to have been found in situ.

- **Cekalovic and Muir (2004)** completed an archaeological investigation of land that was formerly part of the Ford Geelong manufacturing complex, in North Geelong. During the survey two Aboriginal archaeological sites were identified: one isolated stone artefact (VAHR 7721-0540) and an artefact scatter (VAHR 7721-0541). Both sites were found in areas that had been previously disturbed.
- **Chandler and Feldman (2009)** completed a complex CHMP for the proposed installation of a recycled water treatment plant in North Geelong. The complex assessment identified a total of three sub-surface stone artefacts (VAHR 7721-0969 to 0971). The artefacts were comprised of quartz, silcrete and quartzite material. All of the stone artefacts were flakes. The artefacts were identified within a range of 0-150 mm depth within flat and gently sloping land within the activity area. The three artefacts were spaced approximately 500-700 m from each other.
- **Clark and Kiddell (2010)** completed a desktop CHMP for the Cowies Creek sewerage pump station in North Geelong. The desktop assessment revealed that no known Aboriginal cultural heritage places are located within the activity area. The closest known heritage place (VAHR 7721-0540) is 140 m south-east of the activity area and will not be affected by the activity The land use history shows that Cowies Creek has undergone changes to its natural course since European settlement. Fill has been deposited on top of an excavated surface within the study area. Extensive geotechnical and environmental subsurface testing was conducted, and the depth and nature of the fill layer confirmed. Although it remains a possibility that there could be unidentified cultural heritage material beneath the imported fill layer, the assessment determined that the possibility is remote.
- **Kaskadanis and Reid (2010)** completed a complex CHMP for a track duplication project between North Geelong and Gheringhap. During the survey four isolated stone artefacts (VAHR 7721-0978 Cowies Creek 4, VAHR 7721-0979 Cowies Creek 5, VAHR 7721-0980 Cowies Creek 6and VAHR 7721-0981 Cowies Creek 7) were detected on the exposed ground adjacent to Cowies Creek and two medium- to-high density stone artefact scatters (VAHR 7721-0982 Moorabool River 7 and VAHR 7721- 0983 Moorabool River 8) were recorded. The presence of these Aboriginal places is an indicator of archaeologically sensitive landforms that may contain subsurface Aboriginal cultural heritage. These landforms include: The western outcropping escarpment overlooking the Moorabool River Valley and the existing access track which dissects approximately 2km of the modified lower slopes and terraces adjacent to the meandering Cowies Creek.

  Additional subsurface artefacts were identified. The assemblage contains a relatively high proportion of silcrete, indicating that this material was commonly utilised and possibly imported into the area from sources elsewhere. It may also indicate that silcrete was available from a nearby source or sources; however, the availability of silcrete is not well documented for the area and the location of local quarries has yet to be determined. Artefacts on average were relatively small in size. This supports a final stage reduction sequence; and, the number of artefacts with cortical surfaces was very low, supporting an early stage reduction sequence (larger flakes with cortex were either transported off-site, or, re-sharpened on-site).

- **MacCulloch (2012)** prepared a CHMP (#11980) for a residential subdivision and includes a section of Cowies Creek. One Aboriginal place, Cowies Creek 4 (VAHR 7721-0978), had previously been recorded within the activity area. The standard assessment led to the identification of 181 surface artefacts located across four landforms. These were recorded as Cowies Creek 8 (VAHR 7721-1210) and Cowies Creek 10 (VAHR 7721-1211). Clusters of artefacts within VAHR 7721-0211 were recorded as separate components. During the complex assessment one new artefact scatter was identified; Cowies Creek 9 (VAHR 7721-1199). Previously recorded Cowies Creek 4 (VAHR 7721-0978) was not re-identified during the assessment. All four Aboriginal places were assessed as having low archaeological significance due to disturbance by ploughing.
- **Orr (2012)** completed a complex CHMP for a retail development in Norlane. The desktop assessment indicated that a number of archaeological studies had been undertaken within the geographic region (Cowies Creek). Site types found within the geographic region are predominantly stone artefact scatters in proximity to the creek, with a shell midden also present in proximity to the bay. A predictive model was put forward which noted the high archaeological sensitivity of the local area while also acknowledging the high level of prior ground disturbance within the activity area. One area of archaeological potential was identified during the survey. One Aboriginal place was identified during the assessment: VAHR 7721-1224 consists of two stone artefacts recovered from a subsurface context within introduced soil.
- **Bullers (2016)** completed a standard CHMP for extensions to an existing barley malting plat on the southern side of Corio Quay, approximately 2 km south west of the study area. The assessment identified extensive ground disturbance across the activity area as a result of early industrial development for a fertilizer manufacturing facility, followed by topsoil removal as part of soil contamination remediation following demolition of the plant, and finally from construction of the current barley mating plat. No Aboriginal Places or areas of archaeological potential were identified.

3.2 Historical Cultural Heritage

3.2.1 Land Use History of the Study Area

The history of European exploration and occupation of the region dates from the beginning of the 19th century, although prior 1835, when Victoria was formally settled, European exploration or occupation in the area was sparse. In 1835 John Batman explored the region for the Port Phillip Association (PPA) from Tasmania. After exploring parts of the Bellarine Peninsula they sailed across Corio Bay and landed at the mouth of Hovells Creek. Batman's party was followed soon after by John Helder Wedge, a PPA surveyor, who declared it suitable for sheep and cattle grazing (Brownhill 1955). Batmans and Wedge's glowing accounts of the area encouraged formal settlement of Victoria in 1835, and the PPA to take up land within the region. Large numbers of sheep were shipped from Van Diemen's Land to the extensive grazing lands around Port Phillip. Pastoral squatters soon arrived in the region forming large sheep and cattle pastoral runs, these runs dominated the region through the 1850s (Pescott 1985: 28).

Following Batman's Treaty in 1835 European graziers settled the area and Geelong was established in 1836. In 1837 Governor Bourke 'instructed the Surveyor General of New South Wales to lay out the township of

Geelong, between the Barwon River and Corio Bay By the following year, sheep stations had been established within a 40 km radius of the town (Clark 1990: 291). The town of Geelong officially came into existence on 26 October 1838, though the first sale of town lots was not held until February 1839. Large parcels of land were purchased from the Crown from 1840 onwards (Broome 1984; Bonwick 1983).

John Cowie and David Stead were among the first Europeans to permanently settle Geelong. They landed their sheep in 1836 and camped on a flat adjacent to the Moorabool River, west of Bell Post Hill. They occupied the Bungeeltap Run, which had an area of approximately 30,000 acres. The run was first gazetted on 23 February 1849, and in May 1850, was subdivided into Bungeeltap East and West (Wynd 1981: 18; Spreadborough and Anderson 1983: 90). By 1847 Cowies Creek had been surveyed and divided into allotments, and the first land sales had occurred. The creek had been named after John Cowie (Wynd 1981: 175).

The opening of the Ford factory brought employment to the area, but was only one of several major industries that established themselves near Corio Bay in the North Geelong area during the 1920s including Cresco Fertilizers Ltd and the Corio Distillery (Wynd 1981: 104). Along with the jobs supplied by the Ford plant came the need for housing.

The parish plan from the 1850s for this part of the coastline was not available at the time of writing, but a map of the Melbourne to Geelong railway from the 1870s shows the coastline prior to its modification for port structures (Figure 3). The plan does not show any subdivision in this part of the coastline at that time.

The 1953 Moorpanyal Parish Map (Figure 4) shows the same basic subdivision layout as shown in the 1854 parish map, with the study area being partially within Lots 238 and 245-247. Landowners are not shown in the earlier map, but the 1953 map shows that the original landowners were William Bryan (Lot 238 of 4 acres), James Cowie (Lot 245 of 6 acres) and William Timms (Lots 246 and 247 of 7 acres each). The map also shows the original alignment of the coastline and The Esplanade, which traversed the current study area from south east to north west (cf. Figure 2).

Industry had been developed around the Cowies Creek headlands (Corio Quay) fairly early in its history since European settlement. In the century between 1838 and 1938, Geelong's population increased from 360 to 52,408. Geelong and its hinterland produced many resources for both internal use and export; this included a range of natural resources and essential commodities including limestone, basalt and seawater. Industries developed around those commodities and the products were catered for by the port facilities in Corio Bay. The Geelong port and waterfront changed to meet the needs for production and export. Major development of the waterfront occurred between 1910 and 1928, with the establishment of the Corio Freezing Works, Cresco Fertilizer, Ford and Phosphate Cooperative, and the construction of the Corio Quay berths (Stirrat, n.d.).

In 1925 the Pivot phosphate works were established on land immediately south of the current study area (see Figure 2). During the 1920s there were several land subdivisions in the North Shore area. One of them was 'Fordtown', no doubt trying to cash in on the coming of the Ford works, and the name was well enough accepted to appear on a 1923 Army Survey map. A small residential area gradually developed between the International Harvester plant and the Pivot works.

Figure 3: Map of the Geelong-Melbourne Railway dated 1870s showing the subdivision and approximate location of study area (Source: SLV vc099974-001)

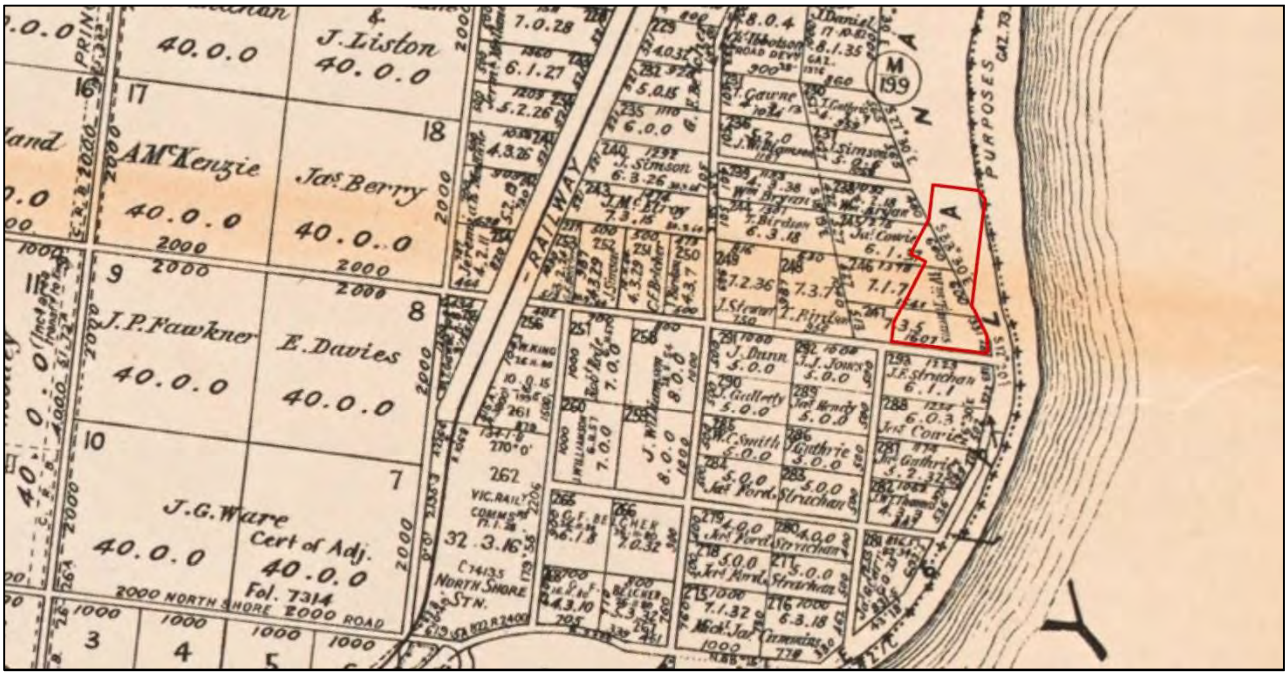

Figure 4: Moorpanyal Parish Plan dated 1953 showing the georeferenced activity area (Source: SLV dq200479)

In the post-war years the Shell Oil refinery began production in 1956 at the northern end of North Shore. Other industries established at that time included Coca Cola Bottlers, Pilkington Glass and the Rylands (later BHP Steel) processing mill.

3.2.2 Register Searches

Victorian Heritage Register

The Victorian Heritage Register (VHR), established by the Victorian *Heritage Act 1995*, provides the highest level of statutory protection for historical sites in Victoria. Only the State's most significant historical sites are listed on the VHR. A search of the VHR for information relating to the study area was undertaken. The study area and the surrounding 2 km of land were investigated.

No heritage places were listed in the VHR within a 2 km radius of the study area (Table 2).

Victorian Heritage Inventory

The Victorian Heritage Inventory (VHI), established by the Victorian *Heritage Act 1995*, provides the statutory protection for all historical archaeological sites, areas or relics, and private collections of relics, in Victoria. Sites listed on the VHI are not of State significance but are usually of regional or local significance. A search of the VHI for information relating to the study area was undertaken. The study area and the surrounding 2 km of land were investigated.

A total of nine historical places were listed on the VHI within 2 km. Details of these sites can be found in Table 2. None of these heritage places were located within the study area, although Kings Wharf and Lascelles Wharf are located directly adjacent to the study area. Of these places, five have been 'delisted'.

Local Council Heritage Overlay

The study area is located within the City of Greater Geelong and is governed by the Greater Geelong Planning Scheme (PS). Planning schemes set out policies and provisions for the use, development and protection of land. The Heritage Overlay of the Greater Geelong Planning Scheme was examined.

One heritage place was identified in the PS within a 2 km radius of the study area. Details of these sites can be found in Table 2. This heritage place is not located within the study area.

National Trust of Australia (Victoria) Register

The National Trust of Australia (Victoria) is an independent, not-for-profit organisation that classifies a number of heritage places. Listing by the National Trust does not impose any statutory protection, however often National Trust Register listings are supported by the local council Planning Scheme.

No heritage places were listed in the National Trust Register within a 2 km radius of the study area (Table 2).

Victorian War Heritage Inventory

The Victorian War Heritage Inventory (VWHI) was established in 2011 as a means to catalogue Victoria's war history such as war memorials, avenues of honour, memorial buildings, former defence sites and places of commemoration. Places listed on the VWHI do not currently have discrete statutory protection, however many are concurrently listed on the VHR, VHI, or local planning schemes.

No heritage places were listed in the VWHI within a 2 km radius of the study area (Table 2).

National, Commonwealth and International Heritage Lists

The Australian Government Department of the Environment (DoE) maintains the National Heritage List (NHL), a register of exceptional natural, Aboriginal and historical heritage places which contribute to Australia's national identity. The DoE also maintains the Commonwealth Heritage List (CHL), a Register of natural, Aboriginal or historical heritage places located on Commonwealth land which have Commonwealth heritage values.

A place can be listed on one or both lists, and placement on either list gives the place statutory protection under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

The World Heritage List (WHL) lists cultural and natural heritage places which are considered by the World Heritage Council to have outstanding universal value. In addition, the DoE also maintains the Register of the National Estate (RNE) which is a list of natural, Indigenous and historic heritage places throughout Australia. Following amendments to the *Australian Heritage Council Act 2003*, the RNE was frozen on 19 February 2007 and no new places were added or removed. In February 2012 the RNE ceased statutory operation and sites listed on the RNE no longer have statutory protection, however items listed on the RNE may continue to be considered during approvals processes.

Listings on the NHL, CHL, WHL and RNE are accessed via the Australian Heritage Database (AHD), managed by DoE.

No heritage places were listed in the AHD within a 2 km radius of the study area (Table 2).

Table 2: Historic Heritage Places within 2 km of the Study Area.

Register & Site Number	Site Name	Site Type	Within Study Area?
H7721-0132	Kings Wharf	Maritime: Wharf	No, but adjacent
H7721-0133	Lascelles Wharf	Maritime: Wharf	No, but adjacent
H7721-0134	Land Boom Jetty/ Pivot Pier	Maritime: Jetty	No
D7721-0135	Corio Channel Marker Dolphins		No
D7721-0136	Moorpanyal Park Vernacular Fishing Platforms		No
D7721-0137	Moorpanyal Park Shell Midden		No
D7721-0139	Moorpanyal Park Bluestone Drain Outlet Disperser	Municipal/Utility	No
H7721-0140	North Shore Baths	Municipal	No
D7721-0425	North Shore Seaplane Base	Aviation/Military	No
HO1728	Former Corio Distillery complex (Cheetham Pty Ltd) including former workers houses	Built Heritage: Industry	No

3.2.3 Previous Disturbance

The study area was formerly the site of a BHP (One Steel) wire milling plant, associated with the existing facility to the west of the study area. A range of disturbances are evident from a review of historical data, aerial images, and available geotechnical and anecdotal information.

Former Buildings and Plant

The study area contains the (demolished) footprint of the former milling plant, which covers the majority of the south western sector of the study area (Map 1). Another smaller building is located on the northern side of the diagonal road (former Esplanade).

Roads and Carparks

Closely associated with the plant buildings, is a complex of internal roads that skirt around all four sides of the former plant; the road on the eastern side also appears to contain a car park. A diagonally oriented road on the northern side of the mill is the former alignment of The Esplanade, which dates back to the 1854 subdivision of the area.

Land Reclamation

Historical mapping and photographs that the land on the northern side of the diagonal road was once the original coastline with much of the current land occurring in the subtidal zone (see Figure 2). This part of the study area has been reclaimed and is unlikely to contain any Aboriginal or historical heritage material.

Former Residences

Prior to the construction of the former wire mill, the study area was generally rural farm land, although historical photographs (e.g. Figure 2) show that a small subdivision of houses once occupies the Walchs Road frontage within the study area. These dwellings have long since been demolished and were replaced with the wire mill.

Fill Material and Geotechnical Testing

A geotechnical investigation has been carried out in the study area (Coffey 2016). The geotechnical investigation involved the drilling of a series of 10 boreholes across the study area, designated BH01 to BH10 (Map 4). The boreholes were drilled to a depth of between 10 and 30 m below the existing ground surface using solid flight auger, wash boring and coring techniques (Coffey 2016: 3).

The stratigraphy identified during the testing showed that the deep soil profiles typically comprised a layer of clay and sand fill ranging in depth from 0.2 to 2.5 m in BH04 to BH10 and 2.8 to 6.1 m through BH01 to BH03, located in the north east section of the study area (Table 3). Beneath the fill a layer a thick layer of interbedded stiff to hard clays and sandstone bands belonging to the Moorabool Viaduct Sands geological formation occur to depths ranging between 17.4 and 18.7 m. In turn these overlay the predominantly firm to hard clay/sandy clay and medium-dense clayey sand of the Fyansford Clay formation to depths exceeding the test limit.

Table 3: Summary of Geotechnical Boreholes

BH No.	Easting	Northing	Fill Depth	Underlying soil Type
BH01	270275	5780830	6.1	Clay below (Moorabool Viaduct Formation)
BH02	270277	5780778	4.5	Clay below (Moorabool Viaduct Formation)
BH03	270199	5780802	2.8	Clay below (Moorabool Viaduct Formation)
BH04	270219	5780695	1.2	Clayey Sand below (300 mm) (Moorabool Viaduct Formation)
BH05	270180	5780673	1.5	Clay below (Moorabool Viaduct Formation)
BH06	270199	2780622	1.6	Clayey sand below (700 mm) (Moorabool Viaduct Formation)
BH07	270155	5780594	2.6	Could not penetrate deeper
BH07A	270129	5780548	0.2	Clay below (Moorabool Viaduct Formation)
BH08	270163	5780533	2.5	Clay below (Moorabool Viaduct Formation)
BH09	270214	5780559	0.7	Clay below (Moorabool Viaduct Formation)
BH10	270256	5780547	0.6	Clay below (Moorabool Viaduct Formation)

Boreholes BH01 to BH04 are located in the north east section of the study area and, with the exception of BH04, contain relatively deep layers of fill material consistent with land reclamation works seaward from the original coastline. The remaining boreholes have shallower levels of fill, but in all cases the fill overlays either the clays or clayey sands of the Moorabool Viaduct Sands formation, which was laid down during the Pliocene Epoch between approximately 2 and 5 million years before present. As such, the strata underlying the fill significantly pre-date human occupation periods.

These results suggest that the original topsoils have been stripped for previous construction and/or reclamation works and replaced with engineering quality fill to allow construction of the former mill. A map of the borehole locations is provided in Map 4.

4 FIELD ASSESSMENT RESULTS

A site visit and field inspection was carried out on 3 March 2016 by Rick Bullers (Senior Archaeologist/Heritage Advisor).

4.1 Landforms

The landform in the study is a uniformly flat coastal plain with little topographic variation (Plates 1 and 2). One raised mound feature is located in the south east corner of the study area (Plate 3). This feature is unusual for the region and is interpreted as an artificial mound possibly associated with landscaping works for the former mill. A review of historical photographs of the site does not show any natural mound features present (Figure 2).

Plate 1: Looking south towards the south eastern corner showing levelled ground

Plate 2: Northern end of the study area, looking east, showing the flat landforms

Plate 3: Looking south towards a vegetated artificial mound in the south eastern corner

4.2 Previous Ground Disturbance

A range of disturbances were noted during the field inspection. These relate almost entirely to the previous construction and subsequent demolition of the BHP Wire Mill site, which occupied the site until the late 1990s. These include:

As discussed in the desktop assessment, the study area is the former site of a BHP Wire Mill, which covered a large portion of the south western section of the study area.

- Evidence of disturbance associated with the Mill footprint includes:
  - The remnant footings of the mill itself including a deeply excavated central 'well' (measuring about 10 x 8 m) and offshoot underground passages (Plates 4 and 5), some of which are filled with rubble (Plate 6);
  - A large concrete structure of unknown use, measuring about 20 x s.5 m by 7 m high (Plate 7);
  - Cuttings along the southern edge of the study area up to 2 m below the level of the adjacent road and 0.5 m below the level of the adjacent land along the south western boundary (Plates 8 and 9);
  - Bitumenised access roads around the eastern, western and southern sides of the Mill footprint (Plates 10 to 12);
  - A bitumen entry road that runs from the middle of the eastern boundary up towards the north western boundary (Plate 13). This is the former alignment of The Esplanade;
  - A large carpark along the eastern side of the former Mill (Plate 11);
  - A large concrete apron area that fill s the land between the former mill, the diagonal road and the western boundary (Plate 14). This is a continuation of the existing One-Steel facility to the west;
- Evidence of landscaping works include:
  - Levelled surface on the eastern side of the former Mill footprint (Plate 1);
  - The presence of a large artificial mound in the south east corner of the study area which was not present in historical photographs – see Figure 2 (Plate 3);
  - The deep cut along the southern boundary to level the site for the Mill (Plates 8 and 9); and
  - A number of native trees are present around the carpark, along the eastern boundary and on the artificial mound. None of these were present in 1938 (Figure 2) and are clearly planted for landscaping or are regrowth from those planted individuals. According to the ecological report (Ecology and Heritage Partners 2016) the species are non-indigenous to the local area.

Plate 4: Raised slab on the eastern side of the former Mill buildings

Plate 5: Large, deep central 'well' with offshoot passages within the Mill building slab

Plate 6: Narrow underground 'passage', filled with rubble on the western side of the building slab

Plate 7: Large unknown rectangular concrete structure on the western side of the building slab

Plate 8: Southern end of the carpark road showing cutting below level of Walchs Road

Plate 9: Edge of access roads in south western corner approx. 0.5 m below level of surrounding land

Plate 10: Roads around the south eastern side of the former Mill, looking WNW

Plate 11: Road and carpark along the eastern side of the former Mill, looking north

Plate 12: Road between the Mill buildings and the western boundary

Plate 13: Diagonal road looking NW. This is the former alignment of The Esplanade. The former coastline is to the right of the image.

Plate 14: Large concrete apron on the NW side of the former Mill building, looking north

Plate 15: The site of an old monitoring well and the location of a recent geotechnical borehole, looking south towards the artificial mound in SE corner

4.3 Aboriginal Cultural Heritage

4.3.1 Aboriginal Places

No previously identified Aboriginal places are located in the study area. Although the identification of Aboriginal artefacts was not an objective of the site inspection, an opportunistic observation of ground surface exposures was made. No Aboriginal artefacts were identified.

4.3.2 Areas of Aboriginal Archaeological Potential

Due to the degree of disturbance in the study area, no areas of Aboriginal likelihood were identified. The *legislated* areas of cultural heritage sensitivity were assessed as having been subject to significant ground disturbance, based on the following:

- The presence of a large artificial mound in the south east corner of the study area, which would have required large amounts of soil to be mechanically pushed into position;
- The cut along the southern boundary (Walchs Road) up to 2 m deep below the level of the road done to level the site. This cut is not evident in historical photographs (c.f. Figure 2); and
- The entire northern end of the study area was, until the mid-20th century below the subtidal zone off the coast. This part of the study area comprises entirely reclaimed land.

These results are supported by the geotech results (Coffey 2016) which shows that the entire study area if covered by a layer of fill that directly overlays the clays and clayey sands of the Moorabool Viaduct Sands formation, which significantly pre-dates human occupation. It is likely that all original topsoils that may once have contained Aboriginal cultural heritage have been removed and replaced with fill material more suitable for construction of the former mill.

4.4 Historical Heritage

The site is the location of a former Wire Production Mill operated by BHP, which still runs the One Steel facility on the adjoining parcel to the west. The Mill post-dates the 1930s when aerial photographs show that the study area was still farmland and coastal/subtidal.

The remnants of the former mill are not considered to reach the thresholds for listing on the Victorian Heritage Inventory. Therefore, no significant historical heritage places or significant areas of historical archaeological likelihood were identified during the inspection.

4.5 Constraints

The study area identified for this project includes only the land specified in Section 1.2. However, it is understood that unloading facilities in the form of a conveyor from the wharf to the new site is being considered as part of the development. It should be noted that the entire land between the Wharf and The Esplanade is currently part of the curtilage registered for two VHI sites: H7721-0132 (Kings Wharf) H7721-0133 (Lascelles Wharf), see Map 3.

5 LEGISLATIVE AND POLICY IMPLICATIONS

5.1 Aboriginal Heritage Act 2006 (State)

The *Aboriginal Heritage Act 2006* protects Aboriginal heritage in Victoria. If certain high impact activities are undertaken as stated in the *Aboriginal Heritage Regulations 2007* (the Regulations) then preparation of an Aboriginal Cultural Heritage Management Plan (CHMP) may be required to be approved by the OAAV or the Registered Aboriginal Party (RAP) prior to lodging a planning permit.

Triggers for mandatory preparation of a CHMP include whether certain criteria are met under the Regulations, required by the Minister, or if the activity requires an Environmental Effects Statement (EES) under Sections 46 to 49 of the *Environmental Effects Act 1978*.

The Regulations require a mandatory CHMP if:

1. All or part of the proposed activity is a high impact activity; and
2. All or part of the activity area (study area) is an area of cultural heritage sensitivity (subject to whether the entire area of cultural heritage sensitivity has been subject to *significant ground disturbance*).

> 'Significant Ground Disturbance (SGD)' is defined in r.4 of the Regulations as meaning disturbance of – (a) the topsoil or surface rock layer of the ground; or (b) a waterway – by machinery in the course of grading, excavating, digging, dredging or deep ripping, but does not include ploughing other than deep ripping… The Victorian Civil and Administrative Tribunal (VCAT) has determined that the words "topsoil or surface rock layer" include the former topsoil or former surface rock layer if that topsoil or surface rock layer is a naturally occurring surface level that is readily ascertainable and does not include the current topsoil or current surface rock layer if established by the mere filling of the land (OAAV 2010: 2).

Implications for the project

The preliminary assessment indicates that under the *Aboriginal Heritage Regulations 2007* the proposed activity **is** considered to be a high impact activity. The specific high impact activity is:

- the construction of a building or the construction or carrying out of works for a specified use, namely 'an industry' (r. 43 [1][b][xii]).

The study area is **notionally** located within an area of cultural heritage sensitivity under the *Aboriginal Heritage Regulations 2007*. The specific area of cultural heritage sensitivity is:

- located within 200 m of the high water mark of the coastal waters of Victoria or any sea within the limits of Victoria (r.28).

However, the entire the study area (and therefore the entire legislated area of cultural heritage sensitivity) has been subject to significant ground disturbance under r.4 of the *Aboriginal Heritage Regulations 2007*, associated with the former industrial use of the site as a Wire Production Mill. It is also clear that the entire northern end of the site was, until the middle of the 20th century, win the sub-tidal zone, before land reclamation works were carried out. Due to the extensive disturbance, Aboriginal cultural heritage materials are unlikely to remain within the study area. Thus, it is the finding of this assessment that previous development of the study area is consistent with the definition of significant ground disturbance. As such the cultural sensitivity of the study area is voided and the following Regulation applies:

> Regulation 28(2):
>
> *If part of part of the land specified in subregulation (1)*[i.e. land within 200 m of the high water mark of the coastal waters of Victoria...] *has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.*

Given r. 28(2) applies to the study area, a mandatory Cultural Heritage Management Plan under the *Aboriginal Heritage Act 2006* is not required to issue a planning permit for the development.

5.2 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a national framework for the protection of heritage and the environment and the conservation of biodiversity. The EPBC Act is administered by the Australian Government Department of the Environment (DoE). The EPBC Act established the National Heritage List (NHL), the Commonwealth Heritage List (CHL) and the World Heritage List (WHL) for statutory protection of heritage places of national or international significance. Where Matters of National Environmental Significance (NES), including National Heritage Places, will or may be impacted by a development, then a referral to the Minister will be required to determine whether an approval under the EPBC Act is required.

DoE also administers the Register of the National Estate (RNE). The RNE is no longer a statutory register and listed sites are no longer protected (unless registered on another statutory register).

Implications for the project

There are no known Matters of NES within the study area (Map 3). It is considered unlikely that any cultural heritage sites of National Significance will be located it the study area. Therefore no referral or further works would be required under the EPBC Act 1999.

5.3 Planning and Environment Act 1987 (State)

All municipalities in Victoria are covered by land use planning controls which are prepared and administered by State and local government authorities. The legislation governing such controls is the *Planning and Environment Act 1987*. Places of significance to a locality can be listed on a local planning scheme and protected by a Heritage Overlay (or other overlay where appropriate). Places of Aboriginal cultural heritage significance are not often included on local government planning schemes. The study area is governed by the Greater Geelong Planning Scheme. In addition to the Heritage Overlay, Clause 52.37 of the Particular Provisions provides protection to post boxes constructed before 1930 and dry stone walls constructed prior to 1940 (if listed in the schedule).

Implications for the project

There are no heritage places or dry stone walls listed on the Greater Geelong Planning Scheme within the study area (Map 3). Therefore there are no implications for this project.

5.4 Heritage Act 1995 (State)

This Act protects all heritage places on the VHR and all non-Aboriginal archaeological sites older than 50 years. If a site is of State Significance it is listed on the VHR and a Permit from Heritage Victoria (HV) is required to disturb it. If an archaeological site is not of State significance it is usually listed on the VHI and Consent from Heritage Victoria would be required to disturb it.

Implications for the project

There are no historical places listed on the Victorian Heritage Register and Victorian Heritage Inventory within the study area (Map 3), it is considered unlikely that heritage sites that are of significance and warrant protection are located within the study area. This conclusion is based on the historical evidence that shows the former Mill only dates from the mid-20th century. The site inspection did not find any potential areas of historical archaeological significance. Therefore, no further historical heritage investigation is required.

However, it should be noted that two heritage (archaeological) places are located immediately to the east of the study area. The curtilages for these places take up the whole land between The Esplanade and the wharves. If any construction works associated with the proposed development impact upon these curtilages, a Consent from Heritage Victoria may be required.

6 CONCLUSION

The following conclusions are made regarding the likely presence of Aboriginal and/or historical heritage within the study area.

6.1 Aboriginal Cultural Heritage

With regard to Aboriginal archaeological heritage, the preliminary assessment indicates that the proposed activity is considered a high impact activity (an 'industry') and is located within a mapped area of cultural heritage sensitivity (i.e. located within 200 m of the high water mark of the coastal waters of Victoria or any sea within the limits of Victoria). However, the entire study area has been subject to significant ground disturbance under r.4 of the *Aboriginal Heritage Regulations 2007*, associated with the former industrial use of the site as a Wire Production Mill. It is also clear that the entire northern end of the site was, until the middle of the 20th century, within the sub-tidal zone, before land reclamation works were carried out. Due to the extensive disturbance, Aboriginal cultural heritage materials are unlikely to remain within the study area. Thus, it is the finding of this assessment that previous development of the study area is consistent with the definition of significant ground disturbance. As such the cultural sensitivity of the study area is voided and the following Regulation applies:

> Regulation 28(2):
>
> *If part of part of the land specified in subregulation (1)*[i.e. land within 200 m of the high water mark of the coastal waters of Victoria…] *has been subject to significant ground disturbance, that part is not an area of cultural heritage sensitivity.*

Given r. 28(2) applies to the study area, a mandatory Cultural Heritage Management Plan under the *Aboriginal Heritage Act 2006* is not required to issue a planning permit for the development.

6.2 Historical Heritage

With regard to historical archaeological heritage, this assessment concludes that although the archaeological remains of the former BHP Wire Mill is present on site, those remains are not considered to meet the thresholds for registration on the Victorian Heritage Inventory. Furthermore, there is no evidence to suggest that significant historical archaeological heritage is likely to be present within the study area and therefore no further historical archaeological investigations are warranted.

However, if any construction works associated with the proposed development impact upon the curtilages of the VHI sites east of The Esplanade, it is recommended that Heritage Victoria be contacted to determine whether a Consent under the *Heritage Act 1995* is required.

MAPS

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Map 1
Location of the Study Area
Preliminary Cultural Heritage Study for Proposed Works for Boral Cement, Lascelles Wharf North Shore, Geelong

Legend

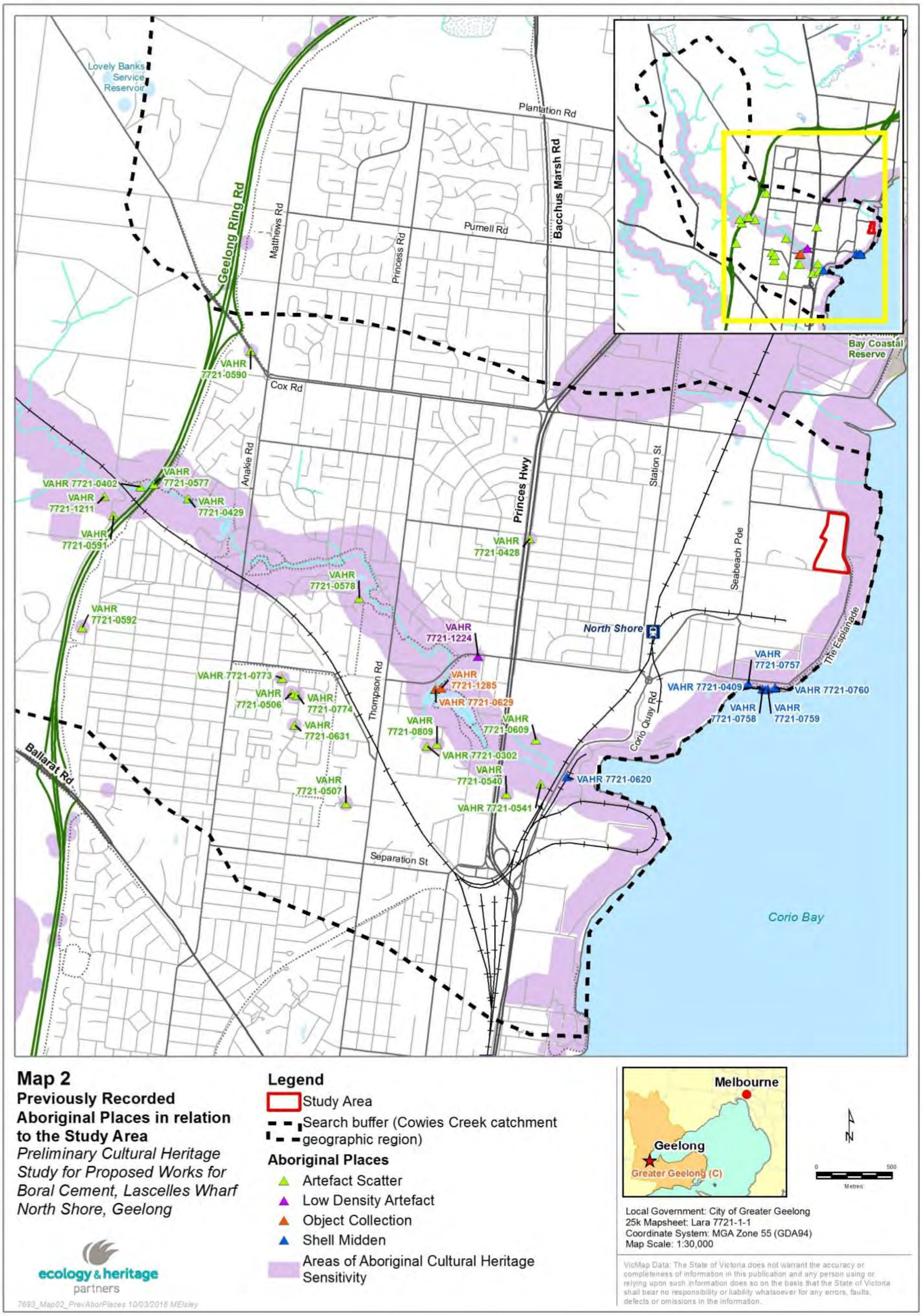
- Study Area
- Collector Road
- Minor Road
- Minor Watercourse
- Permanent Waterbody

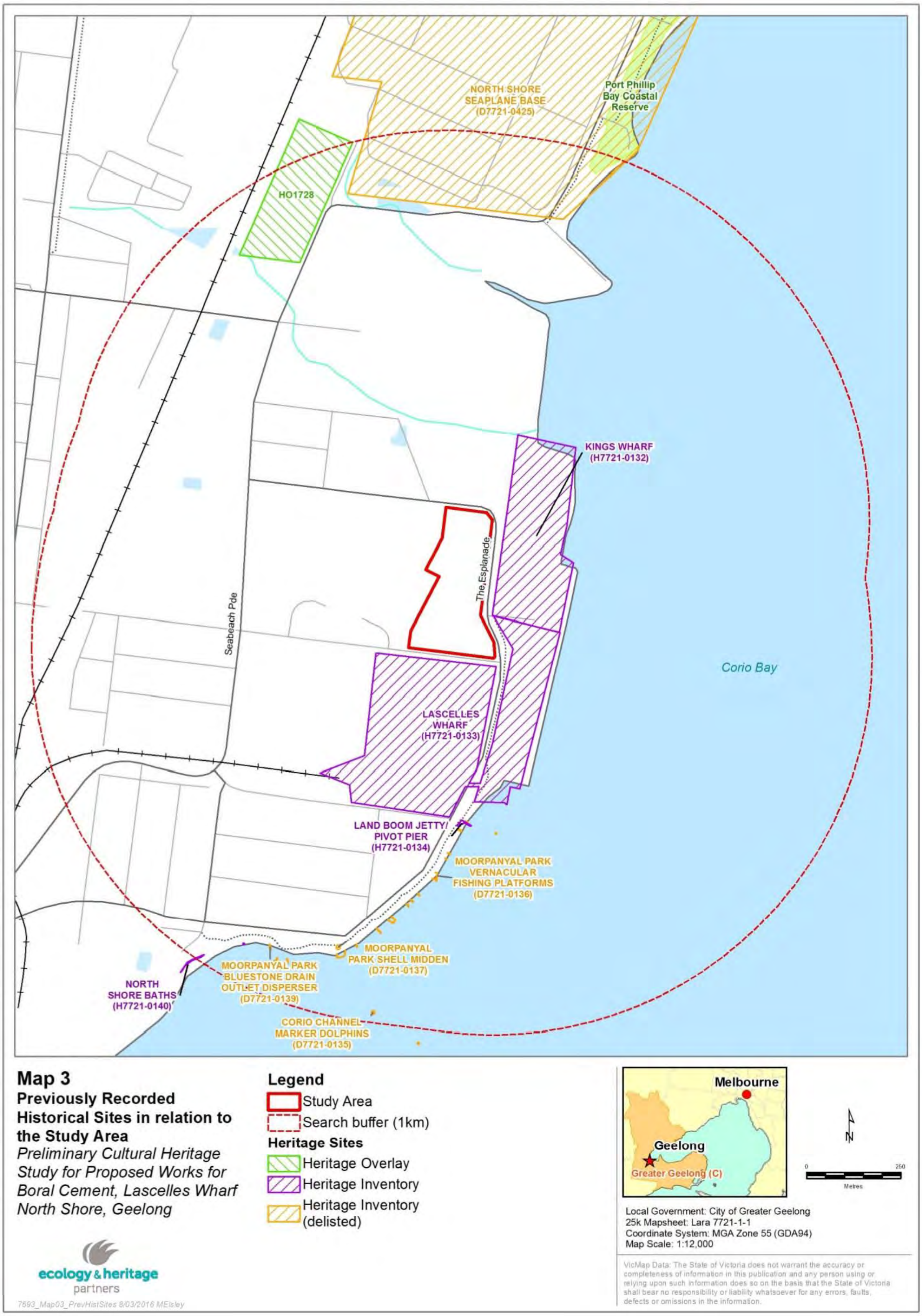
0 100
Metres

Local Government: City of Greater Geelong
25k Mapsheet: Lara 7721-1-1
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:4,000

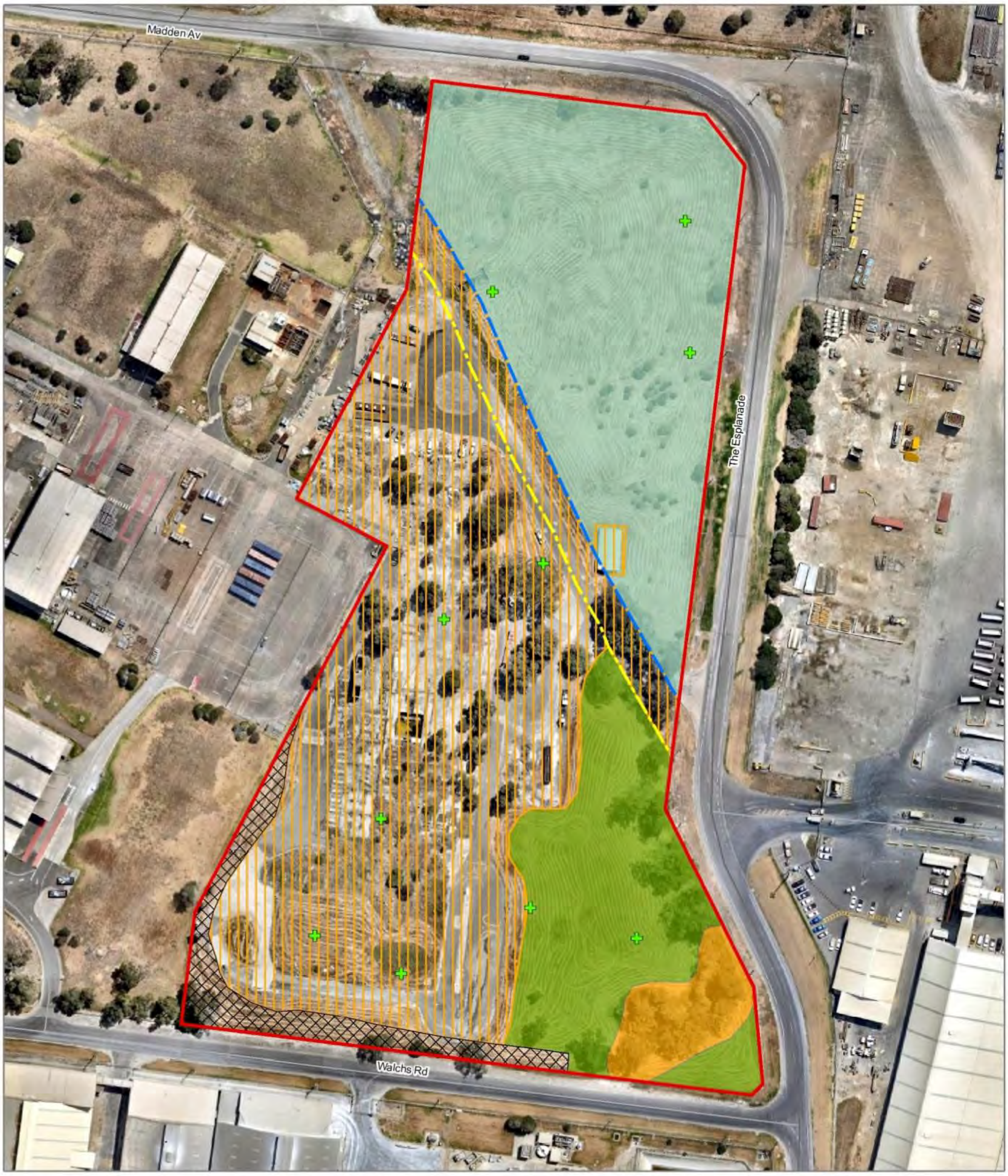
ecology & heritage partners

7693_Map01_StudyArea 8/03/2016 MElsley


Lovely Banks Service Reservoir
Plantation Rd
Geelong Ring Rd
Matthews Rd
Princess Rd
Bacchus Marsh Rd
Purnell Rd
Cox Rd
Anakie Rd
Princes Hwy
Station St
Seabeach Pde
North Shore
Thompson Rd
Corio Quay Rd
The Esplanade
Ballarat Rd
Separation St
Bay Coastal Reserve
Corio Bay
VAHR 7721-0590
VAHR 7721-0402
VAHR 7721-0577
VAHR 7721-1211
VAHR 7721-0429
VAHR 7721-0591
VAHR 7721-0428
VAHR 7721-0578
VAHR 7721-0592
VAHR 7721-1224
VAHR 7721-0773
VAHR 7721-0506
VAHR 7721-0774
VAHR 7721-0631
VAHR 7721-1285
VAHR 7721-0629
VAHR 7721-0809
VAHR 7721-0609
VAHR 7721-0302
VAHR 7721-0540
VAHR 7721-0541
VAHR 7721-0507
VAHR 7721-0620
VAHR 7721-0757
VAHR 7721-0409
VAHR 7721-0760
VAHR 7721-0758
VAHR 7721-0759
Map 2
Previously Recorded Aboriginal Places in relation to the Study Area
Preliminary Cultural Heritage Study for Proposed Works for Boral Cement, Lascelles Wharf North Shore, Geelong
Legend
Study Area
Search buffer (Cowies Creek catchment geographic region)
Aboriginal Places
Artefact Scatter
Low Density Artefact
Object Collection
Shell Midden
Areas of Aboriginal Cultural Heritage Sensitivity
Melbourne
Geelong
Greater Geelong (C)
0 500
Metres
Local Government: City of Greater Geelong
25k Mapsheet: Lara 7721-1-1
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:30,000
VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.
ecology & heritage partners
7693_Map02_PrevAborPlaces 10/03/2016 MElsley



Map 3
Previously Recorded Historical Sites in relation to the Study Area
Preliminary Cultural Heritage Study for Proposed Works for Boral Cement, Lascelles Wharf North Shore, Geelong



Map 4
Inspection Results
Preliminary Cultural Heritage Study for Proposed Works for Boral Cement, Lascelles Wharf North Shore, Geelong

Legend

- Study
- Geotechnical Boreholes (Coffee 2016)
- Former alignment of The Esplanade
- Former coastline
- Extent of demolished infrastructure from Former Wire Mill
- Steep cutting around south edges of the Former Wire Mill footprint – up to 2 m deep
- Artificial mound
- Machine levelled landscape
- Reclaimed land

0 50
Metres

Local Government: City of Greater Geelong
25k Mapsheet: Lara 7721-1-1
Coordinate System: MGA Zone 55 (GDA94)
Map Scale: 1:2,000

APPENDICES

Appendix 1: Author Details

Rick Bullers

Rick has more than 18 years of natural and cultural resource management experience. Rick has specialised in archaeology and built heritage since 2004, and has worked as a heritage consultant since 2007. He has managed numerous Aboriginal and historic heritage projects for a variety of Agents and developments within Victoria, NSW and SA. Projects include heritage assessments and/or excavations for linear construction projects such as pipelines, sewerage lines and transmission lines, large area heritage assessments for Greenfield developments (e.g. residential subdivision and mining operations), as well as cultural heritage assessments and cultural heritage management plans for large Department of Defence sites. To date Rick has authored 60 approved CHMPs.

Rick has experience in a variety of tasks, including project management, peer reviews, background research and due diligence assessments, archaeological survey, subsurface testing and salvage excavation, Aboriginal and non-Aboriginal site identification, recording and photography, site significance assessment, development of recommendations to mitigate the impact of development upon Aboriginal and non-Aboriginal historical heritage, flaked stone artefact and historical artefact recording and interpretation, communication and consultation with regulatory bodies (OAAV and HV), Agents, landowners, RAPs and community representatives, preparation of conservation management plans, Historical Heritage Assessments and desktop, standard and complex Aboriginal CHMPs. Rick has published widely in refereed scientific journals including *International Journal of Nautical Archaeology*, *Bulletin of the Australasian Institute for Maritime Archaeology* and *Papers and Proceedings of the Tasmanian Historical Society*. His formal qualifications include:

- Bachelor of Applied Science (Conservation and Park Management), University of South Australia (1994);
- Graduate Diploma of Maritime Archaeology, Flinders University (2005);
- Master of Maritime Archaeology, Flinders University (2006);
- Full Member: Australian Association of Consulting Archaeologists Inc. (AACAI);
- Member (Cultural Heritage): Barwon Otway Bushfire Advisory Group (2013-present);
- Council Member (Victoria): Australasian Institute for Maritime Archaeology (2013-present);
- Committee Member (Victoria): Maritime Heritage Advisory Committee (2014-present); and
- Member, Anthropological Society of South Australia.

Oona Nicolson

Oona Nicolson is a Director and the Principal Heritage Advisor at Ecology and Heritage Partners Pty Ltd. She is a heritage specialist with over 18 years of experience in the archaeological consulting sector, working in Victoria, South Australia, New South Wales and Tasmania. Oona regularly appears before VCAT and independent panels as an Expert Witness in the areas of Aboriginal and historical heritage. Oona has extensive experience in over 800 projects with a wide variety of Agents.

Oona's skills include project management, peer reviews, background research and due diligence assessments, archaeological survey, subsurface testing and salvage excavation, Aboriginal and non-Aboriginal site identification, recording and photography, site significance assessment, development of recommendations to mitigate the impact of development upon Aboriginal and non-Aboriginal historical heritage, flaked stone artefact and historical artefact recording and interpretation, communication and consultation with regulatory bodies (OAAV and HV), Agents, landowners, RAPs and community representatives, preparation of conservation management plans, expert witness statements, Permits and Consents to Disturb for Heritage Victoria, Historical Heritage Assessments and, desktop, standard and complex Aboriginal CHMPs. Her formal qualifications and memberships include:

- Bachelor of Arts (Honours in Archaeology; First Class), Flinders University (1996);
- Bachelor of Arts (Australian Archaeology and Australian Studies), Flinders University (1995);
- Current Archaeology (Alternate) Member of the Victorian Heritage Council;
- Maritime Archaeology Certificate: Part 1 (Part 2 pending), AIMA and NAS (U.K.);
- Australian Association of Consulting Archaeologists Inc. AACAI (Full Member and current Treasurer of Victorian Chapter; Current National Secretary and Current Membership Committee);
- Member, Australian Archaeological Association (AAA);
- Victorian Planning and Environmental Law Association;
- Accredited UDIA EnviroDevelopment Professional (Accredited August 2012)
- UDIA Sustainability Committee; and
- Heritage member of the South Australian Chamber of Mines and Energy (SACOME) Sustainability and Development Committee.

Appendix 2: Aboriginal Places in the Geographic Area

The following table provides a summarised list of Aboriginal Places in the geographic area (OAAV 2016).

VAHR Site Number	Component Number	Site Name	Component Type	Within Activity Area?
7721-0302	1	Batesford 1	Artefact Scatter	No
7721-0402	1	Cowies Creek 1	Artefact Scatter	No
7721-0409	1	Moorpanyal Park Midden	Shell Midden	No
7721-0428	1	Norlane Artefact Scatter	Artefact Scatter	No
7721-0429	1	Cowies Creek No.2	Artefact Scatter	No
7721-0506	1	Bell Park 1	Artefact Scatter	No
7721-0507	1	Hume Reserve 1	Artefact Scatter	No
7721-0540	1	Ford IA 1	Artefact Scatter	No
7721-0541	1	Ford SAS 1	Artefact Scatter	No
7721-0577	1	Cowies Creek 2	Artefact Scatter	No
7721-0578	1	Cowies Creek 3	Artefact Scatter	No
7721-0590	1	Western Bypass 12	Artefact Scatter	No
7721-0591	1	Western Bypass 13	Artefact Scatter	No
7721-0592	1	Western Bypass 14	Artefact Scatter	No
7721-0609	1	Ford Carpark 1	Artefact Scatter	No
7721-0620	1	Corio Quay 1	Shell Midden	No
7721-0629	1	Davis Collection	Object Collection	No
7721-0631	1	Bell Park 2	Artefact Scatter	No
7721-0757	1	Calcutta Bay 1	Shell Midden	No
7721-0758	1	Calcutta Bay 2	Shell Midden	No
7721-0759	1	Calcutta Bay 3	Shell Midden	No
7721-0760	1	Calcutta Bay 4	Shell Midden	No
7721-0773	1	Prestige Park 4	Artefact Scatter	No
7721-0774	1	Prestige Park 5	Artefact Scatter	No
7721-0809	1	Northstate I.P 1	Artefact Scatter	No
7721-1211	1	Cowies Creek 10	Artefact Scatter	No
7721-1224	1	Birdwood Avenue 1	LDAD	No
	2			No
7721-1285	1	Wathaurung Aboriginal Co-operative Scarred Tree - Morgan St North Geelong	Object Collection	No

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Final Report

Biodiversity Assessment, 37-65 Walchs Road, North Shore, Victoria

Prepared for

Boral Cement Limited

April 2016

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DOCUMENT CONTROL

Assessment	Biodiversity Assessment
Address	37-65 Walchs Road, North Shore, Victoria
Project number	7686
Project manager	Shannon LeBel (Senior Botanist)
Other EHP staff	Andrew Warnock (Botanist/GIS)
File name	7686_EHP_NH_WalchsRd_BA_Final_27042016
Client	Boral Cement Limited
Bioregion	Victorian Volcanic Plain
CMA	Corangamite
Council	City of Greater Geelong

1 Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Boral Cement Limited (Boral) to conduct a Biodiversity Assessment at Lascelles Wharf located at 37-65 Walchs Road, North Shore, Victoria.

We understand that Boral currently imports materials through the Port of Geelong, and has recently identified the parcel of land at Lascelles Wharf as a potential location for the construction of a new import and grinding facility that will assist Boral implement a number of potential improvements and efficiencies to its business model.

The purpose of the assessment was to identify the extent and type of remnant native vegetation present within the study area and to determine the presence of significant flora and fauna species and/or ecological communities. This report presents the results of the assessment and discusses the potential ecological and legislative implications associated with the proposed action. The report also provides recommendations to address or reduce impacts and, where necessary, highlights components that require further investigation, such as targeted surveys.

2 Study Area

The study area is located at 37-65 Walchs Road, North Shore, Victoria, approximately 6.5 kilometres north of Geelong's CBD (Figure 1). The site covers approximately 5.9 hectares and is bound by The Esplanade to the north and east, Walschs Road to the south and private property to the west.

The study area is flat, with no ridges, crests or waterways within or immediately adjacent to the site.

According to the DELWP Native Vegetation Information Management Tool (DELWP 2016a), the study area occurs within the Victorian Volcanic Plain bioregion. It is located within the jurisdiction of the Corangamite Catchment Management Authority (CMA) and the City of Greater Geelong municipality.

3 Methods

3.1 Desktop Assessment

Relevant literature, online-resources and numerous databases were reviewed to provide an assessment of flora and fauna values associated with the study area. The following information sources were reviewed:

- The Victorian Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) Tool (DELWP 2016a) for:
    - Modelled data for location risk, remnant vegetation patches, scattered trees and habitat for rare or threatened species; and,
    - The extent of historic and current EVCs.
- The VBA (DELWP 2016c), Flora Information System (FIS) (Viridans 2014a) and Atlas of Victorian Wildlife (AVW) (Viridans 2014b) for previously documented flora and fauna records within the project locality;

- The Federal Department of Environment (DoE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoE 2016);
- The online resource Planning Maps Online to ascertain current zoning and environmental overlays (DELWP 2016d);
- Aerial photography of the study area; and,
- Relevant environmental legislation and policies.

3.2 Site Inspection

A site assessment was undertaken on 3 March 2016 to obtain information on flora and fauna values within the study area. The study area was walked, with all observed flora and fauna species recorded, any significant records mapped and the overall condition of vegetation and habitats noted. Ecological Vegetation Classes (EVCs) were determined with reference to DELWP pre-1750 and extant EVC mapping and their published descriptions (DELWP 2016b).

Where remnant vegetation was identified a habitat hectare assessment was undertaken following methodology described in the Vegetation Quality Assessment Manual (DSE 2004).

3.3 Permitted Clearing Assessment (the Guidelines)

Under the *Planning and Environment Act 1987,* Clause 52.17 of the Planning Schemes requires a planning permit from the relevant local Council to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follows the 'Permitted clearing of native vegetation - Biodiversity assessment guidelines' (the Guidelines) (DEPI 2013).

3.3.1 Risk-based Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using a risk-based approach. Two factors – extent risk and location risk – are used to determine the risk associated with an application for a permit to remove native vegetation. The location risk (A, B or C) has been determined for all areas in Victoria and is available on DELWP's Native Vegetation Information Management (NVIM) Tool (DELWP 2016a). Determination of risk-based pathway is summarised in Table 1.

Table 1. Risk-based pathways for applications to remove native vegetation (DEPI 2013)

Extent		Location		
		A	B	C
Native Vegetation	< 0.5 hectares	Low	Low	High
	≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
	≥ 1 hectare	Moderate	High	High
Scattered Trees	< 15 scattered trees	Low	Moderate	High
	≥ 15 scattered trees	Moderate	High	High

Notes: For the purpose of determining the risk-based pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before an application to remove native vegetation is lodged.

3.3.2 Vegetation Assessment

Native vegetation (as defined in Table 2) is assessed using two key parameters: extent (in hectares) and condition. Extent is determined through a site assessment. The condition score for Moderate and High Risk-based pathways must be assessed through a habitat hectare[1] assessment conducted by a qualified ecologist. The condition score for Low Risk-based pathways may be based on either modelled data available on the NVIM Tool (DELWP 2016a), or through a habitat hectare assessment.

Table 2. Determination of remnant native vegetation (DEPI 2013)

Category	Definition	Extent	Condition
Remnant patch of native vegetation	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native. OR An area with three or more native canopy trees where the canopy foliage cover is at least 20 per cent of the area.	Measured in hectares. Based on hectare area of the remnant patch.	Vegetation Quality Assessment Manual (DSE 2004).
Scattered tree	A native canopy tree that does not form part of a remnant patch.	Measured in hectares. Each scattered tree is assigned an extent of 0.071 hectares (30m diameter).	Scattered trees are assigned a default condition score of 0.2.

Notes: Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'.

3.3.3 Offsets

Offsets are required to compensate for the permitted removal of native vegetation. Offsets are divided into two categories: General and Specific, with the offset obligations and offset site criteria determined in accordance with the Guidelines (DEPI 2013).

3.4 Assessment Qualifications and Limitations

The 'snap shot' nature of a standard biodiversity assessment, meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the site assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Targeted flora or fauna surveys were not undertaken, as this was beyond the preliminary scope of the project. Nevertheless, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered suitable to provide an accurate assessment of the ecological values present within the study area.

[1] A 'habitat hectare' is a unit of measurement which combines the condition and extent of native vegetation.

4 Results

4.1 Vegetation Condition

Historical imagery of the site show that the original shoreline has been altered, with the north-east corner of the study area formerly being part of Corio Bay (Plate 1).

The vegetation on the site is highly modified from previous disturbances due to the study area having a long history of industrial and agricultural use. The study area is dominated by introduced grasses including Kikuyu *Cenchrus clandestinum,* Cocksfoot *Dactylis glomeratus* and Brome *Bromus* spp.

Plate 1. Historical photo (1938) of the study area, showing the original Corio Bay shoreline: photo direction: south

4.1.1 Native Vegetation

One small patch of native vegetation was recorded within the south-east corner of the study area (Figure 2). Historical aerial imagery shows that this area was formerly in close proximity to the shoreline. As such, this vegetation was considered to be representative of the Coastal Alkaline Scrub EVC (EVC 858), rather than Grassy Woodland (EVC 175) predicted to occur within the study area within pre-1750s native vegetation modelling (DELWP 2016a).

Native species diversity within Coastal Alkaline Scrub within the study area was restricted to an understorey of Seaberry Saltbush *Rhagodia candolleana*. An overstorey of planted non-indigenous trees and shrubs was present (eg. Southern Blue-gum *Eucalyptus globulus* subsp. *globulus* and River Sheoak *Casuarina cunninghamii*; Plate 2) and dominant and high threat weeds included Galenia *Galenia pubescens*, Kikuyu and Cocksfoot. Given the site context, with a long history of agriculture, industrial use and landscaping, it is unlikely that the Coastal Alkaline Scrub is remnant, but has regrown since the previous landscape works and planting of the non-indigenous trees and shrubs. Nevertheless, this 'regrowth' is considered to be older than ten years.

Plate 2. Coastal Alkaline Scrub within the study area (3/3/2016)

4.1.2 Introduced and Planted Vegetation

Several River Red-gums *Eucalyptus camaldulensis* were recorded within the study area (Figure 2; Plate 3). Given the close proximity of the study area to the pre-European settlement coastline, lack of remnant trees distinguishable in 1938 aerial photography, and presence of formed garden beds and guttering around the majority of the trees (Plates 1 & 3), it is considered that these trees are not remnant to the study area and have been planted for amenity purposes. The River Red-gums are of similar age to non-indigenous eucalypts (eg. Southern Blue-gum) planted within the study area.

A range of non-indigenous species (eg. Southern Blue-gum and River Sheoak) and exotic trees and shrubs have also been planted throughout the study area for amenity purposes.

A number of noxious weeds were also recorded throughout the study area, including, Boxthorn *Lycium ferocissimum*, Chilean Needle-grass *Nassella neesiana*, Bridal Creeper *Asparagus asparagoides* and Spear Thistle *Cirsium vulgare.*

Plate 3. Planted River Red-gum within the study area

Plate 4. Planted non-indigenous trees within the study area

4.2 Fauna Habitat

Introduced Grasslands

The majority of the study area consists of introduced grasses, which are likely to be used as a foraging resource by common generalist bird species which are tolerant of modified open areas. Fauna observed using this habitat included; Australian Magpie *Cracticus tibicen*, Common Blackbird *Turdus merula*, Little Raven *Corvus mellori*, House Sparrow *Passer domesticus*, Willie Wagtail *Rhipidura leucophrys*, and European Hare *Lepus europaeus*.

Planted Vegetation

Planted vegetation is located throughout the study area as windrows or as ornamental plantings, which also includes an understorey of indigenous shrubs within the south east of the study area (Section 4.1.1). These areas provide foraging, roosting and nesting habitat for mobile generalist fauna including locally common birds and microbats. Species observed using this habitat includes Noisy Miner *Manorina melanocephala*, Superb Fairy-wren *Malurus cyaneus*, Grey Fantail *Rhipidura albiscarpa*, New Holland Honeyeater Phylidonyris novaehollandiae, and introduced bird species Common Blackbird *Turdus merula* and Common Starling *Sturnus vulgaris*.

4.3 Permitted Clearing Assessment (the Guidelines)

4.3.1 Vegetation proposed to be removed

The study area is within Location A, with 0.133 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Low Risk-based pathway.

As the application falls under the Low Risk-based pathway, condition scores for vegetation proposed to be removed are based on modelled scores available on the NVIM system (DELWP 2016a).

Table 3. Permitted Clearing Assessment (the Guidelines)

Risk-based pathway	Low
Total Extent	0.133
Remnant Patch (ha)	0.133
Scattered Trees (no.)	0
Location Risk	A
Strategic Biodiversity Score	0.207

4.3.2 *Offset Targets*

The offset requirement for native vegetation removal is 0.017 General Biodiversity Equivalence Units (BEU).

A summary of proposed vegetation losses and associated offset requirements is presented in Table 4 and the Biodiversity Assessment Report is presented in Appendix 3.

Table 4. Offset targets

General Offsets Required	0.017 General BEUs
Specific Offsets Required	n/a
Vicinity (catchment / LGA)	Corangamite CMA / City of Greater Geelong
Minimum Strategic Biodiversity Score*	0.166

Note: BEU = Biodiversity Equivalence Units

4.4 Significance Assessment

4.4.1 *Flora*

The VBA and FIS contain records of eight nationally significant and 31 State significant flora species previously recorded within 10 kilometres of the study area (DELWP 2016c; Viridans 2014a) (Appendix 1; Figure 3). The PMST nominated an additional seven nationally significant species which have not been recorded in the locality but have the potential to occur (DoE 2016).

Based on the highly modified nature of the study area, landscape context and the proximity of previous records, significant flora species are considered unlikely to occur within the study area (Appendix 1).

4.4.2 *Fauna*

The VBA and AVW contain records of 19 nationally significant, 46 State significant and 20 regionally significant fauna species previously recorded within 10 kilometres of the study area (DELWP 2016c; Viridans 2014b) (Appendix 2; Figure 4). The PMST nominated an additional 19 nationally significant species which have not been recorded in the locality but have the potential to occur (DoE 2016).

Based on the highly modified nature of the study area, landscape context and the proximity of previous records, significant fauna species are considered unlikely to occur within the study area (Appendix 2).

4.4.3 Communities

Six nationally listed ecological communities are predicted to occur within 10 kilometres of the study area (DoE 2016):

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Natural Damp Grassland of the Victorian Coastal Plains
- Natural Temperate Grassland of the Victorian Volcanic Plain
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
- Subtropical and Temperate Coastal Saltmarsh
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

However, vegetation within the study area did not meet the diagnostic characteristics that define any national or State-significant communities.

5 Legislative and Policy Implications

5.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a Commonwealth process for the assessment of proposed actions likely to have a significant impact on any matters of National Environment Significance (NES).

The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister will not be required regarding matters listed under the EPBC Act.

5.2 Flora and Fauna Guarantee Act 1988 (Victoria)

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

No species listed or protected under the FFG Act were recorded within the study area, or were considered likely to occur. As such, a permit under the FFG Act is not required.

5.3 Planning and Environment Act 1987 (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption under clause 52.17-7 of the Victorian Planning Schemes applies or a subdivision is proposed with lots less than 0.4 hectares[2]. Local planning schemes may contain other provisions in relation to the removal of native vegetation (Section 5.3.1).

5.3.1 *Local Planning Schemes*

The study area is located within the City of Greater Geelong municipality, is zoned Port Zone (PZ) and is covered by a Design and Development Overlay – Schedule 20 (DDO20).

5.3.2 *The Guidelines*

The State Planning Policy Framework and the decision guidelines at Clause 52.17 (Native Vegetation) and Clause 12.01 require Planning and Responsible Authorities to have regard for 'Permitted clearing of native vegetation - Biodiversity assessment guidelines' (the Guidelines) (DEPI 2013).

5.3.3 *Implications*

The study area is within Location A, with 0.133 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Low Risk-based pathway.

The offset requirement for native vegetation removal is 0.017 General Biodiversity Equivalence Units (BEU).

A Planning Permit from City of Greater Geelong is required to remove, destroy or lop any native vegetation (ie. Coastal Alkaline Scrub). Planted vegetation and/or non-native vegetation is exempt from requiring a permit for removal in accordance with the 'planted vegetation' exemption detailed in Clause 52.17-7 of the local planning scheme.

5.4 Wildlife Act 1975 and Wildlife Regulations 2013 (Victoria)

The *Wildlife Act 1975* (and associated Wildlife Regulations 2013) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DELWP.

5.5 Catchment and Land Protection Act 1994 (Victoria)

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species to minimise their spread and impact on ecological values.

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[2] In accordance with the Victorian Civil and Administrative Tribunal's (VCAT) decision Villawood v Greater Bendigo CC (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

A number of weeds listed as noxious under the CaLP Act were recorded during the assessment (African Boxthorn, Chilean Needle-grass, Bridal Creeper and Spear Thistle). Similarly, there is evidence that the study area is currently occupied by several pest fauna species listed under the CaLP Act (European Rabbit, European Hare). A Weed Management Plan and a pest fauna eradication plan may be required.

5.6 Best Practice Mitigation Measures

Recommended measures to mitigate impacts upon terrestrial and aquatic values present within the study area may include:

- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed;
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Agency guidelines (EPA 1991; EPA 1996; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands; and,
- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

5.7 Offset Impacts

5.7.1 Offset Strategy

The removal of native vegetation within the study area will generate an offset obligation of 0.017 General Biodiversity Equivalence Units (BEUs).

Ecology and Heritage Partners are a DELWP accredited OTC offset broker. We have been assisting permit holders meet their native vegetation offset obligations since 2006. Ecology and Heritage Partners broker native vegetation credits between permit holders and credit holders across all CMAs, and have an excellent knowledge of the type and extent of available credits in the marketplace.

Ecology and Heritage Partners can confirm that the offset obligations generated by this proposal can be satisfied through existing credits registered in our OTC database (third party offsets). Several landowners registered in our offset database have suitable General Biodiversity Equivalence Unit (BEUs) native vegetation credits available within City of Greater Geelong and the Corangamite CMA, and it is anticipated that the relevant offset obligations generated by this proposal can be secured through an OTC scheme without any difficulty should a permit be issued for the development.

6 Further Requirements

Further requirements associated with development of the study area, as well as additional studies or reporting that may be required, are provided below (Table 5).

Table 5. Further requirements associated with development of the study area

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	The proposed action is unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister will not be required regarding matters listed under the EPBC Act.	No further action required.
Flora and Fauna Guarantee Act 1988	No species listed or protected under the FFG Act were recorded within the study area, or were considered likely to occur. As such, a permit under the FFG Act is not required.	No further action required.
Planning and Environment Act 1987	The study area is within Location A, with 0.133 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Low Risk-based pathway. The offset requirement for native vegetation removal is 0.017 General Biodiversity Equivalence Units (BEU). A Planning Permit from City of Greater Geelong is required to remove, destroy or lop any native vegetation (ie. Coastal Alkaline Scrub).	Prepare and submit a Planning Permit application. Planning Permit conditions are likely to include a requirement for: • Identification of a compliant offset, as detailed in Section 4.2. • A Construction Environment Management Plan (CEMP).
Catchment and Land Protection Act 1994	Several weed species listed under the CaLP Act were recorded within the study area. To meet requirements under the CaLP Act, listed noxious weeds should be appropriately controlled throughout the study area.	Planning Permit conditions may to include a requirement for a Weed Management Plan.
Wildlife Act 1975	Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation.

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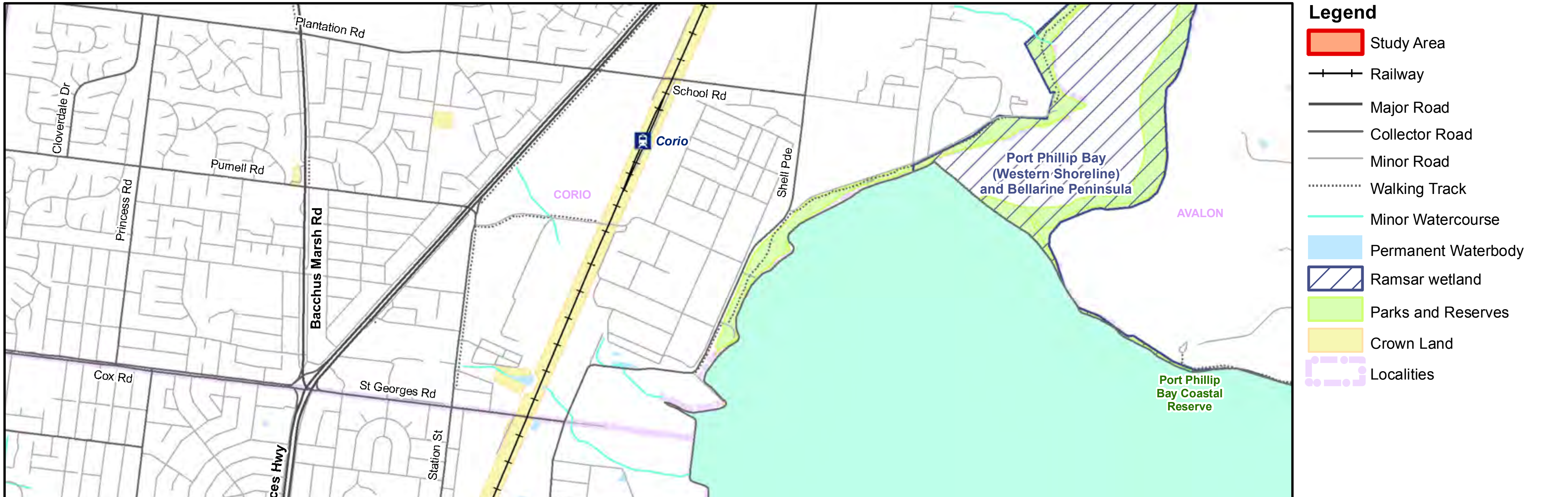

Figure 1

Location of the study area

37-65 Walchs Road,
North Shore

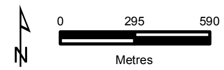

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Figure 2
Ecological features
37-65 Walchs Road, North Shore

Legend
Study Area
Planted River Red-gum
Coastal Alkaline Scrub
Planted River Red-gum

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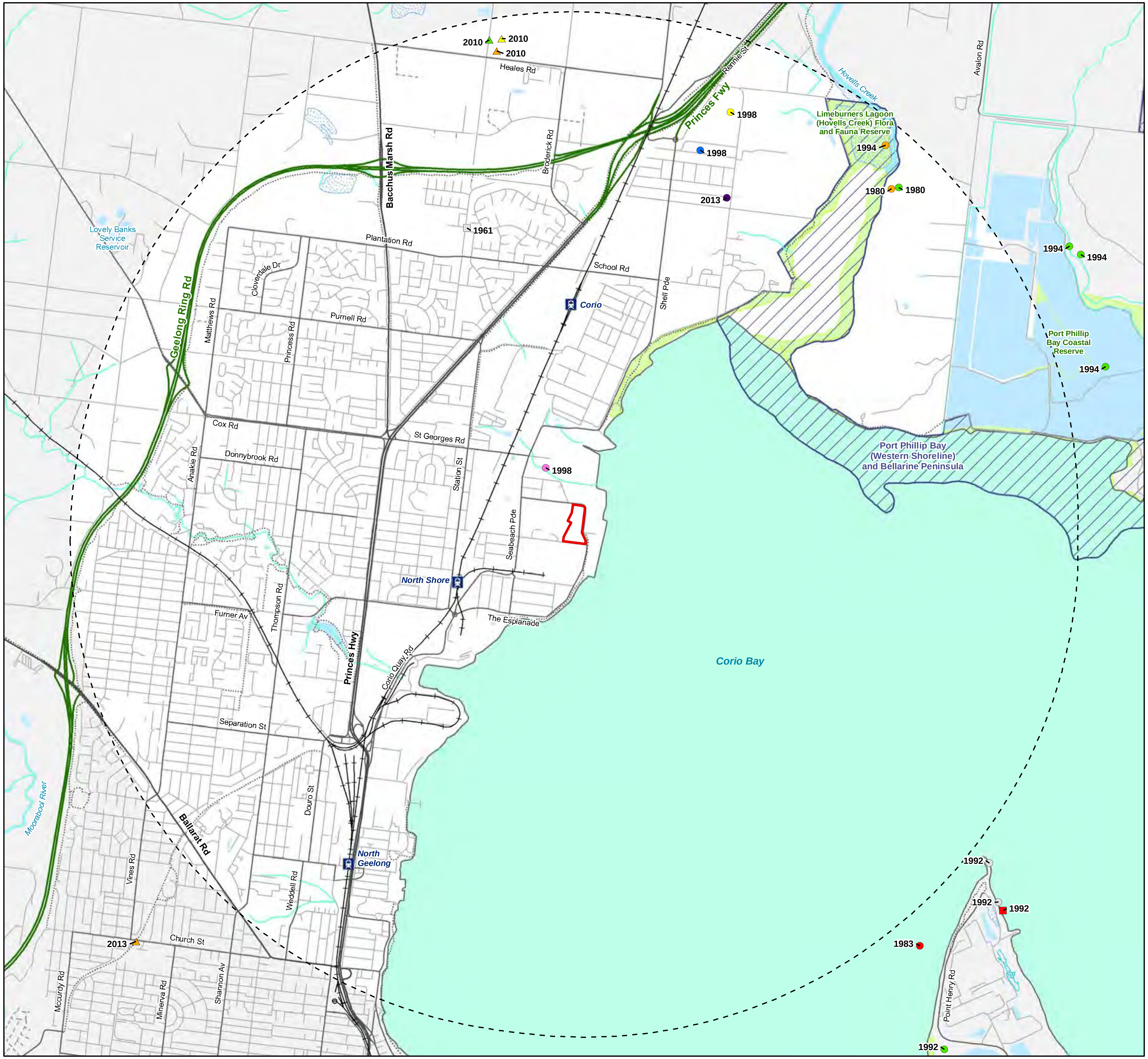
7686_Fig2_EcoFeat_P 29/03/2016 awarnock



Legend

Study Area

Significant flora

- Coast Saltwort
- Cup Wattle
- Grey Mangrove
- Large-headed Fireweed
- Marsh Saltbush
- Rye Beetle-grass
- Small Golden Moths
- Spiny Rice-flower
- Straw Wallaby-grass
- Tasman Grass-wrack

Ecology and Heritage Partners records

- Annual Fireweed
- Slender Fireweed
- Spiny Rice-flower

Figure 3

Previously documented significant flora within 5km of the study area

37-65 Walchs Road, North Shore

0 0.75 1.5

Kilometres

ecology & heritage partners

VBA 2016. Victorian Biodiversity Atlas. // Sourced from: 'VBA_FLORA25' and 'VBA_FLORA100', January 2016 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown. Ecology and Heritage Partners recorded species have been submitted to but are not yet included in the VBA as at October 2014.
VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

7686_Fig03_SigFlora 23/03/2016 Melsley

Figure 4

Previously documented significant fauna within 5km of the study area

37-65 Walchs Road, North Shore

ecology & heritage partners

VBA 2016. Victorian Biodiversity Atlas. // Sourced from: 'VBA_FLORA25' and 'VBA_FLORA100', January 2016 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown. Ecology and Heritage Partners recorded species have been submitted to but are not yet included in the VBA as at October 2014.
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7686_Fig04_SigFauna 23/03/2016 Melsley

Appendix 1 – Flora

Table A1.1 Significant flora recorded within 10 kilometres of the study area

Likelihood: Habitat characteristics of significant flora species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings are defined below.

1 - Known occurrence

- Recorded within the study area recently (i.e. within ten years)

2 - High Likelihood

- Previous records of the species in the local vicinity; and/or,
- The study area contains areas of high quality habitat.

3 - Moderate Likelihood

- Limited previous records of the species in the local vicinity; and/or,
- The study area contains poor or limited habitat.

4 - Low Likelihood

- Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a very low likelihood of presence.

5 – Unlikely

- No suitable habitat and/or outside the species range.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
NATIONAL SIGNIFICANCE							
Caladenia pumila	Dwarf Spider-orchid	-	#	CR	L	e	5
Dianella amoena	Matted Flax-lily	-	#	EN	L	e	5
Diuris basaltica	Small Golden Moths	16	2013	EN	L	e	5
Glycine latrobeana	Clover Glycine	1	1998	VU	L	v	5
Lachnagrostis adamsonii	Adamson's Blown-grass	1	1881	EN	L	v	5
Leucochrysum albicans var. *tricolor*	Hoary Sunray	-	#	EN	-	e	5
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	8	2002	CR	L	e	5
Prasophyllum frenchii	Maroon Leek-orchid	-	#	EN	L	e	5

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
Prasophyllum spicatum	Dense Leek-orchid	1	2013	VU	-	e	5
Prasophyllum suaveolens	Fragrant Leek-orchid	1	1925	EN	L	e	5
Pterostylis cucullata	Leafy Greenhood	-	#	VU	L	v	5
Rutidosis leptorhynchoides	Button Wrinklewort	1	1924	EN	L	e	5
Senecio macrocarpus	Large-headed Fireweed	1	1770	VU	L	e	5
Thelymitra epipactoides	Metallic Sun-orchid	-	#	EN	L	e	5
Xerochrysum palustre	Swamp Everlasting	-	#	VU	L	v	5
STATE SIGNIFICANCE							
Acacia cupularis	Cup Wattle	64	2006	-	-	r	5
Acacia uncifolia	Coast Wirilda	1	1983	-	-	r	5
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush	4	1884	-	-	r	5
Avicennia marina subsp. *australasica*	Grey Mangrove	11	1994	-	-	r	5
Callitriche palustris var. *palustris*	Swamp Water-starwort	3	1994	-	-	k	5
Callitriche umbonata	Winged Water-starwort	1	1986	-	-	r	5
Cardamine tenuifolia	Slender Bitter-cress	1	1770	-	-	P	5
Cullen parvum	Small Scurf-pea	1	1986	-	L	e	5
Diuris palustris	Swamp Diuris	1	1924	-	L	v	5
Eucalyptus leucoxylon subsp. *bellarinensis*	Bellarine Yellow-gum	1	1770	-	L	e	5
Euphrasia scabra	Rough Eyebright	1	1988	-	L	e	5
Galium compactum	Compact Bedstraw	1	1770	-	-	r	5
Heterozostera tasmanica	Tasman Grass-wrack	1	1885	-	-	r	5
Juncus revolutus	Creeping Rush	2	2005	-	-	r	5

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
Lachnagrostis robusta	Salt Blown-grass	1	1993	-	-	r	5
Lawrencia spicata	Salt Lawrencia	1	1997	-	-	r	5
Maireana aphylla	Leafless Bluebush	1	1994	-	-	k	5
Malva preissiana s.s. (white-flowered coastal form)	Coast Hollyhock	3	1992	-	-	v	5
Nicotiana maritima	Coast Tobacco	1	1993	-	-	e	5
Pleurosorus subglandulosus	Glandular Blanket-fern	1	1986	-	-	k	5
Poa billardierei	Coast Fescue	1	1770	-	-	r	5
Prasophyllum lindleyanum	Green Leek-orchid	1	1885	-	-	v	5
Prostanthera nivea var. *nivea*	Snowy Mint-bush	1	1893	-	-	r	5
Rhagodia parabolica	Fragrant Saltbush	1	2006	-	-	r	5
Ruppia tuberosa	Tuberous Tassel	11	2006	-	-	k	5
Rytidosperma richardsonii	Straw Wallaby-grass	1	2000	-	-	v	5
Salsola tragus subsp. pontica	Coast Saltwort	1	1961	-	-	r	5
Senecio cunninghamii var. *cunninghamii*	Branching Groundsel	4	2005	-	-	r	5
Swainsona behriana	Southern Swainson-pea	1	1770	-	-	r	5
Thelymitra circumsepta	Naked Sun-orchid	1	1926	-	-	v	5
Tripogon loliiformis	Rye Beetle-grass	1	1770	-	-	r	5

Notes: EPBC = Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), FFG = Flora and Fauna Guarantee Act 1988 (FFG Act), DSE = Advisory List of Threatened Flora in Victoria (DSE 2005), L = Listed, # = Records identified from EPBC Act Protected Matters Search Tool, * = Records identified from the FIS. Data source: Victorian Biodiversity Atlas (DELWP 2015); Protected Matters Search Tool (DoE 2015). Order: Alphabetical.

Appendix 2 – Fauna

Table A2.1. Significant fauna within 10 kilometres of the study area.

Likelihood: Habitat characteristics of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings are defined below.

1 - High Likelihood
- Known resident in the study area based on site observations, database records, or expert advice; and/or,
- Recent records (i.e. within five years) of the species in the local area (DELWP 2015); and/or,
- The study area contains the species' preferred habitat.

2 - Moderate Likelihood
- The species is likely to visit the study area regularly (i.e. at least seasonally); and/or,
- Previous records of the species in the local area (DELWP 2015); and/or,
- The study area contains some characteristics of the species' preferred habitat.

3 - Low Likelihood
- The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or,
- There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or,
- The study area contains few or no characteristics of the species' preferred habitat.

4 - Unlikely
- No previous records of the species in the local area; and/or,
- The species may fly over the study area when moving between areas of more suitable habitat; and/or,
- Out of the species' range; and/or,
- No suitable habitat present.

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
NATIONAL SIGNIFICANCE								
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	1964	1	EN	L	NT	NT	4
Eastern Barred Bandicoot	*Perameles gunnii*	1980	35	EN	L	WX	CR	4
Grey-headed Flying-fox	*Pteropus poliocephalus*	1995	5	VU	L	VU	VU	3
Wandering Albatross	*Diomedea exulans*	#	1	VU	L	EN	VU	4
Black-browed Albatross	*Thalassarche melanophris melanophris*	#	1	VU	-	VU	NT	4
Shy Albatross	*Thalassarche cauta*	#	1	VU	L	VU	VU	4
Salvin's Albatross	*Thalassarche cauta salvini*	#	-	VU	-	-	VU	4
Indian Yellow-nosed Albatross	*Thalassarche carteri*	1979	1	VU	L	VU	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Antipodean Albatross	*Diomedea exulans antipodensis*	#	1	VU	-	-	VU	4
Campbell Albatross	*Thalassarche melanophris impavida*	#	1	VU	-	-	VU	4
Tristan Albatross	*Diomedea exulans exulans*	#	1	EN	-	-	VU	4
White-capped Albatross	*Thalassarche cauta steadi*	#	1	VU	-	-	VU	4
Buller's Albatross	*Diomedea bulleri*	#	1	VU	-	-	VU	4
Southern Royal Albatross	*Diomedea epomophora epomophora*	#	1	VU	-	-	VU	4
Northern Royal Albatross	*Diomedea epomophora sanfordi*	#	1	EN	-	-	VU	4
Sooty Albatross	*Phoebetria fusca*	#	1	VU	L	-	VU	4
Southern Giant-Petrel	*Macronectes giganteus*	#	1	EN	L	VU	VU	4
Northern Giant-Petrel	*Macronectes halli*	#	1	VU	L	NT	-	4
Fairy Prion	*Pachyptila turtur*	1981	1	VU	-	VU	-	4
Gould's Petrel	*Pterodroma leucoptera*	#	1	EN	-	-	VU	4
Australasian Bittern	*Botaurus poiciloptilus*	2001	7	EN	L	EN	VU	4
Plains-wanderer	*Pedionomus torquatus*	#	1	CR	L	CR	EN	4
Australian Painted Snipe	*Rostratula australis*	1956	2	VU	L	CR	VU	4
Eastern Curlew	*Numenius madagascariensis*	2000	49	CR	-	VU	-	4
Fairy Tern	*Sternula nereis nereis*	2005	79	VU	L	EN	-	4
Swift Parrot	*Lathamus discolor*	1998	3	EN	L	EN	EN	3
Orange-bellied Parrot	*Neophema chrysogaster*	1993	6	CR	L	CR	CR	4
Regent Honeyeater	*Anthochaera phrygia*	1993	2	CR	L	CR	EN	4
Painted Honeyeater	*Grantiella picta*	#	1	VU	L	VU	NT	4
Striped Legless Lizard	*Delma impar*	1992	1	VU	L	EN	VU	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	#	1	EN	L	CR	VU	4
Growling Grass Frog	*Litoria raniformis*	2009	6	VU	L	EN	VU	4
Dwarf Galaxias	*Galaxiella pusilla*	#	1	VU	L	EN	VU	4
Australian Grayling	*Prototroctes maraena*	1997	32	VU	L	VU	VU	4
Murray Cod	*Maccullochella peelii*	1873	1	VU	L	VU	-	4
Macquarie Perch	*Macquaria australasica*	1970	5	EN	L	EN	DD	4
Yarra Pygmy Perch	*Nannoperca obscura*	2009	3	VU	L	VU	VU	4
Golden Sun Moth	*Synemon plana*	2009	1	CR	L	CR	-	4
STATE SIGNIFICANCE								
Magpie Goose	*Anseranas semipalmata*	2005	15	-	L	NT	-	4
Musk Duck	*Biziura lobata*	2005	31	-	-	VU	-	4
Freckled Duck	*Stictonetta naevosa*	1979	1	-	L	EN	-	4
Australasian Shoveler	*Anas rhynchotis*	1999	13	-	-	VU	-	4
Hardhead	*Aythya australis*	2001	41	-	-	VU	-	4
Blue-billed Duck	*Oxyura australis*	2000	4	-	L	EN	-	4
Diamond Dove	*Geopelia cuneata*	1977	1	-	L	NT	-	4
White-throated Needletail	*Hirundapus caudacutus*	2000	15	-	-	VU	-	4
White-faced Storm-Petrel	*Pelagodroma marina*	1983	1	-	-	VU	-	4
Little Bittern	*Ixobrychus minutus dubius*	1970	1	-	L	EN	-	4
Eastern Great Egret	*Ardea modesta*	2006	114	-	L	VU	-	4
Intermediate Egret	*Ardea intermedia*	2001	14	-	L	EN	-	4
Little Egret	*Egretta garzetta nigripes*	2008	120	-	L	EN	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Square-tailed Kite	*Lophoictinia isura*	2008	1	-	L	VU	-	4
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	2007	6	-	L	VU	-	4
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	2007	23	-	L	VU	-	2
Black Falcon	*Falco subniger*	2000	7	-	-	VU	-	2
Brolga	*Grus rubicunda*	2012	8	-	L	VU	-	4
Lewin's Rail	*Lewinia pectoralis pectoralis*	2006	11	-	L	VU	NT	4
Baillon's Crake	*Porzana pusilla palustris*	2010	14	-	L	VU	-	4
Major Mitchell's Cockatoo	*Lophocroa leadbeateri*	1999	1	-	L	VU	-	3
Pacific Golden Plover	*Pluvialis fulva*	2007	24	-	-	VU	-	4
Grey Plover	*Pluvialis squatarola*	1979	3	-	-	EN	-	4
Lesser Sand Plover	*Charadrius mongolus*	1988	3	-	-	CR	-	4
Black-tailed Godwit	*Limosa limosa*	1990	3	-	-	VU	-	4
Whimbrel	*Numenius phaeopus*	1978	2	-	-	VU	-	4
Terek Sandpiper	*Xenus cinereus*	1986	6	-	L	EN	-	4
Common Sandpiper	*Actitis hypoleucos*	1995	7	-	-	VU	-	4
Grey-tailed Tattler	*Tringa brevipes*	2005	9	-	L	CR	-	4
Common Greenshank	*Tringa nebularia*	2005	78	-	-	VU	-	4
Marsh Sandpiper	*Tringa stagnatilis*	2005	42	-	-	VU	-	4
Wood Sandpiper	*Tringa glareola*	2008	1	-	-	VU	-	4
Ruddy Turnstone	*Arenaria interpres*	2005	13	-	-	VU	-	4
Great Knot	*Calidris tenuirostris*	1987	3	-	L	EN	-	4
Red Knot	*Calidris canutus*	2005	7	-	-	EN	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Little Tern	*Sternula albifrons sinensis*	1999	26	-	L	VU	-	4
Caspian Tern	*Hydroprogne caspia*	2006	34	-	L	NT	-	4
Powerful Owl	*Ninox strenua*	1969	1	-	L	VU	-	4
Barking Owl	*Ninox connivens connivens*	1969	1	-	L	EN	NT	4
Brown Treecreeper (south-eastern ssp.)	*Climacteris picumnus victoriae*	1969	2	-	-	NT	NT	4
Speckled Warbler	*Chthonicola sagittatus*	1960	2	-	L	VU	NT	4
Hooded Robin	*Melanodryas cucullata cucullata*	1951	1	-	L	NT	NT	4
Diamond Firetail	*Stagonopleura guttata*	1971	3	-	L	NT	NT	4
Tussock Skink	*Pseudemoia pagenstecheri*	1987	1	-	-	VU	-	4
Southern Pygmy Perch	*Nannoperca australis*	2011	2	-	-	-	-	4
Yellow Sedge-skipper	*Hesperilla flavescens flavescens*	1988	1	-	L	VU	LC	4
REGIONAL SIGNIFICANCE								
Fat-tailed Dunnart	*Sminthopsis crassicaudata*	1972	1	-	-	NT	-	4
Bryde's Whale	*Balaenoptera edeni*	1968	1	-	-	DD	-	4
Common Diving-Petrel	*Pelecanoides urinatrix*	1978	2	-	-	NT	-	4
Pied Cormorant	*Phalacrocorax varius*	2008	77	-	-	NT	-	4
Black-faced Cormorant	*Phalacrocorax fuscescens*	2001	3	-	-	NT	-	4
Nankeen Night Heron	*Nycticorax caledonicus hillii*	2010	53	-	-	NT	-	4
Glossy Ibis	*Plegadis falcinellus*	1991	3	-	-	NT	-	4
Royal Spoonbill	*Platalea regia*	2010	82	-	-	NT	-	4
Spotted Harrier	*Circus assimilis*	2007	9	-	-	NT	-	4
Sooty Oystercatcher	*Haematopus fuliginosus*	1986	2	-	-	NT	-	4

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	National Action Plan	Likelihood
Latham's Snipe	*Gallinago hardwickii*	2006	85	-	-	NT	-	4
Sanderling	*Calidris alba*	1996	2	-	-	NT	-	4
Long-toed Stint	*Calidris subminuta*	1978	1	-	-	NT	-	4
Pectoral Sandpiper	*Calidris melanotos*	1986	6	-	-	NT	-	4
Little Button-quail	*Turnix velox*	1977	2	-	-	NT	-	4
Australian Pratincole	*Stiltia isabella*	1985	1	-	-	NT	-	4
Whiskered Tern	*Chlidonias hybridus javanicus*	2003	38	-	-	NT	-	4
White-winged Black Tern	*Chlidonias leucopterus*	1978	2	-	-	NT	-	4
Pacific Gull	*Larus pacificus pacificus*	2005	112	-	-	NT	-	2
Azure Kingfisher	*Alcedo azurea*	1981	2	-	-	NT	-	4

Notes: EPBC = Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), FFG = Flora and Fauna Guarantee Act 1988 (FFG Act), DSE = Advisory List of Threatened Flora in Victoria (DSE 2014), # = Records identified from EPBC Act Protected Matters Search Tool, L = Listed. Data sources: Victorian Biodiversity Atlas (DELWP 2015); Victorian Fauna Database (Viridans 2014b); Protected Matters Search Tool (DoE 2015). Taxonomic order: Mammals (Strahan 1995 in Menkhorst & Knight 2004); Birds (Christidis & Boles, 2008); Reptiles and Amphibians (Cogger et al. 1983 in Cogger 1996); Fish (Nelson 1994); Mussels & Crustaceans (Alphabetical); Invertebrates (Alphabetical).

APPENDIX 3 - Biodiversity Assessment Report

Biodiversity assessment report

Biodiversity information for applications for permits to remove native vegetation under clause 52.16 or 52.17 of the Victoria Planning Provisions

Date of issue: **03 March 2016**

Time of issue: **12:00:37**

Property address	37-65 WALCHS ROAD NORTH SHORE 3214

Summary of marked native vegetation

Risk-based pathway	**Low**
Total extent	0.133 ha
Remnant patches	
1	0.133 ha
Location risk	A

See Appendix 1 for risk-based pathway details

Offset requirements

If a permit is granted to remove the marked native vegetation, a requirement to obtain a native vegetation offset will be included in the permit conditions. The offset must meet the following requirements:

Offset type	General offset
Offset amount (general biodiversity equivalence units)	0.017
Offset attributes	
Vicinity	Corangamite Catchment Management Authority (CMA)
Minimum strategic biodiversity score	0.166
Strategic biodiversity score of marked native vegetation	0.207

See Appendix 2 for offset requirements details

Next steps

This proposal to remove native vegetation must meet the application requirements of the low risk-based pathway and it will be assessed in the low risk-based pathway.

If you wish to remove the marked native vegetation you are required to apply for a permit from your local council.

The Biodiversity assessment report should be submitted with your application for a permit to remove native vegetation you plan to remove, lop or destroy.

The Biodiversity assessment report provides the following information that is required to be provided with your application for a permit to remove native vegetation:

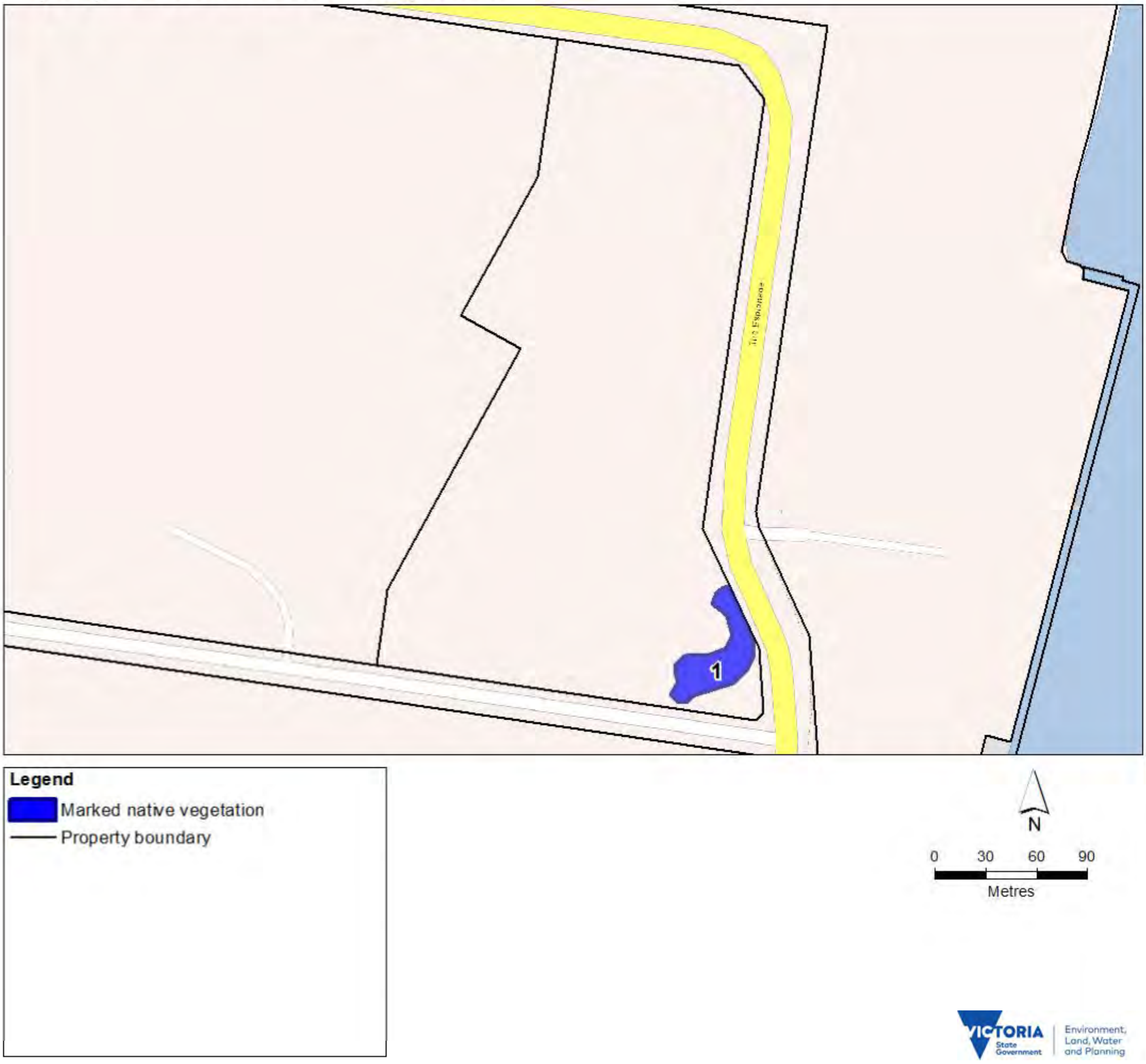
- The location of the site where native vegetation is to be removed.
- The area of the patch of native vegetation and/or the number of any scattered trees to be removed.
- Maps or plans containing information set out in the *Permitted clearing of native vegetation - Biodiversity assessment guidelines*.
- The risk-based pathway of the application for a permit to remove native vegetation.
- The strategic biodiversity score of the native vegetation to be removed.
- The offset requirements should a permit be granted to remove native vegetation.

If you have undertaken any permitted clearing on your property within the last five years contact DELWP to confirm offset requirements.

Additional information is required when submitting an application for a permit to remove native vegetation. Refer to the *Permitted clearing of native vegetation - Biodiversity assessment guidelines* for a full list of application requirements.

Maps of marked native vegetation

Property view of marked native vegetation



See Appendix 3 for biodiversity information maps

Appendix 1 - Risk-based pathway details

Risk-based pathway	Low
Total extent	0.133 ha
Remnant patches	
1	0.133 ha
Location risk	A

Why is the risk-based pathway low?

The following table explains how the risk-based pathway is determined:

Extent	Location A	Location B	Location C
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectares	Low	Moderate	High
≥ 1 hectares	Moderate	High	High

The marked native vegetation is located entirely within Location A and has a total extent of less than 0.5 hectares.

At this location, native vegetation removal of this size is not expected to have a significant impact on the habitat of any rare or threatened species. As a result, an application for the removal of this native vegetation must meet the requirements of, and will be assessed in, the low risk-based pathway.

For further information on location risk please see *Native vegetation location risk map factsheet*. For information on the determination of the risk-based pathway see *Permitted clearing of native vegetation – Biodiversity assessment guidelines*.

Have you received a planning permit to remove native vegetation in the last five years?

If you have undertaken any permitted clearing on your property within the last five years, the extent of this past clearing must be included in the total extent of your current permit application. The risk-based pathway for your application requirements and assessment pathway is determined using the combined extent of permitted clearing within the last five years and proposed clearing.

If the risk-based pathway determined from this combined extent is low, contact DELWP to confirm offset requirements.

Appendix 2 - Offset requirements details

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset. This offset must meet the following requirements:

Offset type	General offset
Offset amount (general biodiversity equivalence units)	0.017
Offset attributes	
Vicinity	Corangamite Catchment Management Authority (CMA)
Minimum strategic biodiversity score	0.166
Strategic biodiversity score of marked native vegetation	0.207

Native vegetation to be removed		
Total extent (hectares) for calculating habitat hectares	0.133	This is the total area of the marked native vegetation in hectares. The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree.
Condition score*	0.394	This is the weighted average condition score of the marked native vegetation. This condition score has been calculated using the *Native vegetation condition map*. The condition score of native vegetation is a site-based measure of how close the native vegetation is to its mature natural state, as represented by a benchmark reflecting pre-settlement circumstances. The *Native vegetation condition map* is a modelled layer based on survey data combined with a benchmark model and a range of other environmental data.
Habitat hectares	0.052	Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares = total extent x condition
Strategic biodiversity score	0.207	This is the weighted average strategic biodiversity score of the marked native vegetation. This strategic biodiversity score has been calculated using the *Strategic biodiversity map*. The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

Biodiversity assessment report

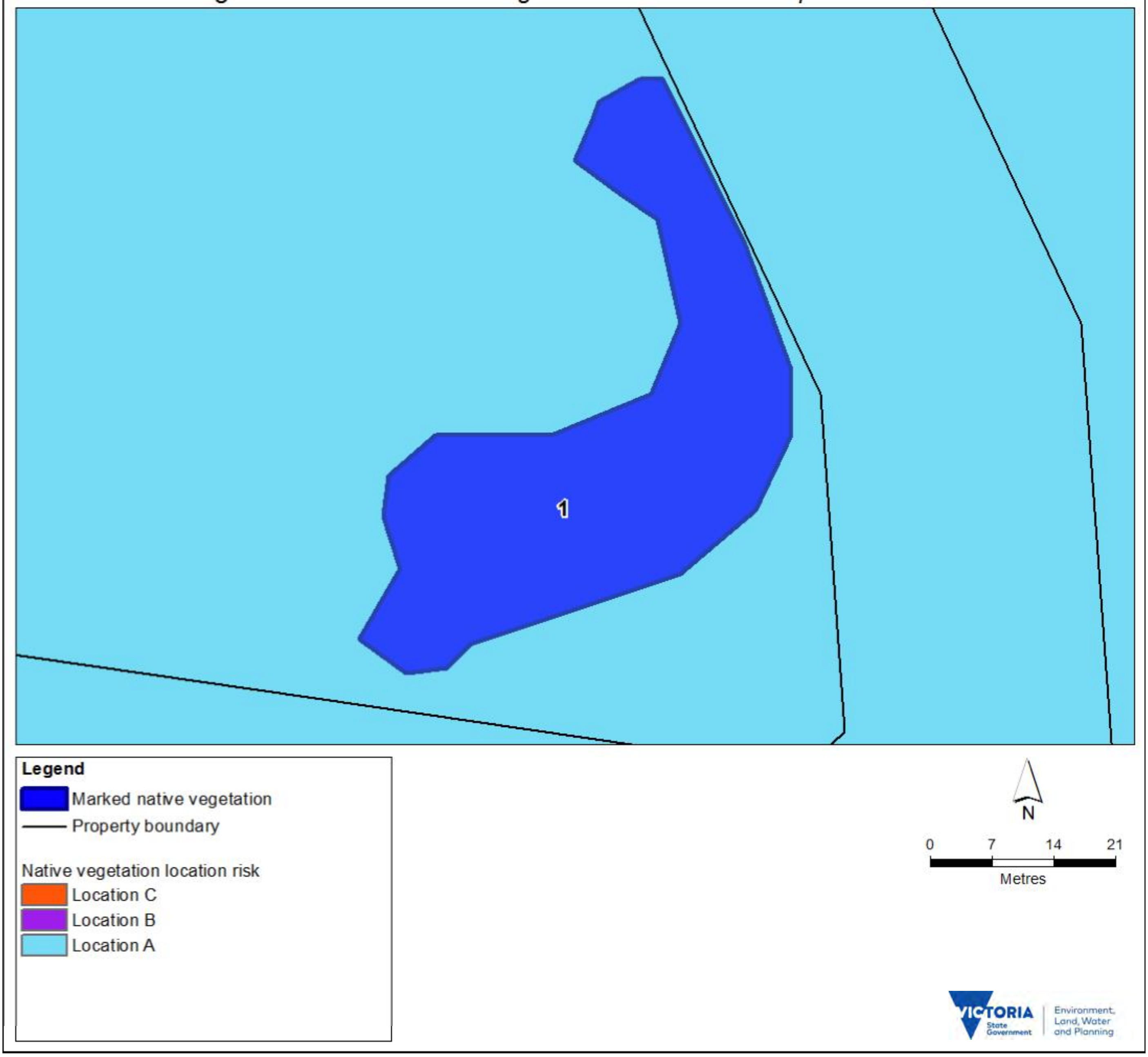
General biodiversity equivalence score	0.011	The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed (the marked native vegetation) makes to Victoria's biodiversity. It is calculated as follows: General biodiversity equivalence score = habitat hectares × strategic biodiversity score

* Offset requirements for partial clearing: If your proposal is to remove parts of the native vegetation in a remnant patch (for example only understorey plants) the condition score must be adjusted. This will require manual editing of the *condition score*, and an update to the following calculations that the biodiversity assessment tool has provided: *habitat hectares*, *general biodiversity equivalence score* and *offset amount*.

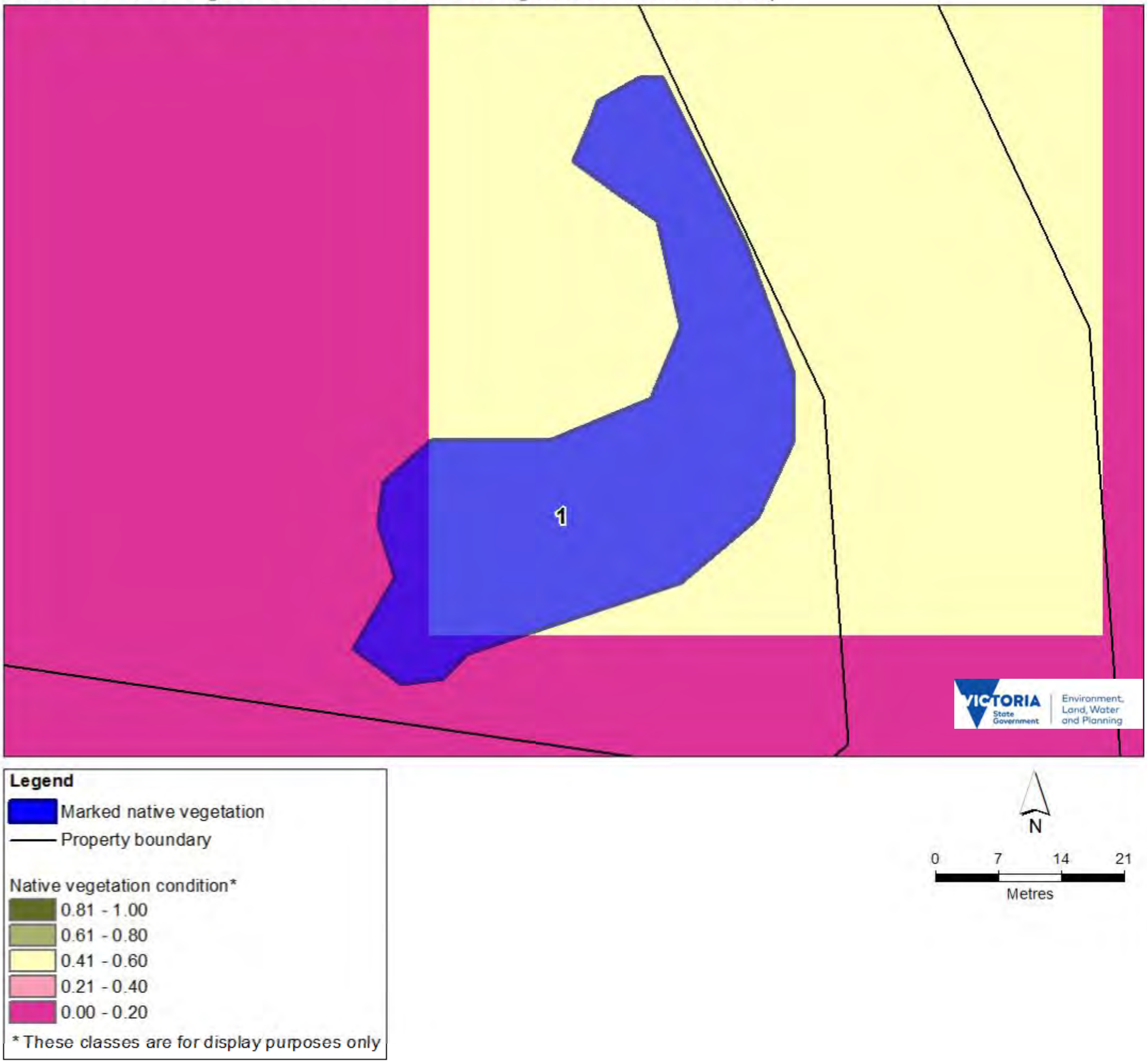
Offset requirements		
Offset type	General offset	A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have a significant impact on habitat for any rare or threatened species. All proposals in the low risk-based pathway will require a general offset.
Risk factor for general offsets	1.5	There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity. To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.
Offset amount (general biodiversity equivalence units)	0.017	This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation. Risk adjusted general biodiversity equivalence score = general biodiversity equivalence score $_{clearing}$ × 1.5
Minimum strategic biodiversity score	0.166	The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed.
Vicinity	Corangamite CMA	The offset site must be located within the same Catchment Management Authority boundary as the native vegetation to be removed.

Appendix 3 - Biodiversity information maps

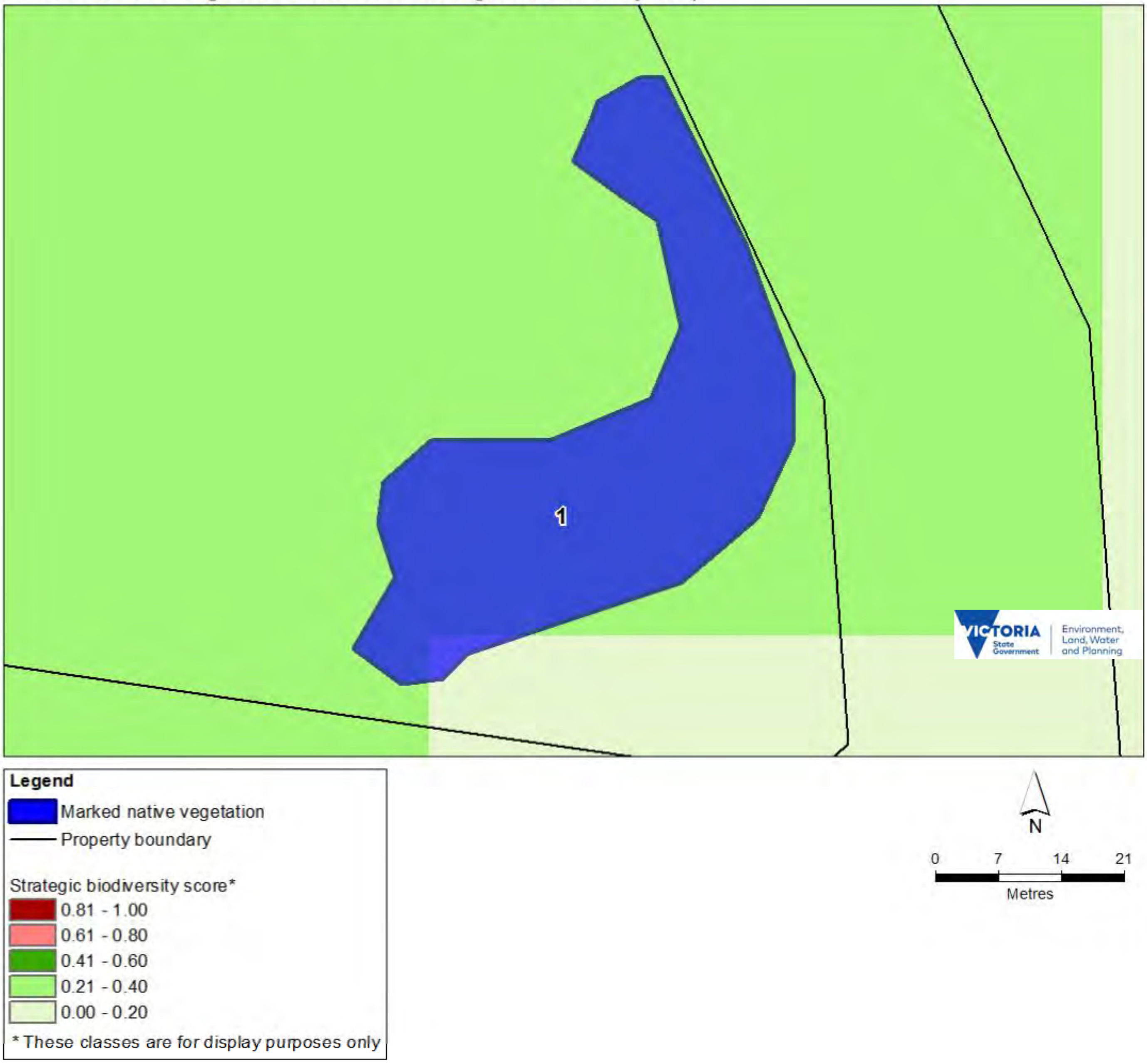
Marked native vegetation and the *Native vegetation location risk map*



Marked native vegetation and the *Native vegetation condition map*



Marked native vegetation and the *Strategic biodiversity map*



Appendix J

30 Pages

Community Consultation Information

Geelong Portside Cement Proposal, Stakeholder Engagement and Consultation Plan (September 2016)

Stakeholder Identification and Engagement Channel Schedule (September 2016)

Boral Cement in Geelong, Information for our community (November 2016)

Boral Cement in Geelong, Information for our community (January 2017)

Environmental Approvals Presentation, Clinker Grinding Facility, Cardno (February 2017)

Community consultation letter (Boral April 2016)

Community consultation letter (Boral December 2016)

Letter distribution footprint

Letter to Hon Luke Donnellan, Minister for Ports (Boral January 2017)

Geelong Portside Cement Proposal
Stakeholder Engagement & Consultation Plan
EXTERNAL VERSION

UPDATE - September 2016

Build something great™

CONTENTS

To be read with accompanying document

1609 GLNG Cement E&C Schedule Portside Proposal UPDATE (External Version).xlsx

1.0 Background

- The Boral Waurn Ponds Cement Works is the organisation's sole cement manufacturing location in Victoria. It was opened in 1964 and, until 2013, produced clinker for grinding into a range of cement products.
- Throughout the late 2000s and into the 2010s, domestic cement manufacturing began to experience a number of serious and sustained challenges. These included increasing costs of production driven by increasing energy prices, a period of strength for the Australian dollar, and the viability of importing clinker.
- The resultant effect on the Australian market saw the closure or downgrading of a number of long-standing manufacturing sites across the country.
- One of these, Cement Australia's Kandos facility in central western NSW, was closed in 2010 and replaced with a new imported clinker grinding facility at Port Kembla.
- With these factors as a context, a commercial decision was taken by Boral in 2012 to close the kiln at Waurn Ponds.
- The Waurn Ponds site has operated as a grinding facility since early 2013, intaking imported clinker through the Port of Geelong which is then transported to the site via city roads.
- While the site has continued successfully in 'grinding only' mode, the need to deliver further value to the business, customers and shareholders has led Cement to review the Waurn Ponds operations and compare these with potential new operations at the Port of Geelong.
- As part of investigating the business feasibility of new operations, a site for the proposed new clinker grinding facility has been identified in the northern part of the Port precinct, known as Lascelles.
- Lascelles is a long-standing industrial area, with the potential site bounded by a number of other manufacturing operations. The nearest residences are approximately 540 metres south in the suburb of North Shore, with the site hidden from their view by other industrial premises.
- The attraction to Cement of relocating operations to Lascelles is in the positive influence upon cost and efficiencies. The need to transport clinker between the Port and Waurn Ponds would be removed, and marine-related costs (eg demurrage) would reduce.

2.0 Document Purpose

The purpose of the Engagement and Consultation Plan is to outline the stakeholder engagement approach in support of the proposal. In particular, the Plan defines the following:

- Aims of stakeholder engagement and consultation;
- The level of stakeholder engagement which is to occur;
- Key stakeholders;
- How key stakeholders will be engaged;
- Timing of stakeholder engagement;
- Key project messages; and
- How engagement success will be monitored.

3.0 Aims of Engagement and Consultation

The aims of this Boral Cement initiative include:

- Investigation into the best commercial approach for Boral Cement production in the Geelong region (existing Waurn Ponds operations or new facility at the Port of Geelong);
- Securing a site and the appropriate approvals should the establishment of a new Port facility prove to be the better of the options available.
- Construction and commissioning of the new facility subsequent to approval.

Each of these components will have an impact on other areas of the Project. Accordingly, aspects of this Plan will need to remain flexible to any change in the Project resulting from implementation of each stage.

The aims of our stakeholder engagement and communication activity will therefore be:

- Building stakeholder understanding of the Project.
- Supporting the planning process required to gain the necessary approvals to establish the Port site – education of local residents and industrial neighbours, engagement with political decision makers.

- Creating a positive milieu around the concept of the Port operations in order to generate and sustain relationships with industrial neighbours and residents in the area.
- Minimise reputational risk to Boral and promote ongoing community support for the Project through implementing timely communication and highlighting the benefits (potential and actual) arising from the establishment of new operations.

4.0 Level of Engagement and Consultation

The International Association for Public Participation Spectrum (IAP2) is an internationally recognised tool which is used to guide the development and implementation of stakeholder engagement programs.

The table below indicates the IAP2 levels of engagement and the commitment attached to each. A **green** shading indicates the level/s which can apply to this Project, while the **amber** shading indicates levels which may be applied pending further internal review.

Red indicates the level does not or cannot be applied to this Project.

Level	IAP2 Goal	Promise
Inform	Provide balanced and objective information to stakeholders and assist their understanding	Keep stakeholders informed
Consult	Obtain stakeholder feedback on analysis, alternatives and/or decisions	Acknowledge stakeholder concerns and provide feedback on how stakeholder input influenced the final decisions
Involve	Work directly with stakeholders throughout the process to measure concerns. Stakeholder aspirations are understood and considered.	Stakeholder concerns directly reflected in alternatives
Collaborate	Partner stakeholders in each aspect of the decision including alternatives and solutions	Incorporate stakeholder advice and recommendations in decisions
Empower	Final decision making in the hands of the public	Implement community decisions

4.1 Consultation elements

Where IAP2 levels beyond ‘Consult’ are triggered by a Project, the Project components and decisions over which stakeholders have influence should be identified.

During the initial investigatory phase, the influence of residential and community stakeholders will be somewhat limited by the fact that the work carried out on the Project at this point will be aimed toward establishing business case feasibility.

Political and regulatory stakeholders, however, will be briefed on the options being considered in order to secure their understanding and potentially their support for the Project.

It is difficult to discern where stakeholders could be engaged to help make direct decisions about the Project without impacting its viability. This is because the Project is constrained by the need to be located on a site adjacent to the Lascelles Wharf (the number of feasible Geelong sites being limited).

The ‘Involve’ IAP2 goal has been highlighted in amber as there may be a limited number of opportunities for local stakeholders to influence changes to the Project. These opportunities could include:

- Transport routes and hours of usage
- Stockpile placement and storage
- Landscaping

It is also important to identify those components which are inflexible, usually because they can result in the failure or non-viability of the project at hand.

These include:

- Locating the operations within the Port precinct
- The use of heavy vehicle transport to move product
- Construction of unloading and delivery infrastructure

5.0 Project Team and Internal Resources

The Project is an initiative of Boral Cement. The business is wholly responsible for providing budget and ancillary resources (eg administration support) as required by members of the Project Team.

A comprehensive team has already been established by the business to manage this project and has been broken into workstreams. Matters associated with property are being led by the Property Group.

Members of direct relevance to the delivery of this Engagement and Consultation Plan include:

- Project Sponsor – Ross Harper
- Project Director – Neil Cooper
- Project Manager – Jason Wharton
- Site Management (Waurn Ponds and Geelong) – Graham Evans
- PSC Property Workstream Lead/Regional Manager – Judy McKittrick
- Planning – Sally Harle
- Environment – TBC (*Attila Balazs*)
- Human Resources - TBC
- Property Management – Andrew McFadyen
- Stakeholder/Communications Coordination – Paul Jackson

6.0 Who are our Stakeholders?

Thanks to Boral's long-standing operation of the Waurn Ponds site, the organisation has the benefit of already being known by, and holding relationships with, many of the Project's key stakeholders. These connections were most recently utilised through the implementation of Waurn Ponds kiln shutdown in late 2012.

The provisions of this Project, however, have necessitated the need to expand Boral's Geelong stakeholder 'footprint' to include those associated with the Port of Geelong as the location of potential new operations.

Through late 2015-early 2016, initial work to identify these new stakeholders and generate relationships with them has been undertaken. This has involved pursuing various 'leads' out of Boral's attendance at GeelongPort Community Liaison Committee meetings.

The Excel attachment *1609 GLNG Cement E&C Schedule Portside Proposal UPDATE (External Version)* accompanies this document. This spreadsheet captures both existing stakeholders as well as the newer stakeholders expected to be associated with the establishment of a Port operation.

6.1 Primary (critical) stakeholders

Boral regards all stakeholders as of equal importance when communicating about day-to-day initiatives or special projects. Stakeholder engagement and consultation plans are accordingly tailored to be inclusive of all parties, with emphasis on those groups most likely to be influenced or affected by any changes or new proposals.

The 'primary' stakeholders have been identified and listed in the table below:

Primary Stakeholder	Involvement / Key Issues
Geelong City Council	Assessing authority for planning related applications Ensuring planning permits contain conditions governing environmental management and residential amenity.
GeelongPort	Management of lands in Port of Geelong precinct Lessor to Boral for Lascelles site Assistance to Boral for establishment of new operations Ensuring Boral proposal does not unduly affect GeelongPort, its stakeholders or their amenity

Primary Stakeholder	Involvement / Key Issues
Industrial neighbours to Port operations site	Avoidance of any effects on own operations Assurance that Boral proposal/operations will not create issues which may affect entire precinct Ongoing management of environmental obligations to avoid influence on employees and customers/stakeholders
GeelongPort Community Liaison Committee / North Shore community	Management of operations to ensure residents are not affected by proposed Port operations Management of heavy vehicle movements to avoid untoward noise, and maintenance of safe driver behaviours Ongoing commitment to ensuring environmental protection of surrounds, primarily the waters off the Port Ongoing communication of business progress, both during establishment and once operational
VIC Department of Economic Development, Jobs, Transport & Resources (DEDJTR) – Invest Assist	Successful establishment of new operations at Port Liaison between State Government and Council as part of planning and development process Enhancement of Port of Geelong as an economic driver of activity for region and wider Victoria
Environment Protection Authority	Authority responsible for assessing and approving the required Works Approval. Environmental impacts
VIC Minister for Ports	Holds ultimate responsibility for the State's ports Interested in ensuring infrastructure is put to best use for economic gain of Victoria Could be a point of influence in approval process should any unexpected matters arise

7.0 How will we engage our Stakeholders (channels)?

The document *1609 GLNG Cement E&C Schedule Portside Proposal UPDATE (External Version)* uses a Boral template which lists out numerous communications and engagement options for consideration.

The following channels will be used to ensure the broadest reach of stakeholders can be informed and included:

- **Letters** – formal to key stakeholders, initially to introduce Boral and the project concept, then to notify ahead of key stages
- **Phone briefings and emails** – as a precursor to the sending of formal information.
- **One-on-one briefings** – to follow on from introductions and to explain the detail of the project concept.
- **Site visits/inspections** – will be offered to key stakeholders as an extension of one-on-one briefings or formal presentations, with the aim to allow stakeholders to visualise potential effects of the project on surrounds.
- **Formal presentations** – for larger groups such as Council and interested local business organisations
- **Community meetings/Community Liaison Committee meetings** – GeelongPort's CLC will act as a key conduit of information into the local community, and also an indicator of community satisfaction as the project progresses. Phase 3 also includes at least one 'general' community meeting which will be held if felt it is needed to reinforce other communication channels.
- **Information booth/kiosk** – an alternative to holding a community meeting at any stage of this Plan may be to arrange an 'information booth' drop in session at which stakeholders can view material and lodge questions with Boral personnel.
- **Information/fact sheets** – 'dot point' fast facts about the initiative which support other collateral. May include infographics.
- **Community newsletters** – the release of a community 'update' newsletter will keep residential stakeholders, most of whom are distant from the preferred Port operations site, informed of progress with

the project. The business may also opt to use these newsletters along the identified transport routes from the new site to encourage dialogue with those stakeholders
- **Q&A** – for both internal use and publishing as part of stakeholder collateral.
- **Static display** – the material generated for the 'information booth' could be organised for display at a public location such as a library or shopping centre.
- **Editorial** – Geelong's main media outlet, the *Geelong Advertiser* newspaper, will be the preferred channel for communications about the Project. Timely interaction will occur after all primary stakeholders have been engaged first. Photo opportunities will be organised as appropriate.
- **Advertorial** – small advertising campaigns are planned at key stages of the process to encourage interested stakeholders to log onto Boral's website for more information
- **Website** – A project website will be established to support this Plan at www.boral.com.au/geelong
- **Facebook presence** – the establishment of new infrastructure lends itself to the creation of a social media presence through which milestone moments can be publicly reported. The potential availability of positive imagery and a large nearby population suggest that this Project could be suitable for exploration of social media as a support engagement and consultation tool.

8.0 When will we engage our Stakeholders (timeframes)?

The accompanying document *1609 GLNG Cement E&C Schedule Portside Proposal UPDATE (External Version)* includes five tabs to separate the distinct phases of the Project mentioned in Section 2.

For reasons of confidentiality, the Excel document supplied externally shows only the detail of Phase 3. However, the full five phases are:

- **Phase 1: Data gathering** – Since October 2015, Boral has been introduced to a number of stakeholders connected to the Port. The interactions with these stakeholders have helped to inform the content of this Plan.
- **Phase 2: Introductory** – During this phase, a wider range of 'new' and existing stakeholders attached to the proposed site will be engaged. Stakeholders will be given detail about the Port option being explored. The purpose of the phase will be to raise awareness and position stakeholders toward support.
- **Phase 3**: **Planning process –** This phase includes the securing of the Port site and the obtaining of relevant planning approvals for the new operations. The latter involves the obtaining of a planning permit and work authority. Engagement will occur just ahead of and around the lodgement of key documentation with authorities.
- **Phase 4**: **Exhibition of applications –** Once a date for the commencement of the exhibition or advertising period for public comment has been confirmed for relevant applications, Boral will reconnect with stakeholders to inform them of the impending period, and to reinforce key messages.
- **Phase 5: Ongoing** – Known or unexpected issues may arise during or as a result of the exhibition period. The schedule indicated in this phase outlines how such issues should be addressed in terms of communication actions to be activated.

The document indicates whether each stakeholder should be engaged ahead of, at the time of, or after the undertaking of an action which is relevant to each phase. These are colour-coded appropriately.
A number of additional engagement activities will be detailed as the Project progresses. These include:
- Confirmation of approval/refusal of planning permits/work authority; and
- Commencement of construction of new Port facility (if approved);

9.0 What will we tell our Stakeholders (key messaging)?

To assist with management of engagement and consultation, it is standard Boral practice to develop a key messages and 'Q&A' document which considers the main 'story' of the matter at hand. It also seeks to anticipate the likely questions of stakeholders to which answers are framed.

Using the aims and objectives of this Plan (Section 2) as guidance, 'headline' key messages for the Project have been developed. While these remain confidential to Boral, the general themes which the messaging follows include:

- The purpose of the investigations into a new Port facility
- Our program of work for the next 12-18 months
- Benefits of a new Port facility for our business and the local region

10.0 Monitoring, Adjusting and Measuring Success

In order to verify that this Plan is reaching a broad range of stakeholders, and that the main messaging is being understood, continual monitoring of stakeholder reaction will be undertaken.

The main avenues for monitoring will be:

- In person and written responses to information about the Project received from 'primary' stakeholders, either directly or via GeelongPort;
- Feedback through other Property workstream members arising from their interactions with key stakeholders, including Invest Assist, Geelong City Council, the EPA and DEDJTR;
- Direct feedback received from residential and industrial neighbour stakeholders through the engagement initiatives offered through this Plan; and
- The nature and 'tone' of media coverage on the initiative, primarily through the main media outlet being the *Geelong Advertiser*.

Pending stakeholder feedback, adjustments to the Plan may be required to account for issues including:

- Insufficient reach across all stakeholder groups;
- Identification of new stakeholder groups not previously known to the business;
- Non-suitability of preferred channels to stakeholder needs;
- Disquiet among residents living along transport routes regarding actual or planned heavy vehicles movements;
- Dissatisfaction of any industrial neighbours with the proposed design, layout or features of the proposed Port operations; and
- Any requirements of GeelongPort as managers of the preferred site for the new operations.

The ultimate success of the Plan will be defined by the achievement of the overall objectives for the Project program (pg 3). However, specifically to this Plan, criteria which will be assessed when evaluating the success include:

- Stakeholder understanding of the reasoning for Boral's investigation of new operations at the Port;
- Neutral to favourable local media coverage;
- Nil to limited objections received during any planning assessment phases; and
- Formal and anecdotal positive feedback on the information sharing and engagement processes deployed in support of the Project by both stakeholders and assessing authorities.

Geelong Portside Cement project

STAKEHOLDER IDENTIFICATION AND ENGAGEMENT CHANNEL SCHEDULE

Jan-Dec 2016

At Sep 2016

To be read in conjunction with Engagement & Consultation Plan document 1609 GLNG Cement E&C Plan Portside Proposal UPDATE (External Version)
Note: As per the E&C Plan, this schedule features five phases. Due to confidentiality, the details of most have been removed but the phase of most relevance to assessing authorities (Phase 3 below) has been retained to offer an illustration of Boral's approach to stakeholder engagement.

Engagement channels ▷
(Timing indicated by cell shading)
(Pre-action)
(At time of action)
(Post action)
Stakeholders ▽
(Italics = for consideration, nil/limited previous engagement)

ACTION = COMMENCEMENT OF PLANNING PROCESS AS PART OF FEASIBILITY

Stakeholders	***Basic***	Letter (formal)	Email (formal/informal)	Phone briefing (informal)	***In-Person Interactive***	One-on-one meeting (formal) / Informal briefing / 'Door knock'	Site visit/inspection (individual/small group)	Formal presentation (key stakeholder/s)	Community meeting (general)	Community Liaison / Reference Group meeting	Panel discussion / workshop	Site Open Day / experience	Information booth / kiosk	***Written***	Information/fact sheet	Q&A	Community newsletter	Static display	***Media***	Editorial (media release / statement)	Editorial (media opportunity / photo)	Advertorial / advertising	***Social media / online***	Website / microsite	Facebook / Twitter presence	Interactive Q&A event (Facebook / Forum)	Polling / surveying	***Internal channels / forums***	Removed - in confidence	***Other stakeholder-specific channels***	*Nil*
Fenceline Neighbours / Host Communities / Supported Community Organisations																															
GeelongPort			X	X		X			X	X					X	X	X	X		X		X		X	X						
GeelongPort Community Liaison Committee			X						X	X					X	X	X	X		X		X		X	X						
Ports Pty Ltd			X	X		X			X	X					X	X	X	X		X		X		X	X						
North Shore residential community									X						X	X	X	X		X		X		X	X						
Residents living along transport route (Station Street)									X						X	X	X	X		X		X		X	X						
Omya			X	X					X						X	X	X	X		X		X		X	X						
Incitec Pivot			X	X					X						X	X	X	X		X		X		X	X						
OneSteel			X	X					X						X	X	X	X		X		X		X	X						
Viva Energy			X	X					X						X	X	X	X		X		X		X	X						
Terminals Pty Ltd			X	X					X						X	X	X	X		X		X		X	X						
Local Government																															
Geelong City Council - Administrators		X				X		X							X	X	X	X		X		X		X	X						
Geelong City Council - CEO (Spiller)		X				X		X							X	X	X	X		X		X		X	X						
Geelong City Council - GM Investment & Attraction (Luxford)			X	X		X	X	X							X	X	X	X		X		X		X	X						
Geelong City Council - Mgr City Devpt (Van Slagaren)			X	X		X	X	X							X	X	X	X		X		X		X	X						
Geelong City Council - Planning Strategy & Urban Growth (Hellsten)			X	X		X	X	X							X	X	X	X		X		X		X	X						
Geelong City Council - Enterprise Geelong (Hamilton, Jackson)			X	X		X	X	X							X	X	X	X		X		X		X	X						
State Government																															
VIC Member for Lara (Eren)		X							X						X	X	X	X		X		X		X	X						
VIC Member for Barwon South (Katos)		X							X						X	X	X	X		X		X		X	X						
VIC Member for Geelong (Couzens)		X							X						X	X	X	X		X		X		X	X						
VIC Upper House Member for Western Victoria (Geelong based) (Tierney)		X							X						X	X	X	X		X		X		X	X						
VIC Upper House Member for Western Victoria (Geelong based) (Ramsay)		X							X						X	X	X	X		X		X		X	X						
VIC Premier's Office (Andrews)		X																		X		X		X	X						
VIC Minister for Ports (Roads & Road Safety) (Donnellan)		X				X									X	X	X			X		X		X	X						
VIC Minister for Planning (Wynne)		X																		X		X		X	X						
VIC Minister for Industry, Energy & Resources (D'Ambrosio)		X																		X		X		X	X						
VIC Minister for Employment (Public Transport) (Allan)		X																		X		X		X	X						
Federal Government																															
Fed Member for Corangamite (Henderson)		X							X						X	X	X	X		X		X		X	X						
Fed Member for Corio (Marles)		X							X						X	X	X	X		X		X		X	X						
Govt Authorities																															
VIC Dept of Ec Devpt, Jobs, Transport & Resources (Invest Assist)			X	X		X			X						X	X	X	X		X		X		X	X						
VIC Regional Channels Authority			X	X					X						X	X	X	X		X		X		X	X						
VicRoads			X	X											X	X	X			X		X		X	X						
Environment Protection Authority (VIC)			X	X											X	X	X			X		X		X	X						
Media																															
Geelong Advertiser																				X	X	X		X	X						
Geelong Independent																				X	X			X	X						
Geelong News																				X	X			X	X						
The Weekly Review																				X	X			X	X						
95.5 K-Rock / 93.9 BAY FM																				X				X	X						
Interest / Activist Groups																															
Nil known at this stage																															
Environment / Heritage Groups																															
Nil interests at this stage																															
Business Groups																															
Committee for Geelong			X	X					X						X	X	X			X		X		X	X						
G21 - Geelong Regional Alliance			X	X					X						X	X	X			X		X		X	X						
Geelong Manufacturing Council			X	X					X						X	X	X			X		X		X	X						
Geelong Chamber of Commerce			X	X					X						X	X	X			X		X		X	X						
Indigenous Groups																															
Wathaurong Aboriginal Corporation			X	X					X						X	X	X			X		X		X	X						
Customers/Contractors/Lessees																															
Business to advise																															
Essential Community Services																															
Nil known at this stage																															
Internal																															
Removed - in confidence																															

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Boral Cement in Geelong

Information for our community

November 2016

The City of Geelong and surrounds play an important role in the business of Boral Cement. As the headquarters for the supply of our products around Victoria, we're looking at ways we can strengthen our commitment to doing business from this strategic location.

Creating cement from 'clinker'

For more than 60 years, cement has been made in Geelong using 'clinker' ground at a mill within the grounds of the Waurn Ponds Cement Works, on the city's western outskirts.

Originally, this clinker was produced by combining limestone from an on-site mine with various other components in the Works' kiln.

Unfortunately several economic factors influencing the cost of production resulted in the kiln being closed during 2013.

Since then, Waurn Ponds has generated its products using clinker imported through the Port of Geelong and transported by truck to the mill.

Going the distance…

While the current clinker grinding arrangements at Waurn Ponds meet the needs of customers across Victoria, challenges to the future of the domestic cement industry remain ever present.

Sustained pressure on the cost of production from aspects such as increasing energy prices, plus ongoing competition from large-scale producers in Asia, means local industry has been compelled to regularly review its approach.

For Boral, this has meant seeking opportunities which maximise the use of the imported clinker after it arrives at the Port.

One of the many areas we've considered is whether reducing the costs incurred by transporting the clinker from the Port to Waurn Ponds could help improve overall competitiveness and sustainability.

At present, once the clinker arrives, it has to be loaded onto heavy vehicles and driven up to 25 kilometres around Geelong's road network, depending on which route the truck takes.

We've therefore been investigating the viability of potentially relocating the grinding part of the process to the Port, removing the need for this transport.

Closer to the quay?

As part of our investigations, we've spoken with GeelongPort, the managers of the land and facilities on Geelong's northern port foreshore.

Through these discussions, a site has been identified near the Lascelles Wharf which could lend itself to the establishment of a new grinding mill, should investigations prove it feasible.

The site, bordered by The Esplanade and Walchs Road in the North Shore industrial precinct (shown overleaf), would have a number of advantages if clinker grinding was to be established there.

Like to know more? Call us on 02 9033 5215 or email feedback@boral.com.au.

Firstly, it is directly adjacent to the wharf complex which would allow efficient unloading of clinker from ships.

It also allows relatively direct access to the Princes Freeway for deliveries to customers.

Importantly, the site is also surrounded by other large industrial premises, meaning it is well separated and largely hidden from residential areas neighbouring the precinct.

So you're moving?

No. We have not completed the feasibility work required for us to make any informed decision about the future of our operations in Geelong.

For Boral to commit to such a decision, an approval from the Board of Boral Group Ltd is required. Therefore, our Board needs to be given as much information as possible.

As part of gathering this information, we have now reached the planning stage as any new operations would require approval from the relevant statutory authorities.

We've been preparing for the planning process for best part of this year and are now hoping to lodge the relevant applications before the end of 2017.

What are we applying for?

The applications will seek approval for a new clinker grinding mill and associated storages if we wish to proceed that way.

The storage silos would house different components including the imported clinker, and other raw materials.

If approved and subsequently pursued by Boral, we'd expect the new site to be able to operate continuously.

The approval processes will also address any operational and environmental constraints to ensure a compliant facility is provided.

This will include mitigation measures designed to assist with management of potential outputs such as dust and noise, in addition to issues which can effect residents further away from the site, like transport management.

On that subject, trucks delivering to and from any approved site would be required to use the existing transport routes connecting the Port to main roads and the Princes Freeway.

Find out more

With the applications soon to be lodged, we realise neighbours may have more questions about our plans.

Simply send an email to feedback@boral.com.au or phone 02 9033 5215 and we'll be happy to further discuss with you.

Build something great™

Boral Cement in Geelong

Focussed on the future

January 2017

Boral Cement is currently reviewing the way we serve our customers across Victoria from our base in Geelong. As part of this work, we're seeking to understand the feasibility of establishing a brand new clinker grinding facility adjacent to the Lascelles Wharf.

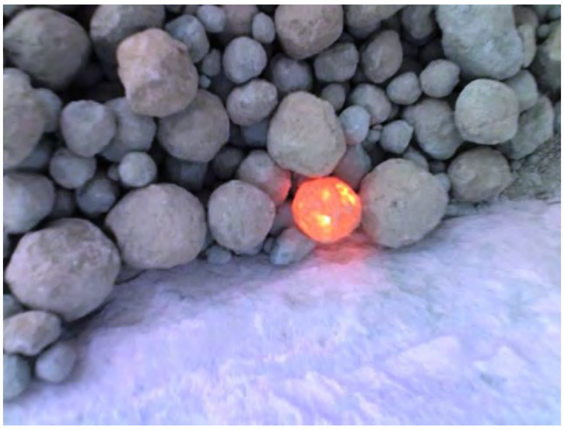
At a community meeting held in December, residents raised several matters about which this newsletter offers further information. Ahead of lodging the relevant applications in coming weeks, we're still welcoming your thoughts and feedback on our proposal.

Determining our direction…

We have been part of the Geelong community since the 1960s when the Waurn Ponds Cement Works first opened. However, the past five years have seen significant changes to the way we provide our products from the local area.

During 2013, production of 'clinker' at Waurn Ponds ceased when the on-site kiln closed. Most cement products are generated from clinker which is ground down into the powdered format with which most of us are familiar.

Since then, we have been incorporating clinker from Asia into our production. This is imported through the Port of Geelong and transported to Waurn Ponds via heavy vehicle.



While this has proven sufficient, the ever-present economic and other pressures on our industry remain. Accordingly, we've been looking at the other ways in which we might be able to operate as effectively.

This investigation has, as the community was informed last year, focussed on the potential for relocating local grinding operations to a site adjacent to the Port.

Our work on this feasibility study is well advanced to the point where we are now ready to make the relevant applications for the proposed facility.

While we reiterate we have made **no decision** to relocate to the Port, engaging with the approval process is critical to giving our Board the comprehensive overview needed to determine our future way of operating.

Our grinding concept

The applications we plan on lodging with authorities incorporate the latest available milling technology, as well as measures to mitigate any potential environmental outputs.

They propose the building of two fully enclosed 'ball mills' at our identified site between The Esplanade and Walchs Road, as well as a number of storage silos.

Enclosed conveyors are also included to allow for the movement of materials between the wharf and around the site which we seek to operate 24 hours a day, seven days a week.

The applications also include a control and administration building, amenities and on-site waiting and parking areas for heavy vehicles.

The facility as proposed is relatively small compared to the existing surrounding industrial operations, with the most noticeable feature likely to be the distinctive domed storage which will hold the clinker.

**Draft design shown for illustrative purposes only*

Like to know more? Call us on 02 9033 5215 or email feedback@boral.com.au.

Dealing with dust

The extensive experience we've gained from operating at Waurn Ponds and several sites in NSW has allowed us to evolve our approach to managing the potential for dust emissions.

As part of our applications, we're proposing mitigation measures drawing both from industry best practice and those we've enhanced at our existing sites through continuous improvement.

Full enclosure of buildings and conveyors is a key design inclusion aimed at reducing the risk of emissions during unloading, transfer, grinding and truck loading.

Our proposal also features the use of dust collection systems throughout the production process including on conveyors, loading hoppers and the truck loading systems.

The truck loading facility will incorporate a 'sock', rubber lined and self-closing to prevent the escape of dust. Similarly, all other hoppers will be self-closing, including those at the Wharf which will receive an upgrade.

As a further mitigation, we're also proposing to arrange the use of vacuum trucks to sweep two to three times each week in the event any fugitive dust from around the precinct affects our facility or neighbouring roads.

A great advantage these systems offer is that any dust collected can be re-used in production, making control of dust emissions in our interests not just from an environmental perspective.

Truck traffic in town

The North Shore industrial precinct is already very busy with heavy vehicle movements, so questions about how our proposal might add to those are entirely understandable.

Pleasingly, our proposal will **not** result in a net increase on our truck numbers. In fact, it would deliver an improved outcome on local roads.

Presently, our truck movements are concentrated over the four to five day period it takes to unload each clinker ship. This means up to 250 trucks per each 24 hour period.

Through our proposal, this will reduce to around **50 to 60 a day** or, in other terms, two to three an hour across a 24 hour cycle (less on weekends due to lower customer need).

Our proposal indicates that our trucks will use the existing heavy vehicle routes to the Geelong Ring Road and Princes Highway. **No** trucks will be permitted to access nearby residential areas.

Not making noise…

Despite our identified site being located among larger existing manufacturing premises, we remain conscious of the amount of noise our proposed operation could potentially make.

Accordingly, in framing our applications, we've ensured the proposed facility will fit within the relevant limits for noise applying to the site.

Modelling included in our application shows that this is the case, mainly due to our planned full enclosure of noise-emitting components.

Hear more and let us know what you think!

Our team will be at the next meeting of the North Shore Residents Group at 7.30pm on Wednesday, 15 February at The Mission to Seafarers to go through the detail of the applications.

In the meantime, we continue to welcome your questions, feedback or any other opportunity to discuss our proposal.

Simply send an email to feedback@boral.com.au or call 02 9033 5215.

Environmental Approvals

Clinker Grinding Facility,
37-65 Walchs Road,
North Shore VIC

Colin Stapleton

Community Engagement Meeting 15 February 2017

Overview

- Approval types
- Application process
- What happens after the application goes in
- Supporting information

Approvals

- Works Approval Application – EPA
- Planning Application – City of Greater Geelong
- Planning application is for “Buildings and Works”
- Works Approval is a public process

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Shaping the Future

Project overview

- Clinker grinding and dispatch
- 6.1 ha of derelict port land (has been since the 90s)
- Boral currently use the Port
- Convey materials rather than truck to Waurn Ponds
- Site to be leased from the Ports
- New facility and proven process technology (ball milling)
- A new conveyor system from the port (owned and operated by the Port)
- Continuous operation of the facility

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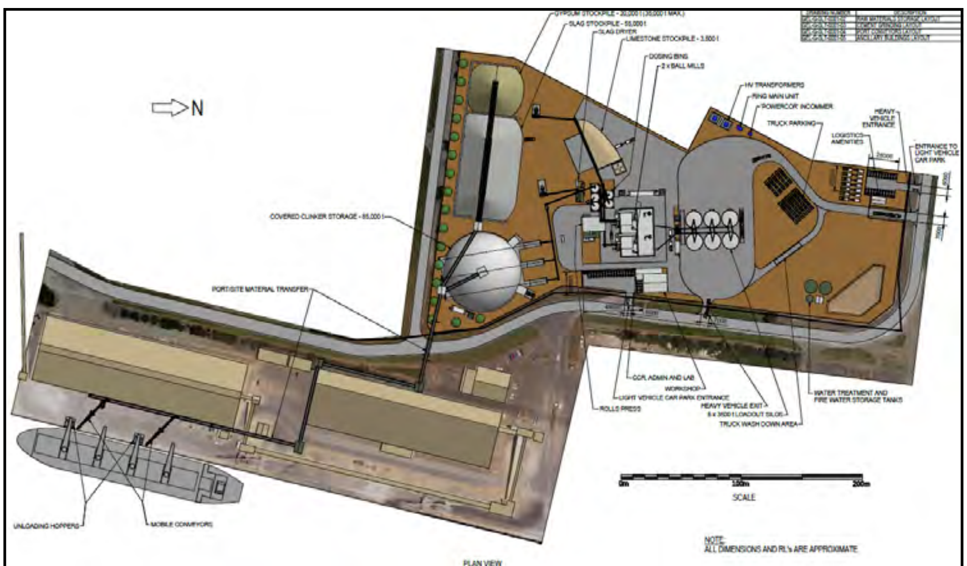
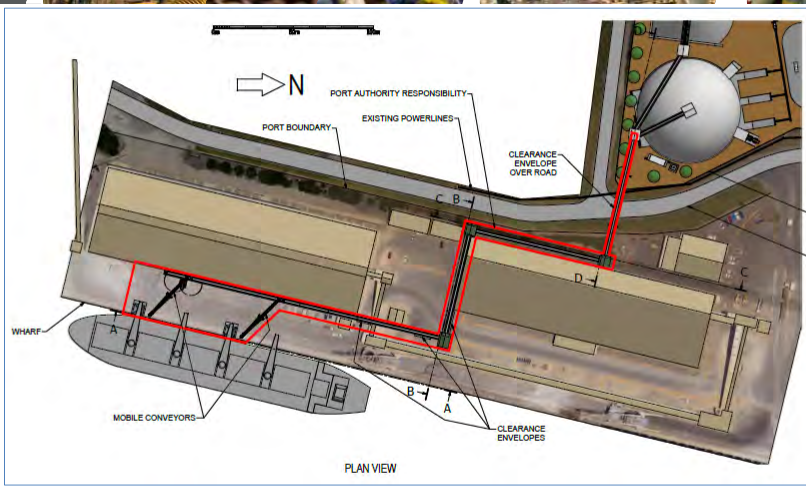
Shaping the Future



Indicative Layout



Indicative Layout

Cardno Shaping the Future

Works Approval

- Activity is “clinker grinding” – scheduled activity
- Demonstrate compliance with regulations and Environmental Policies (SEPPs)
- Public process – documents will be on EPA website
- Decision made by the Authority (not regional office or one particular officer at EPA) due to level and types of assessment required

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Boral has to demonstrate

- Can build and operate the facility in accordance with the statutory requirements
- Has consulted and listened to stakeholder views
- Has used and followed appropriate tools and methodologies to prepare the application (models, guidelines, datasets)
- The proposal is “best practice” and technology is “proven”
- Environmental risks are controlled and contingencies in place
- Have a proven track record and is a “good corporate citizen”

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Shaping the Future

Post Submission of the Application

- Review for compliance by EPA and acceptance of the application
- Formal advertising for public comments
- Public meeting (20B Conference) – opportunity to meet with EPA
- Assessment of the application
- EPA can seek further information from the applicant at any stage i.e. “clock stops”

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Post Approval

- Works Approval has conditions
- Site (once built) will be licensed by EPA
- Ongoing requirements to manage environmental emissions
- Licence requires Boral to report any non-conformances (within 24 hours) and report on performance (annual)

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Supporting Information

Main studies for this application:

- Air quality impact assessment
- Noise impact assessment
- Surface water management
- Traffic (planning requirement)

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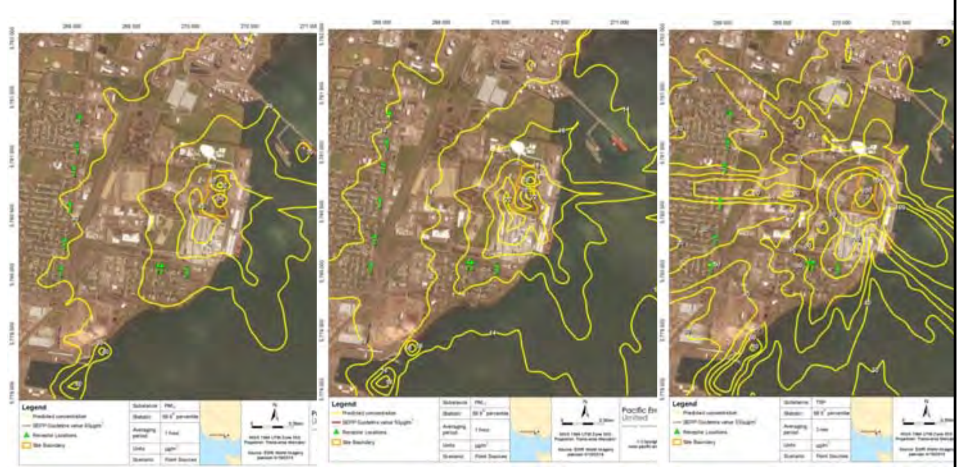
Air Quality Impact Assessment

- Baseline data collection - monitoring
- Numerical “predictive” computer model (emission rates, mitigation, weather locations, sensitive locations)
- Based on operating at planned capacity
- Review and discussions with EPA
- Compliant with statutory requirements
- Include dust management plan



Noise Impact Assessment

- Baseline noise monitoring
- Numerical "predictive" computer model (noise sources, mitigation, sensitive locations, terrain)
- Based on operating at planned capacity
- Compliant with guidelines and policies
- Includes a range of noise mitigation options to comply

Surface Water Management

- Not a water intensive process – does not produce “waste water”
- Manage water flow into and out of the site (turbidity)
- Stormwater hydrology assessment:
  - how much rainfall?
  - how often?
  - how intense?
  - and where does it flow?
- Proposed management strategy
  - Management - controls
  - Treatment – Constructed industrial interceptor and settlement pond
  - Demonstrate that water is controlled and treated (if needed) prior to discharge
- Preserve water quality ensure no impact to the Bay

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Traffic

- Net improvement from current operation – fewer vehicles
- Traffic Surveys (vehicle movements)
- Traffic volume (generated by plant)
- Net reduction of traffic due to raw materials being conveyed to site
- Majority of volume is for the Melbourne market
- Trucks will use existing heavy vehicle route to freeway

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Summary

- Works Approval will be submitted to EPA
- Upon approval, will operate under a licence from EPA
- Air and noise emissions are predicted to comply with statutory requirements and will be managed throughout operations
- Surface waters will be managed to prevent turbid waters leaving the site (and no process water)
- Net reduction of traffic due to raw materials being conveyed to site

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Shaping the Future

Build something great™

11 April 2016

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www.boral.com.au

<Name>
<Title>
<Address>
<CITY> VIC 3XXX

Dear <Name>

Boral is Australia's leading producer and supplier of materials for the building and construction industry. In 2016, we celebrate 70 years of contributing to the growth and development of our nation as a result of significant contributions to key public and private infrastructure projects.

The success of our business has always been reliant upon our well located and integrated network of resources, production facilities and distribution channels. Our effective management of this network has allowed us an advantage when meeting customer expectations and needs.

In Victoria, one of the key locations from which we operate is the City of Geelong. Boral's presence in the region extends back to the 1960s through the Boral Waurn Ponds Cement Works, from which customers across the state are supplied with our cement products.

Until 2013, the Waurn Ponds operation manufactured 'clinker', the base material which is then ground to produce cement. Following a commercial review, clinker production was ceased and the site converted to the grinding of imported clinker only.

There were several contributing factors toward this decision. Production costs had increased, mainly due to rising energy prices, the Australian dollar at the time was strong, and competition resulting from the availability of imported clinker presented challenges to the domestic industry.

Despite the successful transition to grinding only, the conditions which drove the decision of three years ago remain today. As a result, Boral is again reviewing its Victorian cement business model with the aim of improving our competitiveness and ability to serve the market.

Part of this review involves assessing the feasibility of relocating our local operations from the existing Waurn Ponds site to the Port of Geelong. Work has commenced on this assessment and a potential site adjacent to the Lascelles Wharf identified for the purposes of the review.

We expect this program to take between 12 and 18 months. Our findings will inform the preparation of a business case in support of relocation to the Port, which will then be considered alongside the existing Waurn Ponds operations.

The final decision regarding our future approach will then be taken by the Boral Board once the business case is finalised.

We believe the conduct of this feasibility study represents a great opportunity for Boral to reaffirm its connection with the Geelong region and continue the long relationship between the city and our business.

While a final decision is still some time off and much work needs to be completed, we feel it's important to ensure our valued stakeholders are made aware of this initiative and are given more detail about the purpose of Boral's review of its operating model, as well as the process we will follow.

Accordingly, we would like to take the early opportunity to provide you with a briefing on the overall review if appropriate. If it is of assistance, we will have representatives available for meetings in either Geelong or Melbourne throughout April.

Should you be interested in receiving this briefing, please contact our Stakeholder Relations Manager, **Paul Jackson**, via **02 9033 5215** or **paul.jackson2@boral.com.au** who will be pleased to arrange the necessary details.

We thank you for your interest in this letter and our Geelong operations, and look forward to further discussing our plans for the coming period with you.

Yours sincerely

Geoff Goldsmith
Project Manager
Boral Cement Ltd

Build something great™

5 December 2016

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Wentworthville NSW 2145

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F: +61 (02) 9033 4055

www.boral.com.au

<Name>
<Title>
<Address>
<CITY> VIC 3XXX

Dear <Name>

Earlier this year, representatives of our business met with you to discuss a review we had recently commenced into the way Boral Cement products are supplied to customers across Victoria.

At present this supply is produced by grinding 'clinker', one of the base materials needed to generate cement, as imported through the Port of Geelong and transported by road to a mill at our Waurn Ponds Cement Works.

You may recall we explained that as part of this review, we are seeking to understand the feasibility of potentially establishing a new grinding facility adjacent to the Lascelles Wharf in the Port precinct.

Accordingly, throughout 2016 we have undertaken a range of studies and activities aimed at providing a full scope of information to our Board for their future consideration. This work continues and is now about to reach an important milestone.

In order to fully and correctly assess the feasibility of the Port option, we are about to initiate the relevant planning processes through regulatory authorities. We're expecting to be in a position to consequently lodge the required applications before the end of this year or early in 2017.

The applications will seek approval for the grinding mill and associated storages for clinker and other raw materials. If an approval is received, our expectation is that the site would be able to operate on a continuous basis.

During the past few weeks we have been sharing this news with the fenceline neighbours of the proposed Port site, residents in the nearby North Shore residential area and, of course, our own existing workforce at Waurn Ponds.

The enclosed newsletter has been distributed as part of these engagements and is now provided for your reference as well.

We have also once again been offering to meet with and further brief stakeholders of our Victorian Cement business on the applications and specific plans for the proposed site, as well as the overall feasibility investigation and review.

This is an invitation we would like to extend to you if deemed necessary and appropriate. Should you be interested in an update, our Stakeholder Relations Manager, **Paul Jackson**, can arrange this – Paul is available on **02 9033 5215** or via **paul.jackson2@boral.com.au**.

We thank you for your continued interest in our Geelong operations and look forward to detailing the progress of our plans with you.

Yours sincerely

Jason Wharton
Senior Project Manager
Boral Cement Ltd

Sea Breeze Parade
Myrtle Grove
Pine Ave
The Esplanade
Phosphate Rd
Seabeach Parade
Seaforth St
Seabright St
Seaside Parade
Beatty St
Seaside Cornice
Ikon Collectables
C115
Sava Engineering
Geelong Standard Trailers Pty. Ltd
Wolfsburg Automotive
Paragon Fabrications
Geelong Poultry
Australia Post - North Shore CPA
Newtown Pools & Spas
Bay Walk
Park

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BORAL®

25 January 2017

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The Hon Luke Donnellan MLA
Minister for Ports
Minister for Roads and Road Safety
Member for Narre Warren North
Level 22, 1 Spring Street
MELBOURNE VIC 3000

Via email: luke.donnellan@parliament.vic.gov.au

Dear Minister

Boral is Australia's leading producer and supplier of materials for the building and construction industry. Last year was our 70th year of contributing to the development of our nation through our products, from which innumerable public and private infrastructure projects have been created.

The success of our business was established upon, and is sustained by, our well located and integrated network of resources, production facilities and distribution channels. In Victoria, one of the key locations from which we operate is the City of Geelong.

Our presence in Geelong began in the 1960s with the Boral Waurn Ponds Cement Works, from which customers across the state are supplied with our cement products.

Until 2013 'clinker', the base material from which these products are generated, was manufactured at the site. Following a commercial review, clinker manufacturing was ceased however cement production was continued through the use of clinker imported from Asia.

Despite the successful transition to grinding only, the conditions which saw the end of clinker manufacturing at Waurn Ponds persist today. As a result, we are reviewing the way we serve our customers in Victoria with the aim of improving our competitiveness and sustainability.

This has been a process we've been undertaking for the past 18 months. Amongst other things, our work has involved assessing the feasibility of relocating the local clinker grinding operations to a site adjacent to the Lascelles Wharf at the Port of Geelong.

A decision to relocate to the Port of Geelong is subject to a number of factors including approval of our Board and statutory approvals for the proposed site. This key milestone is about to begin with the lodgment of the relevant applications, including to the Environment Protection Authority of Victoria.

As the proposal involves operational land within the Port of Geelong precinct, and given it represents an exciting opportunity for our business and for further use of and activity at the Port, we felt it was prudent that we raised this initiative with you as the relevant Minister.

We have been engaging with Port-related organisations, fenceline neighbours to the site, and the wider community about our work for some time. Accordingly, accompanying this letter are our two most recent update newsletters for your information and consideration.

Should it be appropriate, we would be very interested in briefing you or your office further about the proposal and the business drivers behind it. Our Stakeholder Relations Manager, **Paul Jackson**, will be pleased to arrange the necessary details from our end.

If it is of assistance, we would be pleased to meet with you either in Melbourne or at your electoral office or, further, at the proposed site in Geelong. Paul can be contacted via **02 9033 5215** or email to paul.jackson2@boral.com.au.

We believe our proposal represents a great opportunity for us to reaffirm our connection with the Geelong region through the potential investment in a new facility, and to continue the long relationship between the city and our business.

Thank you for your interest in this letter. We look forward to further discussing our plans with you.

Yours sincerely

R. T. Harper

Ross Harper
Executive General Manager
Boral Cement Ltd

Appendix K

3 Pages

Pre-Application Correspondence

K1 - Geelong Ports Correspondence dated 21 December 2016

K2 - City of Geelong Correspondence dated 16 December 2016

GeelongPort Pty. Limited
ABN 50 003 996 594
Corio Quay Road
North Geelong VIC 3215
PO Box 344
Geelong VIC 3220
Telephone: (03) 5247 0200
Fax: (03) 5272 1560

Mr Andrew McFadyen
Boral Property Group
251 Salmon Street
Port Melbourne VIC 3207

21 December 2016

BY EMAIL

Dear Andrew,

RE: EPA application requirements for the proposed Boral Plant adjacent Lascelles Wharf

This letter comes in response to your email of 12 December 2016 in relation to the requirements of Boral's EPA application with respect to the proposed Boral project currently under investigation at GeelongPort.

I can confirm GeelongPort will be responsible for the construction, maintenance and any approvals required for the proposed conveyor system intended to convey Boral product from vessel discharge at Lascelles No.1 berth, specifically any approvals required for the passage and construction of the proposed conveyor as it crosses The Esplanade, North Shore and enters the proposed Boral plant.

Further, GeelongPort will also be responsible for any approvals relating to the proposed conveying system and discharge related activities within the port area.

Should you have any further queries, please feel free to contact the undersigned.

Kind regards,

Jeremy Ballenger

Commercial and Business Development Manager
GeelongPort

From:	Harle, Sally
To:	McKittrick, Judy; Wharton, Jason
Cc:	Colin Stapleton
Subject:	Fwd: Private and Confidential: Boral Cement Limited proposed Clinker grinding facility at Walchs Rd, North Shore
Date:	Friday, 16 December 2016 4:22:28 PM
Attachments:	image003.png image004.png image005.png

FYI

Regards Sally

Begin forwarded message:

From: Roger Munn <RMunn@geelongcity.vic.gov.au>
Date: 16 December 2016 at 4:16:28 pm AEDT
To: "'Asten, Heidi'" <Heidi.Asten@hsf.com>
Cc: "Harle, Sally (Sally.Harle@boral.com.au)" <Sally.Harle@boral.com.au>, "Peacock, Lauren" <Lauren.Peacock@hsf.com>, 'Fiona Slechten' <Fiona.Slechten@calibreconsulting.co>
Subject: RE: Private and Confidential: Boral Cement Limited proposed Clinker grinding facility at Walchs Rd, North Shore

Hi Heidi,

Upon review of the planning controls and the information provided in your letter dated 23 November 2016, we confirm that the only trigger for the proposal (as described by Calibre Consulting at our meeting on 2 September 2016) will be for buildings and works under the Design ad Development Overlay.

We also confirm that such an application will be exempt from notice and review pursuant to Clause 2.0 of the DDO20.

Please don't hesitate to contact me if you require any clarification or wish to discuss further.

Regards,
Roger

Roger Munn
Senior Statutory Planner

P: 03 5272 4459
F: 03 5272 4486
E: rmunn@geelongcity.vic.gov.au

CoGG_logo

100 BROUGHAM ST GEELONG
PO BOX 104 GEELONG VIC 3220 AUSTRALIA

WWW.GEELONGAUSTRALIA.COM.AU

From: Asten, Heidi [mailto:Heidi.Asten@hsf.com]
Sent: Thursday, 24 November 2016 11:30 AM

To: Roger Munn
Cc: Harle, Sally (Sally.Harle@boral.com.au); Peacock, Lauren
Subject: Private and Confidential: Boral Cement Limited proposed Clinker grinding facility at Walchs Rd, North Shore

Dear Mr Munn,

Please see attached correspondence relating to a proposal by our client Boral Cement Limited to develop a clinker grinding facility at Walchs Rd, North Shore. Please feel free to call with any queries, otherwise we look forward to hearing from you in due course.

Kind regards,

Heidi Asten
Special Counsel
Herbert Smith Freehills

T +61 3 9288 1710 F +61 3 9288 1567
www.herbertsmithfreehills.com
https://www.linkedin.com/in/heidiasten

Australasian Law Awards 2016 – International Firm of the Year

Appendix L
3 Pages

About ESA Reports

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno

13 August 2015