BORG CONSTRUCTION PTY LTD

ENVIRONMENTAL IMPACT STATEMENT

TIMBER PROCESSING FACILITY (PARTICLE BOARD)

LOT 1 DP 1085563, LOT 2 DP 1085563, LOT 26 DP 1200697,

LOT 24 DP 1148073 AND LOT 1 DP 1076346

124 LOWES MOUNT ROAD, OBERON

JUNE 2016

THE DESIGN PARTNERSHIP

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PROJECT NUMBER: 14.023

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DECLARATION

Declaration under Part 3, Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Author of the Environmental Impact Statement

Name: Andrew Neil Address: 21 Jusfrute Drive, West Gosford, NSW, 2250

Qualification: Bachelor of Arts (History), Graduate Diploma in Urban and Regional Planning

Address of the Land to which this EIS Applies

The land subject to this EIS is located at 124 Lowes Mount Road, Oberon within the Oberon Local Government Area on the following Lots: Lot 1 DP 1085563, Lot 2 DP 1085563, Lot 26 DP 1200697, Lot 24 DP 1148073 and Lot 1 DP 1076346

Description of the Project to which this EIS Applies

This EIS examines the works that would be required for the Project. The key Project elements include:

- Allow for the construction of a dedicated Particle Board Manufacturing Line to allow Borg to continue their growth and remain internationally competitive
- Create a significant increase in long term employment opportunities within a regional area
- Provide additional infrastructure within existing buildings to value add to existing product
- Modernise the existing facility
- Allow for expansion to Lot 1 and 2 DP 1085563 for the purposes of a wood flake preparation area
- Construct a new automated storage warehouse part on Lot 24 DP 1148073 and part on Lot 26 DP 1200697
- Construction of hardstand on Lot 24 DP 1148073
- Allow for expansion to Lot 1 DP 1076346 for hardstand, water quality ponds and emergency catchment
- Rationalise the current Conditions of Consent under DA 27/95 that apply to a number of different lots, all under fragmented ownership and operation
- Allow for an increase in production by up to 500,000m^3, with a commensurate increase in staff levels
- Boundary adjustment of Lot 1 DP 1076346 to rectify the current split zoning, consolidating the IN1 zoned land into Lot 26, retaining all the RU1 zoned land under the current Lot and DP
- Lot consolidation of all lots the subject of this application.

Assessment of the Environmental Impact of the Project

An assessment of the environmental impact of the Project is contained in this Environmental Impact Statement.

Declaration

Pursuant to clause 6(f), Part 3, Schedule 2 of the Environmental Planning and Assessment Regulation 2000,

I declare that this Environmental Impact Statement:

a) Has been prepared in accordance with the requirements of the Environmental Planning and Assessment Act 1979 and the Environmental Planning and Assessment Regulation 2000;
b) Contains all available information that is relevant to the environmental assessment of the Project to which this Environmental Impact Statement relates; and
c) Contains information that is neither false nor misleading.

Andrew Neil

01 June 2016

EXECUTIVE SUMMARY

Introduction

This Environmental Impact Statement (EIS) has been prepared by The Design Partnership Pty Ltd on behalf of Borg Constructions Pty Ltd (Borg) for a State Significant Development (SSD) application for an expansion to an existing timber panel processing facility at Oberon, NSW.

Borg is seeking approval for the works at the existing facility to be increased through the addition of a particle board manufacturing line, including chipping facility, to the existing MDF manufacturing line, as well as minor additional site works and extension of the area covered by the consent. As part of the approval Borg is proposing to rationalise the existing approval for the facility, DA 27/95. This previous consent will continue to operate for other areas within the Oberon Timber Complex. However, all land owned by or operated by Borg Panels is to be excluded from the operation of this existing consent, to come under this new consent.

This consent will be issued under State Environmental Planning Policy (State Significant Development) 2008 as the Project is for a timber processing facility with a value of over $30,000,000. Approval is being sought under Division 4.1 of the Environmental Planning and Assessment Act (1979) (the Act). This Environmental Impact Statement (EIS) has been prepared by The Design Partnership to meet the requirements of both the Act and the Environmental Planning and Assessment Regulation 2000. This EIS also addresses the Secretary's Environmental Assessment Requirements (SEAR's) which were issued to the proponent in April 2015.

Site and Context

The existing facility is located within the existing Oberon Timber Complex (OTC), which is governed by an existing consent issued by the Department of Planning and Environment (The Department) (then Department of Urban Affairs and Planning) in DA 27/95. The OTC is located approximately 1.5km north of the Oberon CBD. The land on which the Project is located is owned by Borg Panels. The land identified as being within the Project is identified as:

Lot 1 DP 1085563, Lot 2 DP 1085563, Lot 26 DP 1200697, Lot 24 DP 1148073 and Lot 1 DP 1076346

The closest residential receiver is approximately 600m to the south of the Project site boundary, whilst a caravan park is located approximately 300m to the south. Both the nearest residence and the caravan park are separated from the site by un-associated industrial activities and a heavy vehicle bypass.

Project Description

- Allow for the construction of a dedicated Particle Board Manufacturing Line to allow Borg to continue their growth and remain internationally competitive
- Create a significant increase in long term employment opportunities within a regional area
- Provide additional infrastructure within existing buildings to value add to existing product
- Modernise the existing facility
- Allow for expansion to Lot 1 and 2 DP 1085563 for the purposes of a wood flake preparation area
- Construct a new automated storage warehouse part on Lot 24 DP 1148073 and part on Lot 26 DP 1200697
- Construction of hardstand on Lot 24 DP 1148073

- Allow for expansion to Lot 1 DP 1076346 for hardstand, water quality ponds and emergency catchment
- Rationalise the current Conditions of Consent under DA 27/95 that apply to a number of different lots, all under fragmented ownership and operation
- Allow for an increase in production by up to 500,000m^3, with a commensurate increase in staff levels
- Boundary adjustment of Lot 1 DP 1076346 to rectify the current split zoning, consolidating the IN1 zoned land into Lot 26, retaining all the RU1 zoned land under the current Lot and DP
- Lot consolidation of all lots the subject of this application.

Statutory Planning

The Site is located within the Oberon Council LGA which is governed by the Oberon Local Environmental Plan (LEP 2013). However, the Project meets the criteria under SEPP (State and Regional Development) 2011. Therefore, the Project will therefore be assessed in accordance with Part 4, Division 4.1 of the Environmental Planning and Assessment (EP&A) Act as a State Significant Development (SSD).

Being declared as an SSD, the provisions of the LEP 2013 do not apply to the proposed Site. The Project is nevertheless consistent with the provisions of local, regional and State planning instruments and strategies which would otherwise apply to the proposal, including:

- State Environmental Planning Policy (State and Regional Development) 2011
- State Environmental Planning Policy 55 – Remediation of Land
- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy 33 – Hazardous and Offensive Development
- Central West and Orana Regional Growth Plan

Identification of Issues

An assessment of the potential environmental issues and associated level of risk was made for the Project based on issues raised:

- During the operations of the existing facility
- The SEARs issued for the Project
- In consultation with agencies
- Community feedback

This feedback and assessment created a hierarchy of environmental priorities and allowed for the identification and prioritisation of potential environmental issues. This allowed for the focus of the environmental assessment of the proposal to be targeted at those specific areas of concern.

These are as follows:

High

- Noise and Vibration
- Air quality

Medium

- Traffic
- Hazard and risk
- Visual impacts
- Greenhouse gas
- Ground and surface water

Low

- Ecology
- Heritage
- Waste
- Socio-Economic impacts
- Soil impacts

These are addressed in greater detail within the body of the report. However, the following provides for a summation of the issues and mitigation measures proposed.

Noise

A Noise and Vibration Impacts Assessment was prepared by Global Acoustics to examine the noise and vibration impacts of the construction and operational phases of the Project, as well as the cumulative impacts which may result from each phase of the Project.

This assessment utilised the figures that have been gained from undertaking an independent noise survey as well as the ongoing monitoring of existing operations at the site, as part of the EPA Licence and existing Conditions of Consent issues for the Oberon Timber Complex. These monitor the overall noise levels from both the Borg Panels operations and the other commercial operations in the area.

The assessment undertaken for the Project used these existing figures as a baseline from which to measure any changes as a result of the Project. Overall, the noise impacts from the Project are generally consistent with the noise levels generated by the existing development. This has been achieved through the implementation of new technology and significant attenuation to the existing facility, and international best practice being applied to the Project.

The investment in noise attenuation to be applied to the current facility by Borg will allow significant process expansion whilst maintaining or improving the levels of noise and vibration generated by the site.

Traffic

A Traffic Report was undertaken by SMEC to review the impacts of the proposed development, both during the construction of the Project, and also for the ongoing operating. This looked at both truck and light vehicle movements at the current facility, the anticipated levels of traffic generated during construction and the estimated heavy vehicle movements post-construction, during the operation of the facility.

This found that the existing road network was capable of absorbing the probable increase in traffic without any significant compromise.

Air Quality

An air quality impact assessment was prepared by Stephenson Environmental Management Australia (SEMA) to review the impacts of the proposed development on air quality. As with noise, this measured the baseline (that is, the existing facility), made recommendations for improvements and then modelled the likely impacts from the cumulative operations.

This report concluded that the Project would be generally compliant with current IAC levels. This is due to the investment in pollution control measures for the existing plant to bring them up to a more appropriate level. The Project improves the overall air quality.

Hazard and Risk

A Preliminary Hazard Analysis (PHA) was undertaken by Sherpa Consulting to assess the potential risk of the Project in accordance with the Applying SEPP 33 Hazardous and Offensive Industry Development Application Guidelines (DP&E, 1994). This concluded that the site operations do not constitute a hazardous or offensive industry.

No changes to these existing approved operations are proposed in the Project. As such, it was concluded that the Project would not substantially increase the potential for risk in the operations of this facility. However, as part of wider site upgrades, additional firefighting, fire water control and other safety systems will be provided.

Any fire system upgrades will need to be provided for in a Fire Safety Study that will be prepared in consultation with NSW Fire Brigades.

Visual Impacts

A Visual Impact Assessment was undertaken by The Design Partnership in order to assess the potential impacts of the development on surrounding areas. This VIA was not undertaken in order to assess the current impacts of the facility or the surrounding industrial uses that make up the Oberon Timber Complex, but was instead designed to assess the impacts of the Project on the visual character of the area.

Due to the existing visual disturbance generated by the industrial land uses in the area, including existing infrastructure such as the chimneys, the overall visual impacts are considered to be generally low from most areas. One of the key reasons for this is that existing plant infrastructure to the east of the site shields much of the Project from view, meaning that only views from the north and west are generally impacted upon. And these views need to be read as part of the wider industrial context.

Surface and Ground Water

A water cycle impact assessment was prepared by The Sustainability Workshop to review the impacts of the proposed development on both surface and ground water. The existing site stormwater operations take stormwater from the rest of the Oberon Timber Complex and process this water before discharge. This ensures that contaminants are significantly reduced.

As part of this application, an extensive upgrade to the existing stormwater management system will be implemented, with additional retention and catchment basins constructed. This will ensure that stormwater

and any liquids from a potential event can be adequately retained on site prior to treatment, reuse or disposal. This significantly reduces the potential impacts on the surrounding environment in an emergency event.

Other Environmental Considerations

As part of the preparation of the EIS for the Project, a number of other potential environmental impacts were considered. This included ecology, soils, waste, heritage and social and economic impacts. These are more minor matters for consideration as a result of the site characteristics, which is largely a cleared, or already developed, industrial zoned parcel with very little vegetation.

It is considered that overall the Project will have minor to positive impacts in these regards, provided that the recommended mitigation measures contained within this report are implemented.

Environmental Management

The Project has had a number environmental management measures recommended in order to minimise the potential impacts of the Project. These have been compiled on an issues basis, as informed by the EIS, consultant reports and information received during consultation.

It is important to note that as the Project is already operating under an existing consent as part of the wider Oberon Timber Complex approval there are already a range of environmental and safety management plans and controls in place. Where appropriate, these management plans have been prepared in consultation with key stakeholders, government bodies and regulatory authorities.

It is acknowledged that some of these management plans will need to be updated to include additional measures identified within the EIS of the Project. This will involve additional consultation and discussion with those key stakeholders.

Justification of the Project

The Project will have significant economic benefits for the local, regional and state economies. In particular, this will reinforce the important role that timber and timber products have for the local economy of Oberon and the greater Mid-West of the state. The Project minimises the amount of road transport for particle board products, ensures production is located close to the raw materials, and provides additional investment and employment opportunities in a smaller, regional community. This is achieved with minimal environmental impacts, and with significant care taken to avoid conflict with surrounding land uses.

Conclusion

The Project the subject of the EIS has been reviewed, described and possible alternatives outlined. Where potential environmental impacts have been identified, mitigation measures have been recommended to ensure that any impacts are at an acceptable level.

This EIS demonstrates that the Project is both permissible and will have a significant range of benefits, that when viewed relative to the minimal environmental impacts justify consent being granted.

PART A – PROJECT BACKGROUND

1.0 INTRODUCTION

1.1. Overview

The Design Partnership has been engaged by Borg Construction to prepare an Environmental Impact Statement for the construction of a Particle Board manufacturing facility, modifications to existing MDF Board manufacturing facility and general site works (the Project) at the existing Borg Panels facility at 124 Lowes Mount Road Oberon. This Project will be undertaken on Lot 1 DP 1085563, Lot 2 DP 1085563, Lot 26 DP 1200697, Lot 24 DP 1148073 and Lot 1 DP 1076346

The existing development on the site consists of a mix of elements that have been approved and constructed as part of previous applications under Part 3A (repealed) of the Environmental Planning and Assessment Act 1979 (EP&A Act) and modifications to that consent issued under S.75W (repealed) of the EP&A Act. This Project seeks to add a number of additional land holdings to the existing approval, whilst also removing a number of large holdings that currently form part of the Oberon Timber Complex.

As the ownership of the area covered by the existing approval (DA 27/95) is dispersed and different operations have different requirements, it is considered that it is more appropriate for the operations of Borg Panels to operate under a separate consent.

The value of the new works is $106,125,000. This is not including the value of the existing site and operations. The Project will bring all elements of the Borg operations on site under the one consent, allow the expansion on to adjoining land parcels, and allow for the expansion of site operations.

This represents a significant investment in Australian manufacturing, providing additional employment opportunities for regional workers at a time when Australian manufacturers are closing operations and off-shoring manufacturing jobs.

Following confirmation from the Minister in April 2015 that the Project could be assessed as SSD, the Secretary General of the Department of Planning and Environment (DP&E) issued the Secretary's Environmental Assessment Requirements (SRs) for the Project EIS. The SR's form the basis of this EIS.

1.1.1. Existing Operations and Approval

The subject land is currently developed for the purposes of a manufacturing facility for Medium Density Fibre board (MDF). This existing development includes:

- A number of large industrial scale buildings which contain various processes involved with the manufacture of MDF and MDF products;
- Concrete hard stand areas between the buildings
- An existing two-storey administration/amenities building with associated staff car parking
- Various necessary items of infrastructure including venting, conveyors and the like.
- Other facilities/buildings associated with the use of the land (including maintenance areas, security entry/exit gates, weigh bridges and the like.
- Fencing, landscaping, drainage and other site facilities.

The current maximum output of the site is site 280,000m^3 of MDF board annually.

The site currently operates under consent 27/95, issued by the Department. This covers the wider Oberon Timber Complex. In addition to the conditions of consent under this approval, an Environmental Protection Licence (EPL) applies to the site.

1.2. Project Outline

The Project is the expansion of the existing Borg Panels timber processing facility. The components of the expansion are:

- Allow for the construction of a dedicated Particle Board Manufacturing Line to allow Borg to continue their growth and remain internationally competitive
- Provide additional infrastructure within existing buildings to value add to existing product
- Modernise the existing facility
- Allow for expansion to Lot 1 and 2 DP 1085563 for the purposes of a wood flake preparation area
- Construct a new automated storage warehouse part on Lot 24 DP 1148073 and part on Lot 26 DP 1200697
- Construction of hardstand on Lot 24 DP 1148073
- Allow for expansion to Lot 1 DP 1076346 for hardstand, water quality ponds and emergency catchment
- Rationalise the current Conditions of Consent that apply to a number of different lots, all under fragmented ownership and operation
- Allow for an increase in production by up to 500,000m^3, with a commensurate increase in staff levels
- Boundary adjustment of Lot 1 DP 1076346 to rectify the current split zoning, consolidating the IN1 zoned land into Lot 26, retaining all the RU1 zoned land under the current Lot and DP
- Lot consolidation of all lots the subject of this application.
- Surrender of the existing approval (DA 27/95) issued by the Department of Planning for the land identified as being the subject of this application

1.3. Location and Setting

The Oberon LGA covers an area of 3,626km^2 and lies approximately 195 kilometres to the west of Sydney in the NSW Central Tablelands. See Figure 1.

Figure 1: Site Context

The LGA boarders the City of Lithgow to the north, Blue Mountains to the east, Wollondilly to the south-east, Goulburn/Mulwaree and Upper Lachlan to the south and Bathurst Regional to the south-west.

The LGA has a population of 5,270 with the majority of the population living in the Oberon township (being 2,459 people). In addition to the main settlement of Oberon there are a number of small villages (including Black Springs, Burraga and Mt David) as well as rural localities.

The primary industries within the LGA are agriculture (including sheep and beef farming as well as plantation timber growing) as well as industries associated with

logging, sawmilling and timber dressing along with the manufacture of wood products.

The subject land is located to the northern outskirts of Oberon to the east of Lowes Mount Road. The Borg operations are part of the wider Oberon Timber Complex, with facilities operated by a number of separate companies, which generally involve timber product manufacture.

The subject land is identified as Lot 1 DP 1085563, Lot 2 DP 1085563, Lot 26 DP 1200697, Lot 24 DP 1148073 and Lot 1 DP 1076346

Lot 1 and 2 DP 1085563 are currently occupied by a fuel depot and a now vacant frame and truss manufacturing facility. Lot 26 are currently occupied by the existing manufacturing facility, Lot 1 DP 1076346 is located to the east of current facility and is vacant, split zoned industrial/rural zoned land. This land is currently undergoing a minor boundary adjustment to extend further to the south. This application also seeks to subdivide the land to create one lot of RU1 zoned land and one lot of IN1 zoned land. See Figure 2.

Figure 2: Land Subject to Application

1.4. The Proponent

After commencing the manufacture of thermolaminated vinyl doors in Charmhaven in the early 1990's, Borgs has established itself as a leading Australian manufacturer of melamine panels and components for all joinery applications.

Borgs manufactures a range of joinery materials including Polytec Doors (primarily for kitchen and bathroom use), white melamine panels, decorative melamine board products, shelving components, and Createc. With a commitment to Australian manufacturing, Borg focuses much of its activities on manufacturing plants throughout the East Coast (including a world class manufacturing plant at Charmhaven, the Oberon complex and a 45,000m2 manufacturing and distribution centre at Somersby)

Purchase of the Oberon MDF Facility

Experiencing significant growth over the past 2 decades, Borgs has continued to invest in leading edge, world class machinery across its manufacturing sites. Ensuring the production of the highest quality product in the most cost effective manufacturing processes is integral to Borg's intent of delivering superior value to its customers.

In March 2010, Borgs acquired the former Carter Holt Harvey Oberon Medium Density Fibreboard (MDF) facility at Oberon and a few months later, acquired the associated JeldWen factory located adjoining the MDF plant.

This facility manufactures a range of Customwood MDF products include:

- Standard MDF
- Moisture Resistant MDF
- E0 (Low Formaldehyde Emitting) MDF
- Ultraprime MDF Mouldings
- Primed Door Skins
- Decorative Laminated MDF and Particle Board
- Treated paper for the lamination of MDF and Particle Board.

1.5. Project Need and Benefits

The Project is needed to help meet demand and supply of the existing range of Borg products. Currently, particle board is brought in from interstate. The Project will:

- Allow Borg Panels to manufacture their own particle board product, utilising local plantation timber and recycled wood waste from on-site. Locating the Project at Oberon significantly minimises transport impacts, minimising both cost and the environmental impacts from transporting the untreated particle board to the site for processing
- Directly benefit the region through increased investment and employment generation from the operation of the Project and the associated employment in transport
- Increase the efficiency in which the product can be delivered to an increasing market
- There will be a significant direct and indirect benefits for the local region. There will be an increase in employment at the plant itself. There will also be a flow-on increase in employment in supporting industries, such as engineering, forestry, construction and transport, as well as on retail and hospitality.

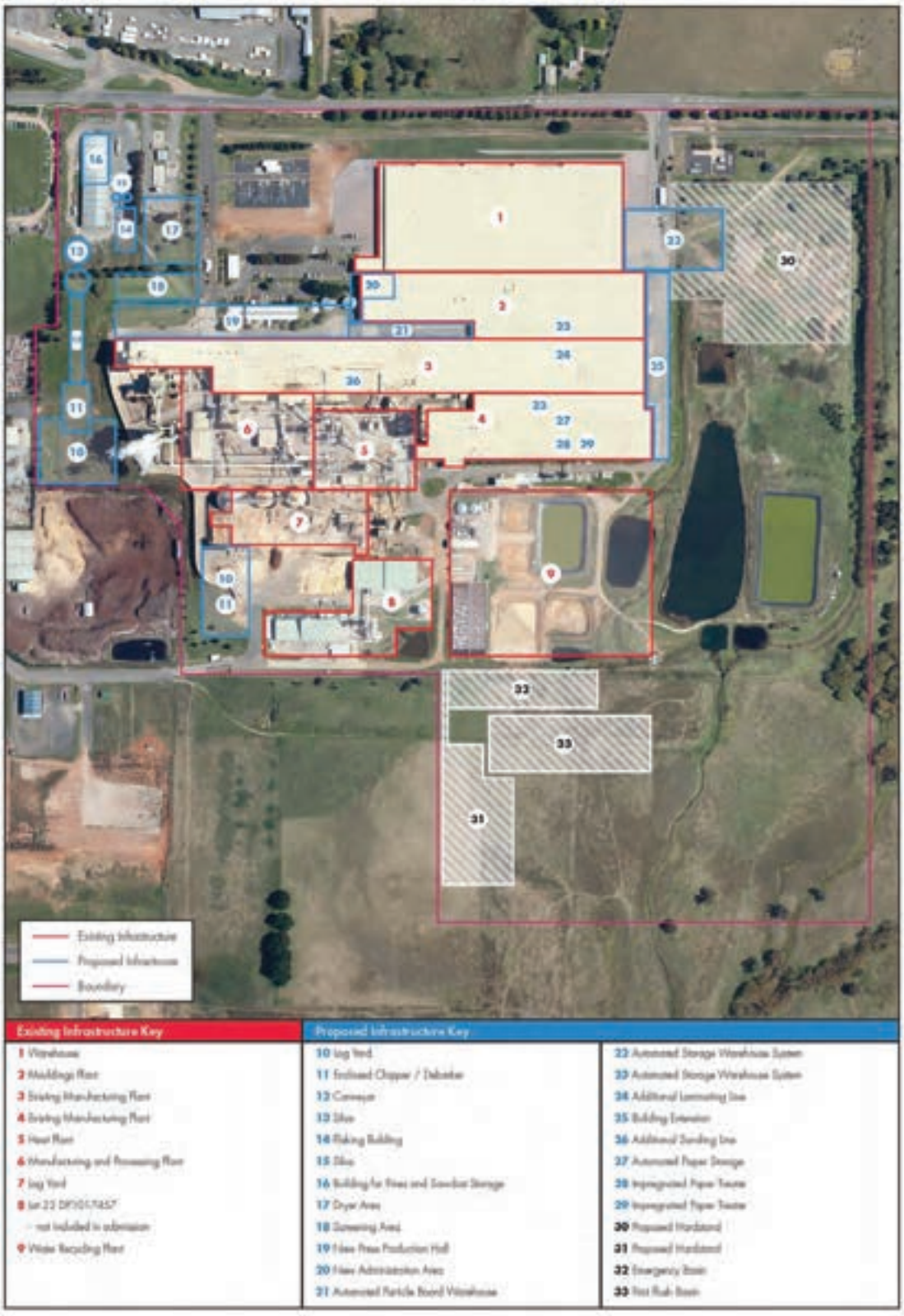

Figure 3: Project Description

1.6. Project Description

The process description for the particle board process is as follows, with the numbers relating to the key on Figure 3 above.

Plantation timber logs are brought to site from external locations and processed through a timber yard (10). This includes processing the timber through an enclosed debarker and chipper (11) – the enclosing of this piece of equipment significantly reduces the amount of noise generated. The chipper is to reduce the timber to a consistent particle size. Recycled boards and reclaimed timber, such as timber from demolished buildings can also be introduced at this point in time. Once the chips have been produced the product is screened to ensure consistency in size and any foreign ferrous contaminants are removed using magnets. This chip is then stored in the chip silos.

These chips are then moved through (via belts and conveyors) (12) to silos (13) prior to being further reduced in size using Knife Ring Flakers, enclosed within the flaking building (14). These Knife Ring Flakers are designed to produce the optimum macro sized particles for the proposed processing methods. These particles are then stored in additional silos (15) prior to being feed into the drier. Timber fines (16) is also introduced to the particles at this point in time. These are stored within an existing industrial building.

The dry saw dust and wet wood particles are then dried in a rotating drum drier (17). Any small particles generated during the drying process which are smaller than required are removed using cyclone extractors. Any surplus air generated which is not required for the drying process is cleaned using a Wet Electrostatic Precipitator prior to being released to the atmosphere as clean air. Once dry and processed in this manner, the particles are screened (18) for quality and stored in another silo.

Any appropriate sized particles and dust are sent to storage, whilst any oversize particles are sent to a grinding mill to reduce them to an appropriate size. These particles are then blended with glue and additives (usually a blend of urea formaldehyde with a paraffin wax emulsions and a catalyst to accelerate the reaction) in a specifically designed ribbon blender.

After blending, the now resinated particles are sent to the appropriate mat forming stations (19). The forming stations are designed to ensure that there is an even distribution of particles across both the width and the thickness of the board. The mat is then weighed and adjusted electronically to ensure that the finished product has a consistent density.

The forming line (19) then transports the layered mat in a continuous format to the press, while simultaneously measuring moisture and removing any remaining ferrous material. The forming line is able to reject and recycle the mat before pressing if the specified product parameters are not of a suitable standard. Any rejected material is reused on site. The press (19) then applies the specified heat and pressure required to cure and consolidate the board in order to meet or exceed the relevant Australian Standards. This process is remotely controlled from the press control room.

Once processed, the pressed board is then cut square, checked to ensure it meets the required standards, cooled and stored in an automated storage system. Once cooled and cured, the boards are removed from storage and processed through the sander to ensure they meet final surface quality and thickness standards.

The proposed particle board operations will generate an additional 500,000m^3 of Particle Board whilst maintaining current approved MDF production capacity.

These new operations will be housed in new industrial buildings, clad in a material to match the existing development on site. Works to the existing manufacturing lines will be housed within existing buildings, with no significant external alterations, with the exception of the demolition and relocation of the administration block in the centre of the site.

1.7. Environmental Impact Assessment Process

1.7.1. Designated Development

Schedule 3 of the *Environmental Planning and Assessment Regulations 2000* sets out the criteria for designated development. The initial investigations identified that the Project would meet the requirements for a Wood Processing Facility under this Schedule. This states:

> *Wood or timber milling or processing works (being works, other than joineries, builders supply yards or home improvement centres) that saw, machine, mill, chip, pulp or compress timber or wood:*
>
> *(a) that have an intended processing capacity of more than 6,000 cubic metres of timber per year and:*
>
> *(i) are located within 500 metres of a dwelling not associated with the milling works, or*
>
> *(ii) are located within 40 metres of a natural waterbody or wetland, or*
>
> *(iii) burn waste (other than as a source of fuel), or*
>
> *(b) that have an intended processing capacity of more than 50,000 cubic metres of timber per year.*

The overall intended processing capacity is approximately 750,000 cubic metres per year.

Therefore, the Project meets the definition of designated development.

The approval path is further discussed in Section 7 of this document.

1.7.2. Environmental Assessment Requirements

On April 14 2015, Borg Panels submitted a request for the Project SEARs to the DP&E. In order to inform the SEAR's for the Project, DP&E consulted with a number of key agencies for input regarding the assessment methodologies and requirements of the EIS. The Project specific SR's are detailed in Section 9.1.

1.7.3. Stakeholder Consultation

Extensive stakeholder consultation has been undertaken. This has included targeted stakeholder consultation with government agencies, an open community consultation session, Council briefings and meetings with local tourism association.

1.7.4. EIS Exhibition

In accordance with Section 89F of the EP&A Act, this EIS will be placed on public exhibition for a period of not less than 30 days. During this time interested parties will be able to review Project documentation and provide feedback for consideration by the proponent and DP&E.

1.8. Nomenclature and Abbreviations

AADT: Annual average daily traffic

ABS: Australian Bureau of Statistics

AHD: Australian Height Datum

DEC: Department of Environment and Conservation

DECCW: Department of Environment, Climate Change and Water

DP&E: Department of Planning and Environment

EIS: Environmental Impact Statement

EPA: Environment Protection Authority

EPBC Act: Environment Protection and Biodiversity Conservation Act,1999

EP&A Act: Environmental Planning and Assessment Act, 1979

EPL: Environment Protection Licence

ESD: Ecologically Sustainable Development

FBA: Framework for Biodiversity Assessment

GHG: Greenhouse Gas

ISEPP: State Environmental Planning Policy (Infrastructure) 2007

LGA: Local Government Area

OEH: Office of Environment and Heritage

POEO Act: Protection of the Environment Operations Act 1997

RMS: Roads and Maritime Services

SEARs: Secretary's Environmental Assessment Requirements

SEPP: State Environmental Planning Policy

SEPP 33: State Environmental Planning Policy 33 - Hazardous and Offensive Development

SSD: State Significant Development

TIA: Traffic Impact Assessment

VPD: Vehicles per day

1.9. Structure of this Report.

This report is generally structured as follows:

Part A – Project Background.

Part B – Location and Context.

Part C – Project Need and Alternatives.

Part D – Project and its Management.

Part E – Issues Identification.

Part F – Environmental Impact Assessment.

Part G – Environmental Management and Monitoring.

Part H – Project Justification.

Part I – EIS Findings.

Part J – References.

PART B – LOCATION AND CONTEXT

2.0 REGIONAL AND LOCAL CONTEXT

2.1. Regional Overview

Oberon is located in the Central Plains region of New South Wales, 46km south east of Bathurst, 77kms west of Katoomba and 195km west of Sydney. The town itself has a population of 2,459 under the 2011 Census. Oberon is the administrative and population centre of Oberon Shire Council, and the local government area has a total population of 5,270.

2.2. Surrounding Land Use

The Project is located within an existing industrial zoned area. Industrial zoned land adjoins the Project to the south and west. Rural zoned land adjoins the site to the north and east.

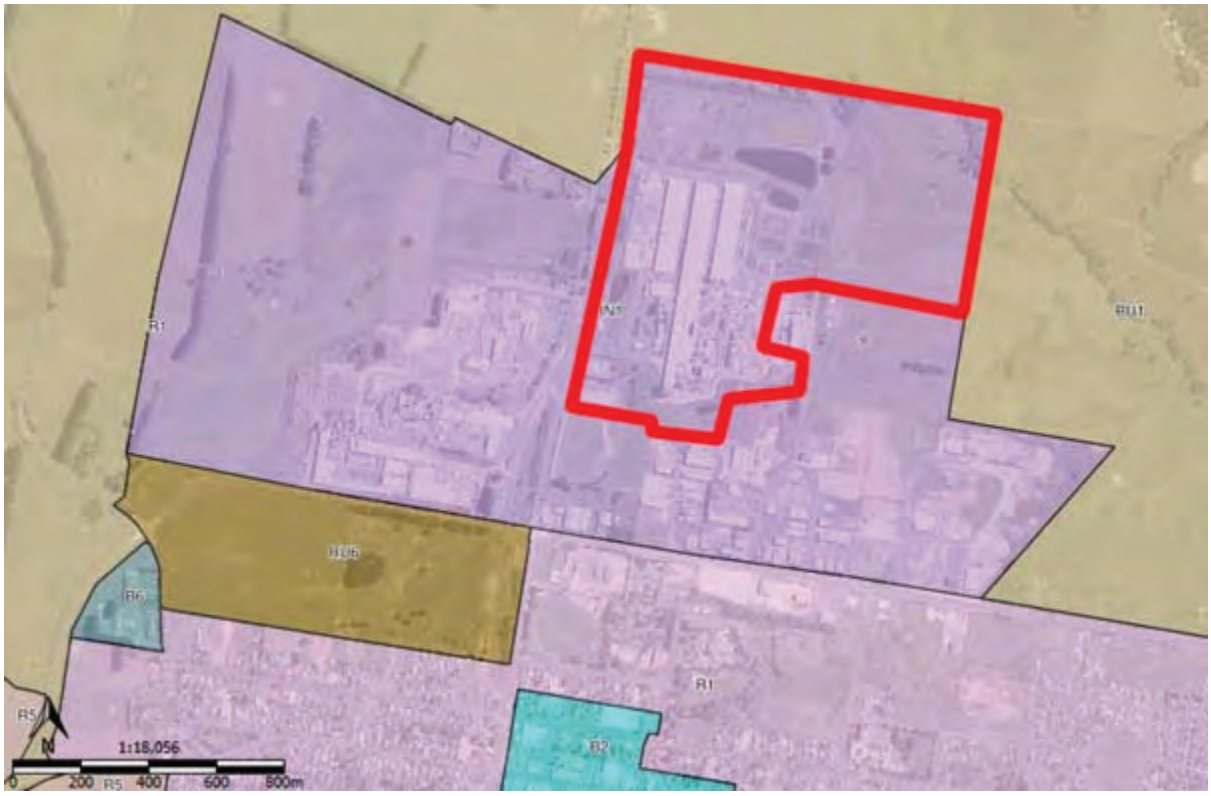

Figure 4: Zoning Context

2.3. Land Use Context

The site is located within the existing Oberon Timber Complex, which is covered by a 1995 Consent issued by the Department of Planning and Environment. This complex includes a number of separate land owners and operations which operate independently of each other. Land on the opposite side of Lowes Mount Road is used by a number of different operators, including Highland Pine Products and Structafloor. These are not associated with the Project.

Land to the immediate south and south east comprises an industrial subdivision, with varied operators, including self-storage establishments and landscape supply yards. The dominant immediate land use context is industrial.

3.0 SITE LOCATION AND HISTORY

3.1. Site Location and Description

The Project is located at 124 Lowes Mount Road, Oberon. Oberon lies approximately 125 kilometres to the west of Sydney in the NSW Central Tablelands. The site itself is located approximately 1.5km from the centre of Oberon.

There is extensive existing development on the site, related to the existing approved use of the site as part of the existing Oberon Timber Complex. This facility incorporates a number of different companies under different ownership. The land the subject to this application is located on the eastern side of Lowes Mount Road, and is under the sole ownership of Borg Panels or subsidiary companies.

3.2. Ownership and Legal Description

The subject land is identified as Lot 1 DP 1085563, Lot 2 DP 1085563, Lot 26 DP 1200697, Lot 24 DP 1148073 and Lot 1 DP 1076346. All land is under the ownership of Borg Panels.

3.3. Site History

The following extracts are taken from 'The Thematic History of Oberon Shire' authored by Philippa Gemmell-Smith (March 16,2004) and is included to provide a history of timber products manufacture in Oberon Shire. Importantly the publication includes extensive details in relation to the subject land.

A review of history publications reveals that the Oberon Shire has a significant timber industry, with timber plantations being established as far back as the late1920s/early 1930's:

> *'The Forestry Commission of NSW recognised the suitability of the Oberon district for the growing of softwoods, and the first pines were planted in the Vulcan and Jenolan State Forests in 1929. In 1930 the Oberon Prison Afforestation Camp was established and began annual plantings in the Gurnang State Forest in 1931. Pine planting was done as Depression relief work.*
>
> *After trials of Pinus radiata, Monterey Pine, was recognised as the most successful pine species. During the 1930s large areas of Crown land were reserved for forestry purposes. During World War II the Cotton family of Broken Hill contracted to supply sawn timber for the Broken Hill North Mine, it being a wartime measure to replace the timber imported from America. The Cottons chose Oberon as a suitable source, and sent Robert Cotton and his wife, Eve, who moved there in 1941 to build a sawmill for cutting mine timbers. They lived first at Dulce Domum. They bought Cunynghame and Star's sawmill and transferred its milling and the log licenses to Oberon and started to build the factory. It began supplying at the end of 1942 under the name Timber Industries Pty Ltd. In 1946 Monty Cotton, returned from war service and joined the team. The following year they bought Beresford Brown's sawmill at Beaconsfield (Black Springs). This gave the Cottons the sawmilling licenses over the whole Oberon shire'*

In the 1960's particle board manufacture commenced in Oberon:

> *'The first particle board factory in Australia, Pyneboard, was in Oberon. When the Forestry Commission advertised the rights to purchase the thinnings from pine plantations in the Oberon area, a joint venture between CSR, Timber Industries and Fletchers (a New Zealand company that was already producing particle board) was formed, and established the factory in 1961. Pyneboard created jobs for nearly 200 people. In 1964 CSR and APM took over Pyneboard as equal shareholders.'*

Since that time there have been a number of additions, alterations and changes in ownership:

> *'In 1978 CSR purchased Pyneboard outright and installed a new press to produce thin particle board. Pyneboard was developed into Structaflor, the particle board flooring plant in 1979. In the 1980s the timber industry ceased to be a locally owned industry. It started on the path of rapid expansion to compete on the global market. In 1978 the Cottons sold Timber Industries sawmill to Blue Metal Industries, and who sold to Boral in 1982.'*

In the 1980's there was a significant expansion of the industries in the area:

> *'A massive expansion if the industry followed with the building of another fibreboard processing plant by AMCOR/Elders Resources NZ Forest Products Limited. With the decision to build the plant Oberon reaped the benefit of access to natural gas in 1987, before other towns in the Central West.*
>
> *Fibron, the world's first fully computerised medium density fibreboard plant opened in 1988, and in 1989 was sold to CSR. In 1994 CSR won a tender issued by State Forests of NSW for the right to purchase an additional 380,000 tonnes of sawlogs and small pulpwood logs per year. Another massive expansion began, this one costing $350 million, doubling the size of the MDF (medium density fibreboard) factory, with a new sawmill and a tannin extraction plant. The building process was a huge boon to the town, especially the accommodation sector. CSR Timber Products sawmill opened in November 1996. Woodchem, the resin plant, was built by London based company ACM Wood Chemicals and opened in 2000.*
>
> *Also in 2000 the major part of the timber factories ceased to be Australian. The expansion had overstretched CSR. In 1999 it was making a loss in its Oberon operations, and in May 2000 sold most of its nationwide timber interests to Carter Holt Harvey, a New Zealand forestry company 50% owned by the U.S. giant International Paper. Its remaining plant in Oberon, FeaturPanels was sold to JELD-WEN, an American multi-national but privately held corporation.*
>
> *CSR's share in the 50/50 proposed joint sawmilling venture with Boral was also taken over by Carter Holt Harvey. Called Highland Pine Products their partnership gave them the volume of logs to get the base cost down and to compete on the world market.*
>
> *In preparation for this move Boral rationalised its operations closing its Bathurst section. Only months after the joint venture, Highland Pine announced 59 permanent jobs would be lost. At the same time the company announced a $26 million expansion to amalgamate the two sawmills (CSR's and Boral's) into one on the Carter Holt Harvey site.*
>
> *In May 2001 Carter Holt Harvey launched Customwood, the internationally known brand name of Oberon's sister plant in New Zealand, in Oberon. The move was designed to increase the export market, particularly to China and the United States. In 2002 the company announced marketing alliances with Sierra Pine to extend its marketing to North America, and with IPPM in China.'*

Carter Holt Harvey's sold the Customwood site in 2010 to Borg, and over the subsequent 6 years a range of sales, separations and consolidation of uses has taken place. Various lots and uses have been sold off to separate parties.

This Project seeks to create a new consent for the land owned by Borg Panels, allowing the original DA 27/95 to continue to operate for the Carter Holt Harvey and Boral owned land. The land subject to this Proposal will be removed and covered under the new approval. The remaining land will continue to operate under the 1995 consent.

3.3.1. Oberon Timber Complex

Experiencing significant growth over the past 2 decades, Borg has continued to invest in local manufacturing utilising leading edge, world class machinery across its sites. Ensuring the production of the highest quality product in the most cost effective manufacturing processes is integral to Borg's intent of delivering superior value to its customers.

In March 2010, Borgs acquired the former Carter Holt Harvey Oberon Medium Density Fibreboard (MDF) facility at Oberon and acquired the associated JeldWen factory located adjoining the MDF plant shortly after.

This facility manufactures a range of Customwood MDF products include:

- Standard MDF,
- Moisture Resistant MDF,
- E0 (Low Formaldehyde Emitting) MDF.
- Ultraprime MDF Mouldings.
- Decorative Laminated MDF and Particle Board
- Treated paper for the lamination of MDF and Particle Board.

Borg is now one of the leading employers in the Oberon region, and the plant forms part of the wider Oberon Timber Complex.

PART C – PROJECT NEED AND ALTERNATIVES

4.0 OBJECTIVES AND PROJECT NEED

4.1. Project Objective

The objective of the Project is to establish an expansion to the existing Borg Panels timber processing facility. The key components of this are:

- New plant and buildings in the south and south-west of the site (items 10-18 on Figure 3)
- Additions to the western side of the existing building (items 19-21 on Figure 3)
- Additions to the northern side of the existing building (items 22 and 25 on Figure 3)
- A new on-grade hardstand area in the north-west corner of the site (item 30 on Figure 3)
- New basins and a new hardstand area east of the existing water recycling plant (item 31, 32 and 33 on Figure 3)

In addition, upgrades to plant inside existing structures on the site are proposed in order to modernise the MDF facility.

The aim of the Project is to create a modern, streamlined timber processing facility to provide high quality, Australian made MDF and Particle Board products in order to meet the ongoing demand for Borg products.

4.1.1. Biophysical Objectives

The biophysical objectives for the Project are to:

- Undertake the Project in a manner which allows for a general improvement in the impacts on surrounding properties
- Minimise the potential impacts to groundwater through the provision of appropriate detention basins for both spills and collection of firewater
- Minimising potential downstream impacts through the appropriate collection and treatment of stormwater on site.

4.1.2. Socio-Cultural Objectives

The socio-cultural objectives for the Project are:

- To minimise the impact of the Project on the community with a focus on appropriately managing potential impacts from:
  - Noise; and
  - Air quality.
- To maintain and operate the Facility in a manner that minimises hazards and risks;
- To operate the Facility in a manner that safeguards the amenity of the nearby urban areas; and
- To maintain an ongoing dialogue with the community regarding the Project and future changes to the Facility.

4.2. Project Need

Borg Panels currently relies on external providers of particle board. These external providers are a mix of off-shore and inter-state suppliers. The Project is designed to allow for Borg to be entirely self-sufficient in this regard, creating a streamlined process in which all major components and products are produced in house rather than relying on external providers. This significantly reduces costs and the potential for the delay.

4.3. Project Benefits

The Project has significant benefits, both for Borg as a company and for the wider region. From a company perspective, the Project significantly streamlines the production process, and further cements their reputation as one of the industry leaders. From a regional perspective, the Project creates significant additional employment opportunities for the wider Orana/Central West region, which has recently experienced additional job losses with the closure of the Electrolux plant at Orange. Many of the other manufacturing operations in the region are reliant on the mining industry, which goes through wide fluctuations based on the global commodities market. The Project represents a much more stable industry with a much more stable employment base.

5.0 ALTERNATIVES CONSIDERED

5.1. Project Alternatives

The following alternatives have been considered by Borg Panels during the feasibility and project planning stages of the original Project Approval, as well as when considering potential alternatives to increasing the capacity and manufacturing base of the existing Facility:

- A 'do nothing' option whereby the Project would not be undertaken;

- Alternative sites in New South Wales; and

- Alternative sites outside New South Wales.

These options are discussed below.

5.1.1. Do Nothing

The 'Do Nothing' approach is one which provides significant uncertainty for the operations of the business. By constructing such a plant, there is a guaranteed supply chain in to the future. Without such a facility, Borg Panels is restricted to sourcing Particle Board from outside companies, which has problems associated with ensuring high production standards are continually met. In addition, the transportation of the finished product from outside the site adds significant cost and social and environmental impacts. As a result, the ongoing Do Nothing approach, currently used for the site, is not considered to be appropriate.

5.1.2. Alternative Locations

The existing facility is located within the boundaries of a significant timber complex, located close to large forestry plantations, from which much of the timber used is sourced.

The establishment of an alternative location would result in the significant duplication of resources that are already in existence at the Oberon Timber Complex, as well as the duplication of infrastructure such as warehouses, chipping yards and the like. The end product would then need to be transported back to the existing factory for processing, significantly increasing transport costs and environmental impacts.

As such, it was not considered appropriate to further consider alternative location.

5.1.3. Preferred Option

The preferred option is for the works to be undertaken on the current Borg Panels landholdings, located within the Oberon Timber Complex. The preferred option is the optimal option for the following reasons:

- It is located in close proximity to the main timber growing area currently servicing Borg Panels, minimising transport requirements and impacts
- It is located in an existing MDF processing facility, allowing both MDF and Particle Board to be manufacture side by side, minimising product wastage and materials that cannot be recycled
- The legislative environment has established the importance of the Oberon Timber Complex, as illustrated by the Buffer Zone established in the Oberon Local Environmental Plan
- The location minimises the requirements for the duplication of infrastructure
- There is extensive disturbance on the site, and the areas that are to be extended in to are either existing industrial operations, or land zoned for industrial purposes, minimising clearing

The existing elements of the Facility have been subject to several environmental assessments and are currently operating in accordance with a Project Approval (27/95) and Environmental Protection Licence (EPL 3035).

When considered against the alternative options, the preferred option also has the following key benefits that couldn't be achieved by the alternatives considered:

- Providing capital investment and multiplier effects within the economy of the Central West/Orana region generally, and the Oberon Local Government Area specifically; and

- Improving the efficiency of the supply of manufactured timber product.

- Minimising environmental impacts through locating the processing facility in close proximity to the main source of the raw timber

- Minimising the current air quality and noise impacts of the current, outdated, plant.

The Preferred option is detailed fully in Part D.

In order to demonstrate that the preferred option can achieve these benefits while continuing to have minimal community or environmental impacts a detailed impact assessment has been undertaken and is contained in Part F of this EIS. Where there is potential for impact to occur, mitigation measures have been recommended to manage impacts to acceptable levels.

PART D – PROJECT AND MANAGEMENT

6.0 PROJECT DESCRIPTION

6.1. Overview

The Project is for the expansion of an existing timber manufacturing and processing facility. The major change to the existing approval for the site is to provide for a facility to manufacture particle board. Particle board manufacturing involves both the processing of virgin wood, residual wood waste from sawmills and the recycling and processing of appropriate used wood to create suitable sized particles. These are then processed to form particle board. In addition to this, expansion to existing MDF and laminating operations are to be undertaken. These are largely to be located within existing structures on site.

6.1.1 Particle Board Facility

Particleboard is defined as a panel product manufactured from lignocellulosic materials, primarily in the form of discrete particles, combined with a synthetic resin or other suitable binder and bonded together under heat and pressure. The primary difference between particleboard and other reconstituted wood products, such as waferboard, oriented strandboard, medium density fiberboard, and hardboard, is the material or particles used in its production. The major types of particles used to manufacture particleboard include wood shavings, flakes, wafers, chips, sawdust, strands, slivers, and wood wool. For the purposes of this description, particleboard pertains only to panels manufactured from a mixture of wood particles or otherwise from wood particles other than wafers and flakes. (Wood Products Industry 2002).

Although some single-layer particleboard is produced, particleboard generally is manufactured in three or five layers. The outer layers are referred to as the surface or face layers, and the inner layers are termed the core layers. for this process we are manufacturing with 3 x layers. Face material generally is finer than core material. By altering the relative properties of the face and core layers, the bending strength and stiffness of the board can be increased.

The general steps used to produce particleboard include raw material procurement or generation, classifying by size, drying, blending with resin and sometimes wax, forming the resinated material into a mat, hot pressing, and finishing.

The general process for the proposed production of particle board can be broken into 9 areas.

- (Area 1 – Fresh Wood) Production of chips from fresh round wood
- (Area 2 – Materials Handling) Production of chips and flakes from waste wood
- (Area 3 – Flaking) Production of flakes from fresh produced chip.
- (Area 4 – Drying) Wood Drying process
- (Area 5 – Sorting) Sorting and Cleaning of dried chip.
- (Area 6 – Gluing) Addition of Resin and Chemicals
- (Area 7 – Forming and Pressing) Forming, Pre-Pressing and thickness Pressing of chip.
- (Area 8 – Trimming to Stacking) Cutting, Cooling and Stacking
- (Area 9 – Sanding Finishing) Final sanding and processing of finished product.

A simplified flowchart of the above process areas can be viewed in figure 5 below. A detailed flowchart will be provided with this submission for reference of process flow volumes and process streams. This document is not intended for public exhibition, as it includes a number of pieces of information that relate to intellectual property and innovations in production techniques which would damage Borgs competitive advantage if competitors were given access to it.

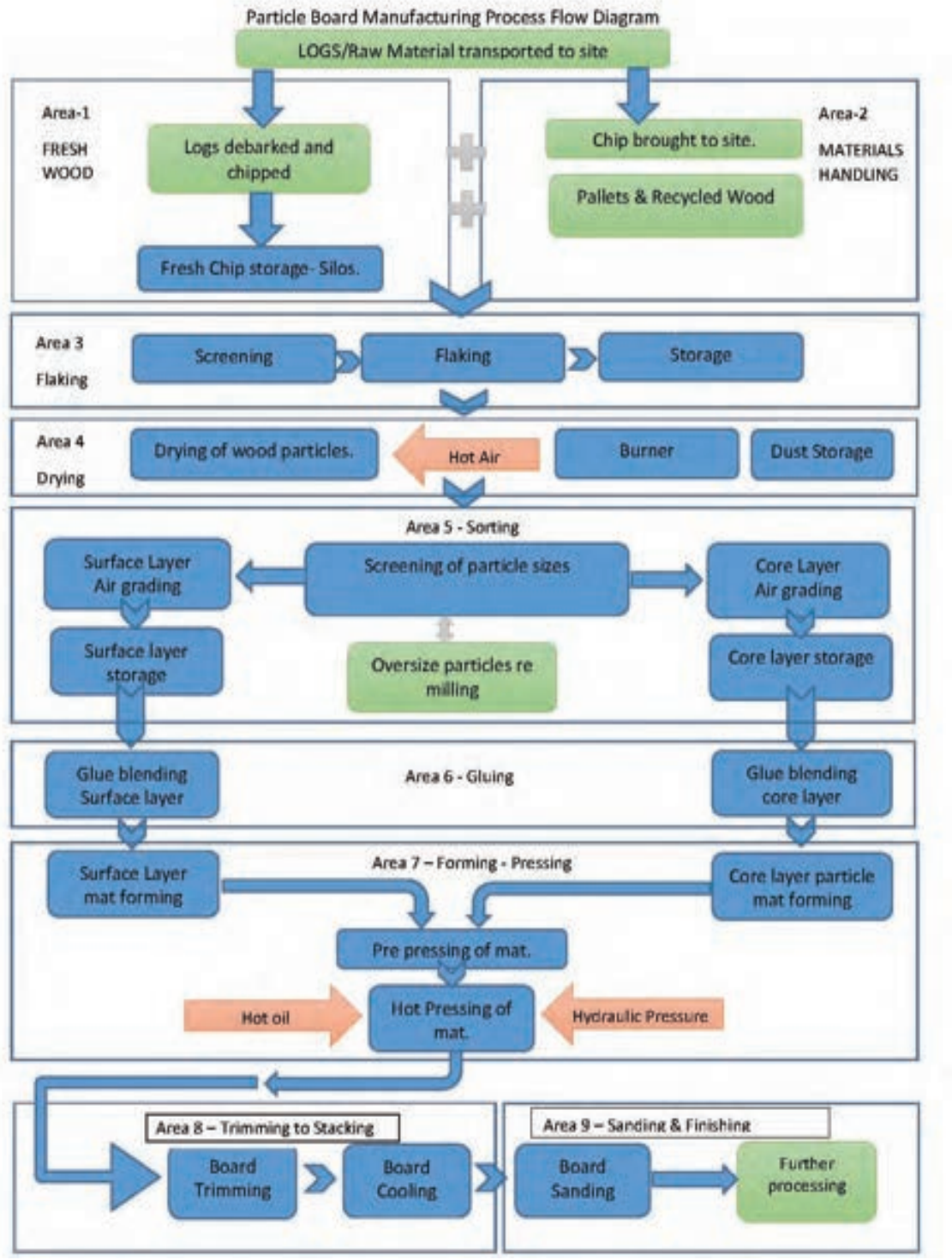

Figure 5: Particle Board Manufacturing Process Diagram

Area 1 – Fresh Wood: Production of chips from fresh round wood

Typically, round wood (Pine log) is brought onto site via road transport and stored in a holding area ready for feeding into the chipper. Other wood is stored on site from either external urban waste supplies, external In-Forrest chipping or site chipped waste products.

This log is fed via debarking unit to remove the bark from the log, then a chipper to break down the log into chip size. The common chip size most suitable for particle board products range between 25 and 35 mm. This material is chipped at approximately 1000m3/hr and fed to the 2 x 13000m3 storage bins.

All fresh chip is stored in these 2 x silos that are covered from external wind and weather elements. These chips are then fed through into Area 3 for screening and size processing via a roller-screen and ring flakers.

Area 2 –Materials Handling: Handling of chips and flakes from waste wood

Wood can be delivered in a variety of forms, mainly pallets and sawdust. The sawdust material is fed via a moving floor systems and screened for oversized pieces. The accepted material is then graded via an air grader, then fed directly to the drier feed conveyor, the oversized wood is collected for further processing.

The broken pallet material is also collected and fed via a moving floor system, directly to a sizing mill to break down the material into acceptable size. The accepted material is fed directly to a 300m3 storage silo ready for mixing with the fresh wood chip and fed to the drier.

Area 3 – Flaking Production of flakes from fresh produced chip.

Fresh chip material is fed from the Area 1 storage silos directly to a roller screen at a rate of approximately 430m3/hr. The chip is spread over the roller separators to sort the material into 3 x fractions and distributed as follows:

- Fines (< 3 mm): transported directly to the wet flakes silo before the drier

- Macro chips (< 35 mm): transported to the silo feeding the knife ring flaker

- Oversize (> 35 mm): removed out of the process and re-chipped to then be feed to the silo feeding the knife ring flakers

After this screening stage, the accepted chips are reduced to flakes (almost matchstick consistency) via a series of knife ring flakers. Before entering the cutting stage in the knife ring, the chips are first cleaned from metals over a magnet roller, and the bigger and heavier pieces are removed from the process by wind sifting. These actions are done to protect the knife rings and to prevent damage in the process. The chain conveyor before the ring flakers feeds each ring flaker the optimum amount of chips at all times to ensure the correct flow rate of chip, due to the sharpness of the ring flaker knives.

The processed chip via the ring flakers is then fed directly to the 300m3 wet flake storage silo ready for mixing with the urban waste material and feeding to the drier via a constant material flow dosing bin.

Area 4 – Drying: Wood Drying process

All flakes have to be dry before further processing. This is done via the main drier. The necessary energy for the drying process is supplied in the form of hot air, coming from hot air directly from a dust and/or gas burner. The wet material (flakes from fresh wood and the sawdust/urban waste) is fed at the inlet of the drier via the constant material dosing bin in Area 3.

The chip is introduced into the flash-pre-drier. In this pre-drier, a hot air flow is taking the wet chip material through the pre dryer chamber, the then homogeneous mixture of the hot gases with the wet chips due to counter flow at the infeed point is fed through to the drum drier. Separation of raw and strange material entering the process due to the separation effect at the wet chip in feed is conduced here, and this material is discharged at the bottom of this chamber.

All material is then directed through the single pass drier drum. After a given retention time in the drum of the drier, the material is brought out at the drum outlet of the drier via the chip discharge elbow under the cyclone group. The air with small particles and dust is cleaned through a series of cyclones. The dry chip particles then join the main flow coming out of the discharge elbow to a fire protection vertical screw, and then to the dry flakes silo.

The air after the cyclones, is partly going to a WESP (Wet Electrostatic Precipitator) for further cleaning before being exhausted in the open air. The other part of the air after the cyclones, is reused in the drying process, and reintroduced into the drier airstream.

Area 5 – Sorting: Sorting and Cleaning of dried chip.

After the drier, the material is stored in the 300m3 dry flakes silo. This silo is used as a buffer in the production, so that in case the production further upstream has stopped, the drier can still be emptied into this silo.

Dry material from this silo is fed via a series of dosing screws to a series of screening machines.

These screening machines separate the dry flakes into 4 fractions, according to their size:

- Dust (< 0.3 mm): pneumatically transported to the dust silo as fuel for the burner in the drier.
- Surface layer (< 1.2 mm): particles used for the both surface layers (Top and bottom) of the board
- Core layer (< 12 mm): particles used for the core layer of the board
- Oversizes (> 12 mm): particles that need to be re-milled before they can be used either in the surface layer or in the core layer.

After the screening machines, the 3 fractions that can be used for further processing are cleaned over a wind sifter. Each wind sifter is splitting up the stream in three fractions:

- Coarse material (oversize): sent to be sorted, then sent to the oversized flakes silo
- Silicates: sorted out of the process
- Accepted Material: Appropriate fraction for further processing going to the core layer surface layer silos.

All oversized flakes from the wind sifters and the screens are sent via a wind sifter to a 100m3 silo for storage before being reduced in size in a grinding (Conidur) mill. This mill is also called a surface layer mill, because the output of the machine is mainly used for surface layer material.

To make sure that all particles end up in the right fraction, the material after the surface layer mills is screened again. Since the flaking process is not always producing enough material for the surface layers of the board, there is also a possibility to send core layer flakes to the flow of oversized flakes, thus reducing them to surface layer flakes. This is done by the core layer by-pass screw. All material in the sorting section Area 5 is stored in the dust silo as fuel for the dust burner, surface layer silo for SL material or the core layer silo for CL material.

Addition of Resin and Chemicals

In this stage, the proper fractions for the board are mixed with resin and other chemicals. The additives are prepared in the glue kitchen. Additives like hardener, buffer and formaldehyde scavenger are prepared as liquid solutions. The other purpose of the glue kitchen, is to make sure that all components are exactly dosed to the flow rate of chip, these additives are sent to be mixed with the core layer and surface layer process streams.

The material from the surface layer and core layer silos respectively are first passed via belt scales, measuring the weight of the process material in each stream. According to this weight, the different chemical pumps send the required amount of mixed resins to the glue blenders. At the inlet chute of the core layer and surface layer blenders the emulsion is added. This mixture is then formed to a ring and given an acceleration in the infeed part of the blender. Tangentially on that ring, the resin and other chemicals are added. The ring is moved forward and intensively mixed by means of paddles. At the outlet of each blender, a pneumatic activated flap is making sure that the retention time and mixing of the materials is enough, but not too high to avoid too much breaking of the flakes into too fine material.

After the blenders, the material is conveyed to the forming station.

Area 7 – Forming and Pressing: Forming, Pre-Pressing and thickness Pressing of chip

The forming station consists of four forming machines: two for the surface layer (bottom surface layer and top surface layer of the board), and two core layer mat formers. The surface layers are spread on the forming line belt by wind formers: wind spreads the material in the way that the finest particles end up at the outside of the board, while the bigger particles are positioned more close to the core layer.

The core layer formers spread the flakes mechanically, making sure that the material is homogenously divided over the mat. After the complete core layer is spread, a pressure roller on the mat is making sure that all flakes are lying horizontally, so no flakes are standing up and sticking out of the formed mat. The final top surface layer is then added to the formed mat.

The mat forming process regulates the weight of the mat, according to the desired board density. This regulation is done by weighing scales inside the mat forming bins, as well as weighing the continuous mat on the forming line, and measuring the total weight of the continuous mat. The forming line then transports the mat via a pre-press to the continuous hot press. During this mat transport, two moisture meters are installed to measure the moisture content of the surface and the core layer. These parameters are very important for the production quantity and quality.

After the weighing scales measuring the total weight of the mat, there is a magnet to remove metal parts, then the mat is compacted by the pre-press, this process vents most of the air out of the mat. The pre-press also ensures that a stable mat is formed prior to entering into the press, ensuring that the mat does not fall apart during transitions of different belts on the forming line.

There is also a mat spraying device on the forming line, in order to increase the moisture at both outsides of the mat. In this way, heat transfer in the press is accelerated, resulting in higher production quantity. There is also a mat density meter on the forming line, to measure the distribution of the weight in the mat. At last, there is a metal detector, which controls if there are still ferrous or nonferrous metals in the mat.

At the end of the forming line, there is a retractable nose. This retractable nose can change the process flow of the formed mat, enabling the mat to be fed directly to the hot press, or in a retracted position, dumping the mat into the reject mat chute. There are several reasons why the mat cannot enter the press and must therefore be dumped this could be attributed to the following:

- Metal is detected in the mat

- If the weight is outside tolerance
- If the pre-press was not working at the correct pressure
- If the humidity in the mat is too low or too high
- If there is a blockage in or after the press

From the reject mat chute, the flakes are transported pneumatically to the reject mat flakes silo, from where they are reintroduced into the process either before the formers or into the dry chip silo. In case metal was detected in the mat, the reject mat does not enter the silo, but is directed to a dump next to the silo.

After the mat is formed into an acceptable condition, it can enter the ContiRoll (Hot Press). Inside this hot continuous press, heat and pressure are transforming the mat to a particle board. The heat is provided by thermal oil, which is fed to five different heating zones in the press. The temperature for each zone can be set independently from each other. The pressure is generated by a hydraulic aggregate, generating 300 bar of pressure. The hydraulic oil is activating hydraulic cylinders that transfer the pressure to the mat. All parameters for this process can be entered from one central operating point. The product leaving the ContiRoll (Hot Press) is called the raw board, this continuous raw formed board is later trimmed, cooled and stacked for further processing.

Area 8 – Trimming and Stacking

The raw board leaving the press is continuously fed to the saw unit. First, the board is trimmed (cutting of the left and right edges), after that, the endless board is cut in separate raw boards. At this stage, some quality tests are performed on-line on the raw boards: the thickness is measured, the board is controlled on blisters (lack of resin adhesion inside the board) and the weight (density) is checked. If one of these parameters are not suitable for acceptable board, the board is rejected at the reject station.

In the reject station, the board is crushed into small pieces and transported to a dump or container. From there, the rejected boards can be fed into the process again over the urban wood waste infeed at Area 2 If the board passes all the tests, it continues to a board cooler. After cooling down, the boards are piled up in stacks to be stored in an intermediate storage.

Area 9 – Sanding Finishing: Final sanding and processing of finished product.

From the raw board storage, boards can for instance be sent to the existing (MDF-)sanding line. After this process, the boards are ready to be sold, or for further processing as required by the manufacturer.

6.1.2 Paper Treatment

This is the manufacture of resin treated paper which is later laminated via pressing onto the surface of MDF and Particle board. The resinated sheet imparts hardness, texture, colour and water resistance to the substrate, allowing it to be used in the joinery applications.

Paper treatment utilises a paper treating machine which takes raw paper and applies Melamine (MF) and Urea (UF) formaldehyde copolymer resin into the core and onto the surface of the product. Resin supplied in bulk is later mixed with various additives which improve the treated papers performance using an automatic glue mixing station. The paper treater utilises several independent processes combining them in to a continuous production line to complete the product manufacture, these are:

- UF Resin saturation into the core of the raw paper (web).
- Pre drying of the saturated web product in a flotation dryer.
- Gravure Coating of the pre dried web with a more durable MF resin

- Final flotation drying of the web.
- Processing of the continuous web in to sheets and rolls.

The MDF site at Oberon will receive 2 paper treatment lines and an additional laminating press. Figure 6 illustrates this process.

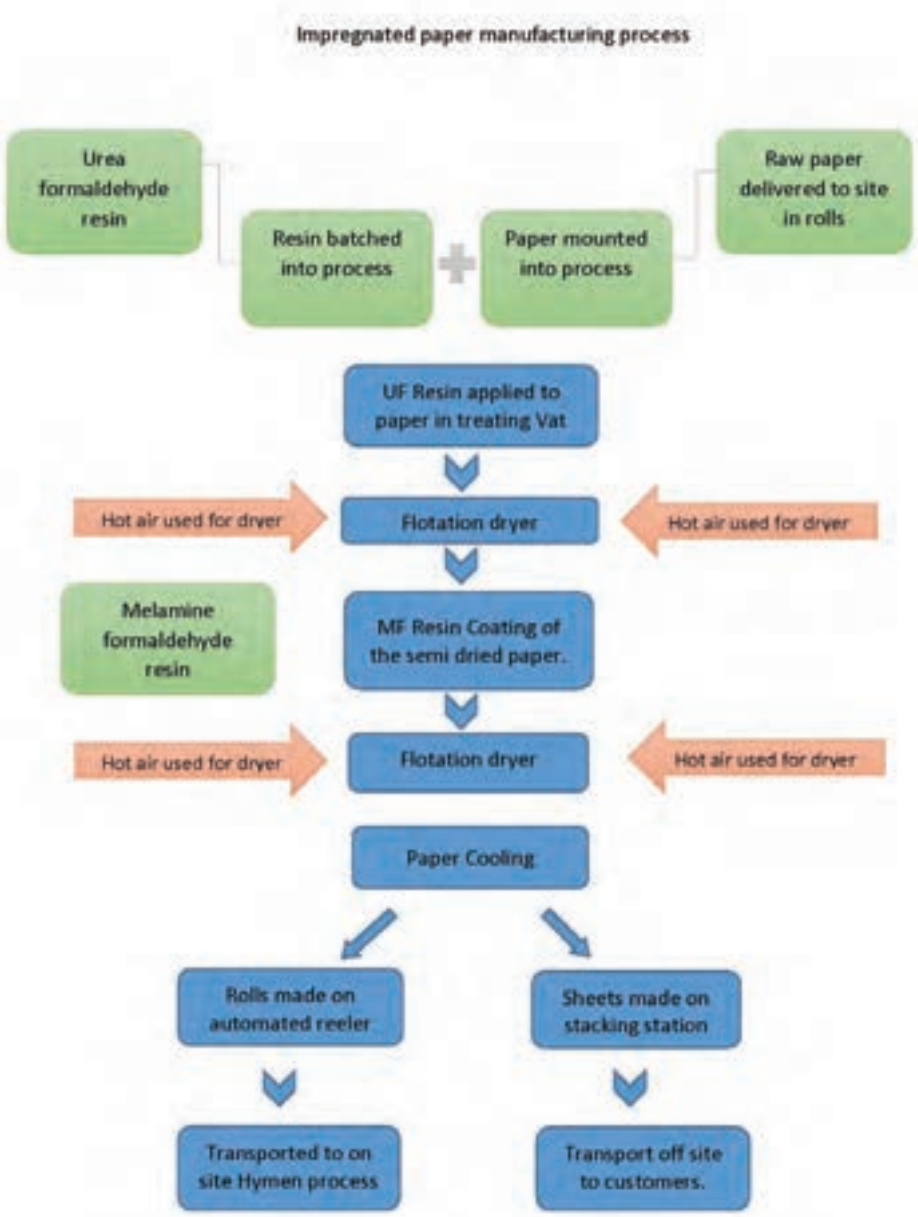

Figure 6: Impregnated Paper Manufacturing Process

The paper is stored in an automated stacking system which controls the stock and the location of all rolls in the paper treatment process.

6.1.3 Laminating Press.

The continuous laminating press utilises the paper manufactured at the paper treater and MDF boards made in the Contiroll presses to manufacture low pressure melamine laminated board products. The laminating press utilises Isobaric pressure and thermal oil heat to consolidate the paper on to the surface of the finished board.

The paper is applied to the surface and underside of the substrate boards in the continuous press process, the substrate and paper are then fed between the platens of the press. These apply the heat and pressure to the package in order to activate the glue in the paper and cause the adhesion of the paper to the surface of the board. The pressed board is then fed into the sawing and automated inspection line which prepares the laminated boards ready final inspection and packing. Once packed the boards are sent with the appropriate labelling to the warehouse to await delivery to the end user.

These works are an expansion and continuation of the existing manufacturing facilities on site, and will follow the same process as the existing approved facilities, but with updated machinery that will create lower noise levels and operate more efficiently.

These works will run in parallel with the existing MDF processing lines, MDF mouldings operation, laminating building (including press and paper treatment) and ancillary cranes, and storage which are to be retained.

Details of this process are included in Figure 7 below.

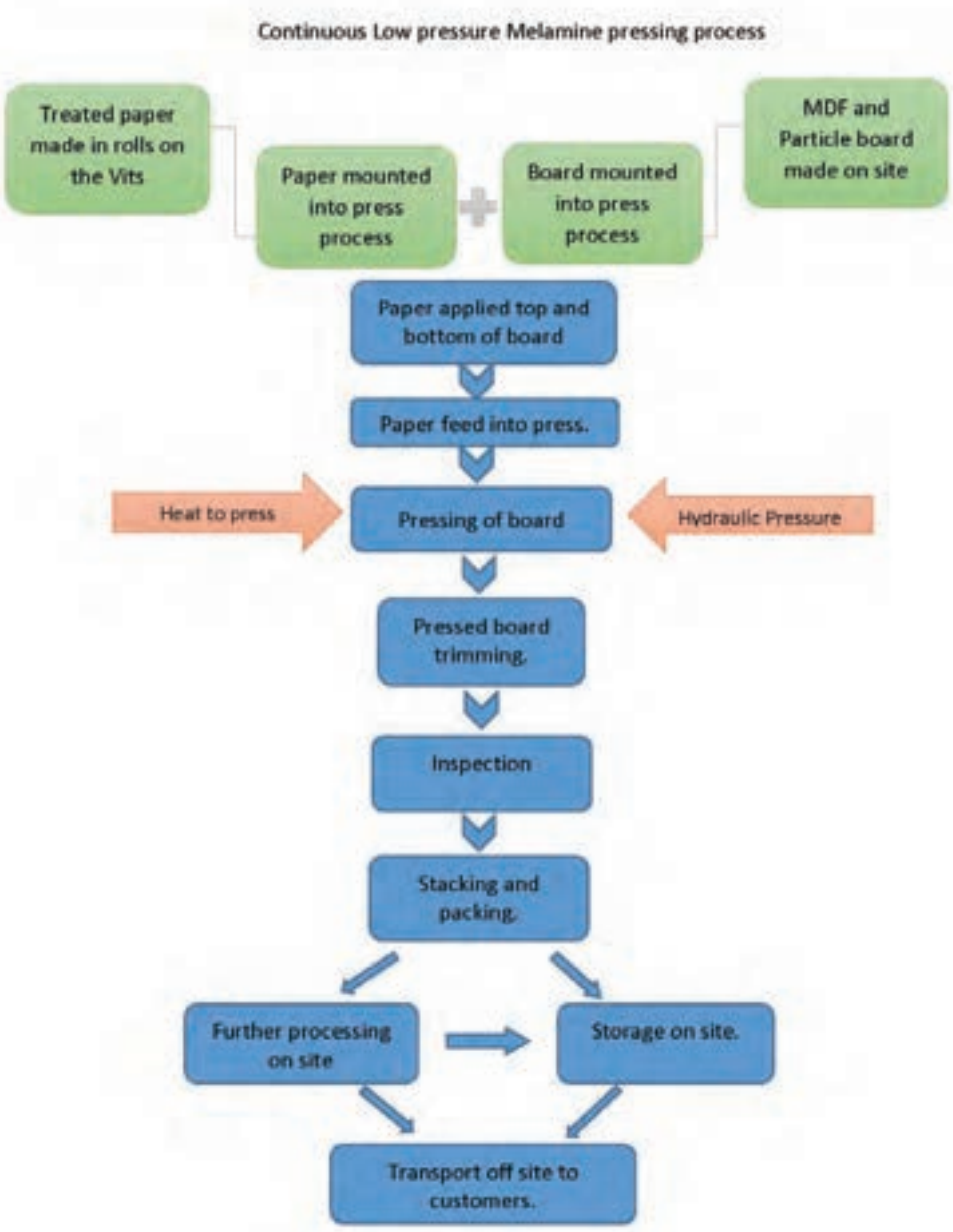

Figure 7: Press Process Flowchart

6.1.4 Automated Storage Warehouse.

The automated storage warehouse building will encompass a completely automated storage and packing process. It will consist of approximately 10,000 material bays, ranging in length, width and thickness. The store will be made up of 6 aisles with automated handling trolleys (stacker cranes) and significant amounts of suitable shelving and or racking which will store and retrieve the contents of the trolleys. The packs will be prepared at all times of the day and the process will be able to operate unmanned during the night once the orders are entered into the Warehouse management system. The prepared packs will then be presented ready for loading to the transport fleet and delivery to customers.

6.1.5 Sanding Line

An additional wide belt sanding line is to be installed within the existing Main Production Hall Building to accommodate extra product generated on site. The sanding line is used to prepare the surface of the board prior to additional processing.

6.1.6 Lot Consolidation and Boundary Adjustment

Consolidation of effected lots is the subject of this application as follows:

- Consolidate Lots 1 & 2 D.P.1085563 into Lot 26 D.P.1200697
- Consolidate Lot 24 D.P. 1148073 into Lot 26 D.P.1200697

A Boundary adjustment is the subject of this application as follows:

- Adjust the adjoining eastern boundary of lot LOT 26 D.P.1200697 and western boundary of Lot 1 DP 1076346. This boundary is to be relocated to the east, increasing the size of LOT 26 D.P.1200697 and reducing the size of Lot 1 DP 1076346.

Details of this consolidation and boundary adjustment are included in Figure 8 below.

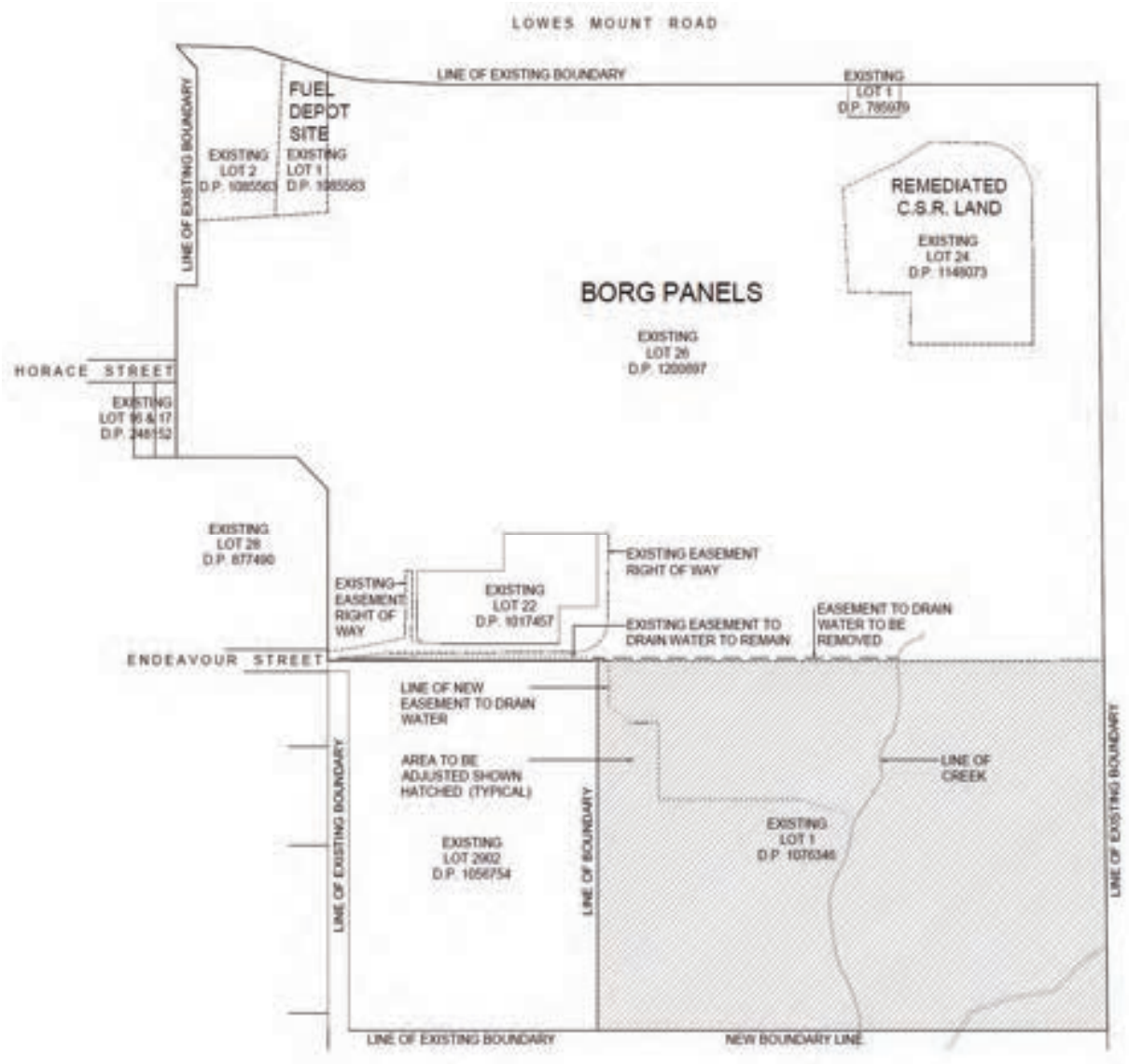

Figure 8- Consolidation Plan

This will rectify the current IN1/RU1 split zoning on Lot 1 DP 1076346, by consolidating the IN1 zoned proportion of land on Lot 1 DP 1076346 into Lot 26 LOT 26 D.P.1200697, thus retaining all the RU1 zoned land under the current LOT 26 D.P.1200697

6.2. Site Preparation

The site is largely cleared, level and comprises existing industrial buildings. As such, very little ground work, with the exception of the car park on the northern section of the site and the detention basins to the east of the site, will be undertaken. All works involving excavation will be undertaken in accordance with an erosion and sediment control plan, prepared in accordance with the Blue Book.

Some demolition will be required over the site. The existing administration building in the centre of the site will be demolished to make way for new plant. In addition, existing industrial facilities, including a refuelling depot, will be demolished in the south western corner of the site. Site remediation works, in accordance with the EPA's *Guidelines for Assessing Service Station Sites*, will need to be undertaken to ensure that this section of the site is appropriately dealt with, and this should be conditioned as such.

6.3. Construction

The target start date for the construction of the first stage of works is nominated for Q4 2016, subject to approval. The work will be executed by a number of specialist and experienced contractors, managed as a project by a dedicated Borg Construction management team led by a site based Construction Manager.

As part of the construction process, a detailed Project Execution Plan, including a Construction Management Plan, Safety Management Plan, Quality Assurance Plan and an Environmental Management Plan would be produced. These will guide the overall process, and will be informed by both this document, and any relevant conditions imposed on the Project

6.3.1. Program of Works

The Project is to be undertaken in four stages. This will be over a period of 24 months:

- Stage 1 – site works, construction of detention basin (required for erosion and sediment control for later stages) and hardstand areas. Within this stage the construction of the detention basin and drainage swale will be undertaken first in order to ensure that the appropriate erosion and sediment control measures can be implemented for later stages. Stage 1 is to commence upon approval and is estimated to take approximately 6 months.
- Stage 2 – construction of Particle Board Manufacturing Facility and installation of related plant. Stage 2 is to commence upon approval or slightly thereafter and is estimated to take up to 24 months, dependent on equipment availability.
- Stage 3 – alterations and additions to existing MDF site and construction of new automated storage warehouse. Stage 3 is to commence upon approval or slightly thereafter and is estimated that this will take up to 24 months.
- Stage 4 – debarker chipper building and chip preparation area. Stage 4 is to commence approximately 12 months after approval and is estimated to take up to 12 months to complete.

These stages are not dependent on each other, and can be carried out independently and concurrently. As such, the staging plan is not indicative of the order in which stages 2, 3 and 4 will be carried out.

Details of the works involved in each staging plan are included in Appendix B along with architectural and landscape plans.

6.3.2. Outline of Main Construction Activities

The construction of the Project is to be undertaken in a number of stages as outlined above. These stages are generally not dependant on each other, and may be undertaken in a different order to the numerical order outlined above. However, the key construction activities are considered to be:

- Construction of new first flush and emergency basin in east of the site.
- Demolition of existing site infrastructure
- Construction of new site access and hardstand
- Construction of new industrial buildings to the south west and north west of the subject site to house new plant and equipment, as well as to provide storage.
- Installation of new plant and equipment in existing industrial buildings

These new buildings are generally as follows:

- Proposed debarker and chipping plants will be constructed to the south and east of the existing production building. The chippers will be contained in concrete and acoustic panels enclosures.
- A mill building with dimensions 19 x 10 metres will be constructed to the west of the proposed production hall. The building is to be fully enclosed with acoustic panelling.

- A flaker building with dimensions 61 x 33 metres will be constructed to the west of the proposed production hall. The building is to be fully enclosed with acoustic panelling.

6.3.3. Fencing, Security and Lighting

During the construction phase of the Project, the existing site security measures will be retained. This provides for secure site access, with all visitors to the site having to undertake an induction. As the site will continue to be operational during the construction phase these worker safeguards are important to be maintained. Deliveries will continue to be split between Gate 6 and Gate 4, which are security controlled.

No changes to the existing site security fencing is proposed to be undertaken as part of the Project.

The separation between the Woodchem operations and the rest of the site will be reinforced through additional fencing to clearly delineate the different operations and ensure that access can be achieved over the Project site without any intrusion in to areas of construction or storage.

Lighting is currently provided on site to allow the full 24-hour operation of the site in line with the current consent. This is designed to project downwards to minimise impacts on the amenity of the area and to increase overall site safety.

6.3.4. Construction Workforce

Where possible, construction workers will be employed from the local community. Some off-site construction of plant and infrastructure will be required. This will generally be undertaken at the Somersby facility of Borg Panels.

6.3.5. Construction Hours

It is proposed that construction activities would occur during:

- Monday to Friday 7am to – 7 pm;

- Saturday 7am – 3pm; and

- No works on Sundays and Public Holidays.

6.3.6. Construction Environmental Management and Monitoring

Prior to construction activities taking place, a Construction Environmental Management Plan (CEMP) would be prepared to address the management of potential environmental impacts associated with construction activities. The CEMP would include as a minimum management measures to address the following environmental aspects during the construction phase:

- Surface Water;

- Soils and groundwater;

- Air quality and odour;

- Noise;

- Waste;

- Indigenous and Non-Indigenous Heritage; and

- Flora and fauna.

6.4. Operation

The operation of the Facility can generally be divided into the following key areas:

- Import – raw material (timber) delivered to the site;

- Production – production of MDF and particle board products as detailed above;

- Storage – in the facility; and

- Dispatch – Out loading of product for delivery to customers by truck.

6.4.1. Import

Delivery of timber would generally be undertaken by the existing Borg trucking fleet, or by nominated contractor. Much of the timber brought to site is produced in the surrounding area, and comes in a raw (unprocessed) form, directly from the plantation. No old growth or native forest is used in the production of either MDF or Particle Board.

The completed Project would require approximately 320 truck movements per day to meet expected demand. Log trucks would continue to enter the site at Gate 5 and proceed to the log storage area in the south eastern corner of the site. The logs would be unloaded and then processed on site.

6.4.2. Production

Production of both MDF and Particle Board is detailed in Section 6.1 above.

6.4.3. Storage

The automated storage warehouse building will encompass a completely automated storage and packing process. It will consist of approximately 10,000 material bays, ranging in length, width and thickness. The store will be made up of 6 aisles with automated handling trolleys (stacker cranes) and significant amounts of suitable shelving and or racking which will store and retrieve the contents of the trolleys. The packs will be prepared at all times of the day and the process will be able to operate unmanned during the night once the orders are entered into the Warehouse management system. The prepared packs will then be presented ready for loading to the transport fleet and delivery to customers.

6.4.4. Dispatch

The automated storage warehouse building will encompass a completely automated storage and packing process. It will consist of approximately 10,000 material bays, ranging in length, width and thickness. The store will be made up of 6 aisles with automated handling trolleys (stacker cranes) and significant amounts of suitable shelving and or racking which will store and retrieve the contents of the trolleys. The packs will be prepared at all times of the day and the process will be able to operate unmanned during the night once the orders are entered into the Warehouse management system. The prepared packs will then be presented ready for loading to the transport fleet and delivery to customers.

Approximately 320 truck movements will occur. This is an increase in 218 over current daily truck movement.

6.4.5. Fire Management

The existing Borg Panels facility has been designed to minimise safety risks and hazards associated with operations, and is fitted with extensive fixed and portable fire-fighting capability. A detailed Fire Management Plan will be prepared prior to construction.

Existing and new process controls will include a monitored fire system with deluge. There is also a manual deluge system proposed for most significant equipment groups.

6.4.6. Stormwater Management

The majority of the Site is sealed and there is an existing stormwater management system in place. This system collects stormwater from the wider Oberon Timber Complex and treats the water on site through a series of treatment ponds. The clean water is then discharged from the site.

In order to prevent pollution of existing watercourses from the site, the existing system will be upgraded, with additional detention basins provided. This is detailed in Section 15.

6.4.7. Security

All visitors to the Site must check in with operations staff, undergo the appropriate level of induction and be wearing appropriate Personal Protective Equipment (PPE) relevant to their visit, prior to entering the Site.

A chain wire mesh fence with a barbed wire top exists around the entire boundary. Truck access to the Site would continue to be managed via three automatic traffic gates that would be opened by terminal staff or access cards (issued to inducted contractors).

Emergency egress points are located at manually-opened gates and the main traffic gates.

6.4.8. Hours of Operation

No change to the existing approved hours of operation under the 1995 consent are proposed. These are 24 hours a day, 365 days a year.

PART E – PLANNING MATTERS

7.0 STATUTORY PLANNING

7.1. Commonwealth Matters

7.1.1. *Environment Protection and Biodiversity Conservation Act 1999*

The primary objective of the Environment Protection and Biodiversity Conservation Act 1999(EPBC Act) is to '*provide for the protection of the environment, especially those aspects of the environment that are Matters of National Environmental Significance'*. Environmental approvals under the EPBC Act may be required for an 'action' that is likely to have a significant impact on Matters of National Environmental Significance.

Where there is potential for a proposal to have a significant impact on any Matters of National Environmental Significance, a Referral under the EPBC Act can be submitted to the Department of the Environment for consideration, concurrent with this State Significant Development application process.

The limited biodiversity value on the site ensures that the Project does not trigger any Matters of National Environmental Significance and no Referral is required.

7.2. State Matters

7.2.1. *Environmental Planning and Assessment Act 1979* (EP&A Act)

The Environmental Planning and Assessment Act 1979 (EP&A Act) and the Environmental Planning and Assessment Regulation 2000 (EP&A Regs) provide the framework for development and environmental assessment in NSW. Given the size of the Project, it would have been one to which Part 3A of the EP&A Act applied had it continue to operate. However, on 16 June 2011, the NSW Government introduced the EP&A Act Amendment Bill into the Parliament to repeal Part 3A of the EP&A Act and replace it with an alternative system for the assessment of projects of genuine State significance. This new legislation came into force on the 1 October 2011.

In line with the amended EP&A Act, a project is classified as State Significant Development, (SSD) pursuant to Part 4 Section 89C of the EP&A Act if it is declared as SSD by a State Environmental Planning Policy or declared SSD by order of the Minister for Planning in the Government Gazette.

In this instance the proposed development falls under the provisions set out in Clause 4 of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) (2011) (SEPPSRD).

Clause 4 of Schedule 1 relates to Timber milling, timber processing, paper and pulp processing facilities that have a capital investment value of more than $30 million as follows:

> *Development that has a capital investment value of more than $30 million for any of the following purposes:*
>
> *(a) milling plants, sawmills, log processing works, wood-chipping or particle board manufacture,*
>
> *(b) manufacture of paper, pulp, cardboard or newsprint,*
>
> *(c) paper recycling,*
>
> *(d) wood preservation,*
>
> *(e) charcoal plants,*

but not including development for the purpose of plantations (unless it is ancillary to other development specified in this clause).

As the proposal is for a particle board manufacturing facility and associated site works with an estimated capital investment value of $106 million, it meets the requirements of Schedule 1 Clause 4 of the SEPPSRD. Therefore, the project is considered State Significant Development.

Section 78(A) (8A) of the EP&A Act states that a

development application for State significant development is to be accompanied by an environmental impact statement prepared by or on behalf of the applicant in the form prescribed by the regulations.

Section 79C of the EP&A sets out the matters for consideration. These are shown in Table 1 below

a) (i)Any environmental planning instrument	Section 7
(ii) Any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority	No proposed instrument is applicable to this application.
(iii) Any Development Control Plan	Development Controls Plans do not apply to State Significant Development. However, consideration of the Oberon Council Industrial DCP is included to show compliance.
(iiia)Any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F	No Planning Agreement has been entered into under Section 93F
(iv) The Regulations (to the extent that they describe the matters for the purposes of this paragraph)	Section 7
(v) Any Coastal Zone Management Plan (within the meaning of the Coastal Protection Act 1979) that apply	No Coastal Management Plans apply
(b) The likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality.	Part G
(c) The suitability of the site for the development	Section 27
(d) Any submissions made in accordance with this Act or the regulations	Any submissions made in accordance with the Act or the regulations will be addressed during the EIS exhibition.
(e) The public interest	The Project is in the public interest as it minimises the current impacts from the development (in regards to both air and noise pollution) whilst increasing regional employment.

Table 1: Section 79C Matters for Consideration:

Schedule 2 of the EP&A Regs sets out the requirements of an Environmental Impact Statement (EIS). This is addressed in Section 7.2.2 below.

Part 2 of Schedule 2 of the EP&A Regs states:

> *Before preparing an environmental impact statement, the responsible person must make a written application to the Director-General for the environmental assessment requirements with respect to the proposed statement.*

Secretary's Environmental Assessment Requirements (SEARs) (formerly Director Generals Requirements) for have been issued for the Project in April 2015 and form the basis of this EIS.

Sections 89J and 89K of the EP&A Act outline authorisations that are not required for State significant development authorised by a development consent, and authorisations that cannot be refused if necessary for carrying out State significant development that is authorised by a development consent.

The requirements of other Acts and Environmental Planning Instruments that are applicable to the Project are discussed in more detail below.

7.2.2. *Environmental Planning and Assessment Regulation 2000*

Form and Content of an EIS

This EIS has been prepared pursuant to Schedule 2 of the EP&A Regulations. Clauses 6 and 7 of Schedule 2 provide requirements in relation to the form and content of an EIS. The requirements of Clauses 6 and 7 and where they are addressed in this document are outlined in Table 2 and Table 3

Form of Environmental Impact Statement

An environmental impact statement must contain the following information:	Addressed:
a) The name, address and professional qualifications of the person by whom the statement is prepared	Certification Page
b) The name and address of the responsible person	Certification Page
c) The address of address of the land: (i) In respect of which the development application is to be made, or (ii) On which the activity or infrastructure to which the statement relates is to be carried out.	Lot and DPs are provided on Title Page, Section 1 and Section 3.2
d) A description of the development, activity or infrastructure to which the statement related	Section 6
e) An assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement related, dealing with the matters referred to in this Schedule	This Table and Part F
f) A declaration by the person by whom the statement is prepared to the effect that: (i) The statement has been prepared in accordance with this Schedule, (ii) The statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and (iii) That the information contained in the statement is neither false nor misleading	Certification Page

Table 2: Form of an EIS

Content of an Environmental Impact Statement

An environmental impact statement must contain the following information:	Addressed:
(1) An Environmental Impact Statement must contain the following: a) A summary of the environmental impact statement,	Executive Summary
(b) A statement of the objectives of the development, activity or infrastructure,	Section 4
(c) An analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,	Section 5
(d) An analysis of the development, activity or infrastructure, including: (i) A full description of the development, activity or infrastructure, and (ii) A general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and (iii) The likely impact on the environment of the development, activity or infrastructure, and (iv) A full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and (v) A list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,	Section 6
(e) A compilation (in a single section of the environmental impact statement) of the measures referred to in item (d) (iv),	Section 27
(f) The reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).	Certification Page
(2) Subclause (1) is subject to the environmental assessment requirements that relate to the environmental impact statement.	Noted
(3) Subclause (1) does not apply if: (a) The Director-General has waived (under clause 3 (9)) the need for an application for environmental assessment requirements in relation to an environmental impact statement in respect of State significant development, and (b) The conditions of that waiver specify that the environmental impact statement must instead comply with requirements set out or referred to in those conditions.	N/A This EIS has been prepared in accordance with Project specific SEARs issued by the Department.
(4) The principles of ecologically sustainable development are as follows: (a) The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the	Section 28

precautionary principle, public and private decisions should be guided by: (i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and (ii) An assessment of the risk-weighted consequences of various options, (b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations, (c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration, (d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as: (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste, (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	

Table 3: Content of an EIS

7.2.3. Relationship with Project Approval 27/95

There is an existing consent that that applies to the subject site: DA 27/95 (as amended). This consent applies to much of the existing Oberon Timber Complex, including the Borg land. However, a number of other DAs have been approved which appear to have removed certain components of the original consent. However, these predate the online publication of consents through the Department of Planning Portal.

As a result, it is proposed to excise the land the subject to this application from DA 27/95, seeking consent for the new works, whilst recognising that existing works have approval under this past application. These existing works that apply to the Project are covered under the following modifications to DA 27/95:

- DA 27/95 – M1,
- MOD-83-10-2002-i,
- MOD-27-2-2005-i,
- MOD 4,
- MOD 5,
- MOD 7
- MOD 8

It is noted that the majority of Lot and DPs that the original consent relates to, and which are still noted on the consent, are no longer in existence, as lot consolidations and subsequent subdivisions have changed the official land descriptions. As such, it is considered that this new approval, and the new conditions of

consent that will be imposed, will take precedence over the existing consent. However, recognition that there is existing, approved development on the site, and that significant elements of this will not be altered, is required from the Department.

The existing consent will still continue to operate to ensure that any land on the western side of Lowes Mount Road, not covered under subsequent consents, will continue to have appropriate controls put in place.

It is considered that the following Lots are still subject to the original 27/95 consent:

- Lot 10 DP846575
- Lot 1 DP 868536
- Lot 1 DP DP155561
- Lot 8 DP 204131
- Lot 88 DP 592323
- Lot 10 DP 1017456
- Lot 86 DP 574012
- Lot 1 DP 1047220
- Lot 11 DP 1017456
- Lot E DP 411788
- Lot B DP 160792
- Lot 1 DP 128404
- Lot 1 DP 360362
- Lot 1 DP 360361
- Lot 1 DP 1047220

This list does not take into account any subsequent approvals that may have removed land parcels on the western side of Lowes Mount Road. As the original consent has not modified these lot numbers it is not clear as to whether land on the western side of Lowes Mount Road is still covered by the consent.

It is requested that the approvals put in place for noise and air quality use the EPA licence requirements as a guideline. The 27/95 approval currently specifies both levels from the Department as well as referencing the EPA licensing requirements. As these are two separate levels, it is requested for consistency that only the EPA licence requirements be brought across to form the new consent.

In regards to the existing conditions of consent that apply to the site under the 27/95 consent, the following conditions are considered to be relevant, and may be appropriate to be carried across to the new consent:

- 1A
- 8(a)
- 9
- 10
- 11
- 17
- 18
- 21
- 24
- 25
- 30
- 35(a)
- 46
- 48
- 50

- 51
- 53
- 54

In regards to the existing condition of consent that applies to the site under the 27/95 consent, the following condition is considered to be relevant for the short term however will expire and drop off at completion of the time frame conditioned:

- 37a

It is noted that the land on which the Woodchem facility is located on (Lot 22 DP 1017457) is not currently part of the 27/95 Consent. This separate consent is to be continued under the current application. There are a number of reasons for this approach:

- The ownership of the site is different to that of the wider Borg Panels facility. There is the potential for the site to be sold, and a similar situation to the current consent to occur (different ownership having to work under the same consent)
- The current consent rests with Oberon Council
- The site is acknowledged as Major Hazardous Facility (MHF) due to storing formaldehyde. This is covered under an existing WorkCover licence.
- No changes are proposed to the Woodchem facility – current capacity meets the expected demand.
- The Woodchem facility sells resins to a number of different companies outside of the Borg group of companies, and operates as a separate business, despite sharing some high level corporate support services.
- An easement for access exists to provide ongoing access to the site from Endeavour Street.

As a result of the above, it is considered that the Woodchem site is best dealt with as a separate application. Due to the size of operations of the Woodchem facility, the consent for such operations will rest with Oberon Council.

7.2.4. State Environmental Planning Polices

State Environmental Planning Policy (State and Regional Development) 2011

The Project is 'State Significant Development' in accordance with Division 4.1 of Part 4 of the EP&A Act, as it is triggered as a 'Waste and Resource Management Facility' under Clause 4, Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011. Specifically, the following provision triggers the proposal as State Significant Development:

> *Development that has a capital investment value of more than $30 million for any of the following purposes:*
>
> *(a) milling plants, sawmills, log processing works, wood-chipping or particle board manufacture,*

The proposal is expected to have a CIV of $105 million, thereby exceeding the SSD trigger of $30 million. Accordingly, the appropriate approval process is State Significant Development under Part 4 of the EP&A Act.

State Environmental Planning Policy 33 – Offensive and Hazardous Development

State Environmental Planning Policy 33 –Hazardous and Offensive Development (SEPP 33), clause 12 outlines that a Preliminary Hazard Analysis screening test must be undertaken to determine the risk of the proposal.

A potentially hazardous industry is defined within SEPP 33 as a development for the purpose of any industry which, if the development were to operate without employing any measures to reduce or minimise its impact, would pose a significant risk to human health, life or property, or to the biophysical environment.

An assessment of the Project in accordance with Hazardous and Offensive Development –Applying SEPP 33, is provided in Section 12 and concludes that the Project is not offensive or hazardous.

7.2.5. Central West and Orana Regional Growth Plan

The Central West and Orana Regional Growth Plan has not yet been formally prepared by the Department. The Department website states:

> *In June 2014 the NSW Government released new draft regional boundaries for NSW. Once the boundaries are finalised for each region, they will provide the basis for a new generation of strategic plans called Regional Growth Plans.*
>
> *There are no existing strategies in place for this region. The Department of Planning and Environment will prepare a Regional Growth Plan for Central West and Orana. The first step is to prepare a Discussion Paper to start the conversation on how the Region will grow over the next 20 years. The Regional Growth Plan will identify areas suitable for housing and employment expansion in the region. However, not all parts of the region are projected to experience growth equally and as such the plan will identify strategies to ensure population sustainability and to manage population decline.*

The Project is located within the Central West and Orana regional boundaries. The key statistic on the region webpage for regional growth plans concerns population growth 2011-2031. This projects the population to increase from 276,850 in 2011 to 299,550 in 2031.

With this increase in population, ongoing, long term employment is an integral part of any future policy. The proposed expansion will provide additional employment, and represents a long term investment in the region, leading to long term jobs, both on site an in associated industries such as forestry.

7.3. Local Matters

The following details more localised matters, including Environmental Planning Instruments, Development Control Plans and other Licencing Requirements of the Project.

7.3.1. *Oberon Local Environmental Plan 2013*

The Project is located within the Oberon Council Local Government Area. As a result, the provisions of the *Oberon Local Environmental Plan 2013* (LEP) need to be considered as part of this EIS.

The subject land has a zoning of IN1 – General Industrial zoning.

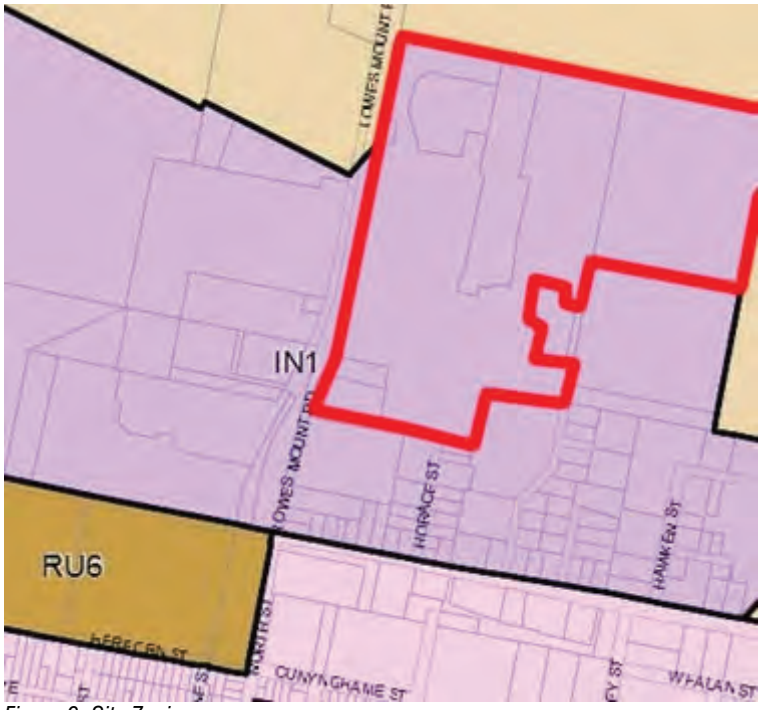

Figure 9: Site Zoning

The objectives of the current zone as follows:

- *To provide a wide range of industrial and warehouse land uses.*
- *To encourage employment opportunities.*
- *To minimise any adverse effect of industry on other land uses.*
- *To support and protect industrial land for industrial uses.*

The proposed development is consistent with the objectives of the zone as set out under the provisions of the LEP. All works are to be internal to the existing buildings on site, and will be enclosed within sound proof enclosures.

The development aims to ensure that all works minimise adverse impacts on other land uses. The proposal will also assist in ensuring the economic viability of the site, ensuring the continuation of employment for the local community and having obvious flow on effects in terms of economic benefits to local settlements (including the Oberon town itself as well as surrounding areas)

The permitted uses in the zone are as follows:

Depots; Freight transport facilities; Funeral homes; General industries; Hardware and building supplies; Industrial training facilities; Kiosks; Landscaping material supplies; Light industries; Liquid fuel depots; Neighbourhood shops; Plant nurseries; Roads; Rural supplies; Take away food and drink premises; Timber yards; Vehicle sales or hire premises; Warehouse or distribution centres; Any other development not specified in item 2 or 4

The prohibited uses in the zone (item 4 above) are as follows:

Agriculture; Air transport facilities; Airstrips; Amusement centres; Camping grounds; Caravan parks; Cemeteries; Commercial premises; Community facilities; Correctional centres; Eco-tourist facilities; Entertainment facilities; Exhibition homes; Exhibition villages; Farm buildings; Forestry; Function centres; Heavy industrial storage establishments; Home-based child care; Home businesses; Home occupations; Marinas; Mooring pens; Moorings; Open cut mining; Registered clubs; Research stations; Residential accommodation; Tourist and visitor accommodation

Development permitted without consent in the zone (item 2 above) are as follows:

> *Environmental protection works; Flood mitigation works; Water reticulation systems; Water treatment facilities; Wharf or boating facilities*

A review of the permitted uses in the zone indicate that the existing development on site meets the definition of *Heavy industry*. This is not anticipated to change as a result of the Project. *Heavy industry* is defined as follows:

> *heavy industry means a building or place used to carry out an industrial activity that requires separation from other development because of the nature of the processes involved, or the materials used, stored or produced, and includes:*
> *(a) hazardous industry, or*
> *(b) offensive industry.*
> *It may also involve the use of a hazardous storage establishment or offensive storage establishment.*

Part of Lot 1 DP 1076346 is zoned RU1. It is proposed that this land undergo a boundary adjustment as part of this process. The new boundary of the lot is to be located on the zone boundary. The IN1 zoned portion of the lot is to be consolidated with Lot 26. Lots 1 and 2 and Lot 24 are also to be consolidated in to Lot 26.

Clause 6.6 of the Oberon LEP notes requirements for land located within an industrial buffer zone. The map for this is shown below:

Figure 10: Indicative Location of the Project relative to Noise Buffer

Clause 6.6 states:

> *(1) The objectives of this clause are as follows:*

(a) to protect the operational environment of industries operating within the Oberon Timber Complex,

(b) to control development near the Oberon Timber Complex and waste disposal facilities to minimise land use conflict.

(2) This clause applies to land identified as "Oberon Timber Complex" on the Industrial Buffer Map.

(3) Before granting development consent to development on land to which this clause applies, the consent authority must consider the following:

(a) the impact that any noise, odour or other emissions associated with existing land uses may have on the development,

(b) any proposed measures incorporated into the development that limit the impact of such noise and other emissions associated with the existing land use,

(c) any opportunities to relocate the development outside the land to which this clause applies,

(d) whether the development is likely to adversely affect the operational environment of any existing development on the land to which this clause applies.

In this instance it is noted that the Project is located within the Industrial Buffer area, as illustrates above. However, the Project is part of the Oberon Timber Complex, rather than being development that may be affected by the ongoing operations of the Oberon Timber Complex. As such, it is considered that the Project does not need to consider the impact of noise, odour of other emissions associated with existing land uses, provide measures to minimise the impacts of noise or considered locating the development outside of the buffer area. This is because the Project represents the expansion of an existing industry that the buffer area was established to protect.

However, it is important to note that mitigation measures have been put in place to minimise the impacts of the development on adjoining land uses, such as installation of appropriate noise reducing technology and buildings, proposed coverings of stockpiles and the like.

Further, detailed consideration of the acoustic impacts of the Project, including further consideration of compliance with Cl. 6.6 of the Oberon LEP are included in Section 13 of this report.

7.3.2. Oberon Development Control Plan

Clause 11 of SEPP SSD states:

Development control plans (whether made before or after the commencement of this Policy) do not apply to:

(a) State significant development, or

(b) development for which a relevant council is the consent authority under section 89D (2) of the Act.

As a result, no DCPs are relevant to the Project.

However, in order to address potential concerns, and to address the requirement in the SEARs, the following table sets out the key criteria within Oberon Council DCP Part D – Commercial and Industrial development, and demonstrates compliance with these controls.

DCP Component	Requirement	Complies?	Comments
D2 – Aims and Objectives	*The aim of this plan is to control development within the town of Oberon so as to create a business area with a special atmosphere and streetscape. It also applies to the other areas of the Council area where commercial and/or industrial development is proposed.* *a) The aim of the plan is to promote the development of a visually pleasing and appealing development of the Commercial Centre and industrial area* *b) The objectives of this plan are to:* *i) Control the material to be used in the façade of the commercial and industrial development.* *ii) Apply specific controls for the setback of development.* *iii) Apply requirements for traffic management and parking.* *iv) Allow flexibility in the application of the controls.*	Y	A Visual Impact Assessment accompanies this EIS and details the impacts on the viewshed of Oberon, as well as recommending mitigation measures. Much of the new development melds in to the existing plant on site, which significantly reduces the visual impact of the Project.
D4.1 – Building Setback	*Provide a building setback minimum of 6 metres from the Street and 4.5 metres from any side street.* *Where there is an existing development which is built to the front boundary along the Street, the Plan does not require that building to be set back upon redevelopment or extension.* *If there is a development proposed which adjoins an existing development built to the front boundary, or closer than 6 metres to the front boundary, the setback requirement may be reduced heaving regard to the adjoining development and the*	Y	Additional development is proposed fronting Lowes Mount Road. This is set back approximately 40m from the street. No side street frontage is proposed.

	overall appearance of the proposed development in the streetscape.		
D4.2 – Building Facade	*The building facade should be designed to enhance the visual amenity of the area. The building designer will be required to give special consideration to the building facade and the site landscaping.*	Y	The façade of the Project has been designed to integrate in to the site context, and provide a functional but attractive streetscape. Consistent materials, integrating new buildings with existing buildings and appropriate site landscaping help achieve compliance with this DCP requirement.
D4.3 – Setback Area Use	*Each development will be considered on its merits and having regard to the adjoining development and the development when considered within the existing streetscape.*	Y	The proposed development is located on an existing industrial site.
D4.4 - Parking	*The development will be required to provide for car parking at the rear of the development site in accordance with Councils Parking Code. Where this is not possible the developer may choose to pay Council the appropriate carparking contribution* *The use of lots adjoining the rear of a commercial lot, for car parking is permissible. The use of these lots or the use of an existing rear lane is encouraged so as to reduce the number of driveways, which would otherwise cross the footpath. Disabled carparking is required on each development site. Signposting indicating the availability and location of car parking on the site is to be provided at the front of the site.*	N	Car parking is provided at the front of the site. This is an existing car park that is to be extended.
D4.5 – Access Driveways	*The access driveways must be designed in accordance with appropriate Engineering Specifications at full cost to the Developer to Councils satisfaction. The access crossing over the footpath from the kerb of the road/street to the gateway of the development is to be concreted.*	Y	Noted. No significant changes to existing access points are proposed.
D4.6 – Site	*The design of the driveways and*	Y	Noted, and all vehicles, including

Access	*manoeuvring areas are to be, wherever possible, accessible to rigid trucks for loading and unloading and will enable on site reversing movements for the forwards direction entry and exit of all vehicles, including the rigid trucks. Council will require turning circles to be detailed on the site plan.*		heavy vehicles, are able to leave the site in forward manner.
D4.7 - Signs	*The development will be required to ensure that no sign is projecting over the front boundary of the lot. Refer to State Environmental Planning Policy 64 – Advertising and Signage for the requirements for signage. The SEPP 64 provides for business and building identification signs.* *Development consent is required for signage. NB. Signage design/details may be included in the Development application submission for the commercial or industrial activity*	Y	No significant additional signage is proposed to be carried out as part of the Project.
D4.8 - Awnings	*Council will require all commercial development in the Oberon Street to provide awnings over the adjacent footpath to provide weather protection for pedestrians.*		Not relevant to the proposed development.

Table 4: Compliance with Oberon DCP

7.4. Licencing and Other NSW Environmental Approvals

A number of existing licence approvals apply to the existing development on site. Due to the significant number of changes to the operation of the facility, new licence conditions will be required to be issued by the EPA. The levels set by these licenses should form the basis of any Conditions of Consent regarding air, noise, odour, general pollution control and water quality.

8.0 ENVIRONMENTAL COMMITMENT

8.1. Policy Statement

Borg Panels has an overarching Environmental Policy that governs corporate and individual employee behaviour. The Guiding Principles of this policy are:

- Identify, understand and effectively manage risks in our business;
- Use common tools, resource, training and systems;
- Build environmental capability and responsibility at all levels;
- Use relevant measures to drive; and
- Without exception, we will all be held accountable

Beneath this overarching policy, a number of more detailed plans relating to specific environmental actions, controls and commitments operate.

This Project, including the design, planning and impact assessment and operations, would be undertaken in accordance with this policy.

8.2. Environmental Management Program

Under DA 27/95 Borg are required to prepare yearly environmental reports that demonstrate compliance with the licensing requirements and conditions of consent. Such an Environmental Management Program is proposed to continue.

PART F – ISSUES IDENTIFICATION

9.0 STAKEHOLDER ENGAGEMENT

9.1. Consultation with Department of Planning and Environment

Since the original lodgement of the 1995 DA, there has been ongoing consultation with the Department regarding the operations of the site, including the lodgement of a number of modifications to the consent under S.75W of The Act.

This has continued under the ownership of Borg Panels.

In relation to the Project, Borg Panels has been in ongoing discussions with the Department regarding the overall aims of the site, including providing updates on future development intentions, and to consult with the Department regarding appropriate approval paths and requirements.

In April 2015, Borg Panels prepared a Preliminary Environmental Assessment for the Department to consider. This report outlined the general scope of the Project, as well as identifying some of the preliminary matters for consideration. In April 2015 the Department issued the Secretary's Environmental Assessment Requirements (SEARs) for the Project.

In accordance with Section 89G of the EP&A Act, the matters raised in the SEARs have been addressed within this EIS. Each of the matters raised by the Secretary-General for consideration in the EIS is outlined in Table 10, together with the relevant sections of the EIS where each matter is addressed.

Matter	Section
The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000.*	
Notwithstanding the key issues specified below, the EIS must include:	
• a detailed description of the development including:	**Section 4**
- need for the proposed development;	**Section 4.1**
- justification of the proposed development;	**Section 29.3**
- proposed output and scope of works;	**Section 6**
- sequence or stage/s of the proposed development during construction and operation;	**Section 6.3.1**
- likely interactions between the proposed development, the	
- existing operation and other neighbouring developments; and	**Section 6**
- plans of any proposed building works.	**Section 6**
• consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments;	**Section 7**
• a risk assessment of the potential environmental impacts of the proposed development, identifying the key issues for further assessment;	**Executive Summary**
• a detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment which includes:	**Section 10-23**
- a description of the existing environment, using sufficient baseline data;	
- an assessment of the potential impacts of all stages of the proposed development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes; and	
- a description of the measures that would be implemented to avoid,	

minimise and if necessary, offset the potential impacts of the proposed development, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment. • a consolidated summary of all proposed environmental mitigation, management and monitoring measures, highlighting commitments included in the EIS. The EIS must also be accompanied by a report from a qualified quantity surveyor providing: • a detailed calculation of the capital investment value (CIV) as defined in clause 3 of the *Environmental Planning and Assessment Regulation 2000)* of the proposal, including details of all assumptions and components from which the CIV calculation is derived; • a close estimate of the jobs that will be created during the construction and operational phases of the proposed development; and • certification that the information provided is accurate at the date of preparation.	**Section 27** **Appendix I**
The EIS must address the following specific matters: • **Consolidation of Operations** - including: - a clear description, including figures and plans, of Borg's existing and proposed operations which would apply to any new SSD consent; and - details of how any new SSD consent and any existing development consents for the site would interact, including any conditions that may no longer apply. • **Strategic Context** - including: - justification for the proposed development and suitability of the site; and - demonstration that the proposed development is generally consistent with all relevant planning strategies including but not limited to, the Oberon Local Environmental Plan 2013, State Environmental Planning Policy (Infrastructure) 2012 and relevant Development Control Plans (DCPs). • **Noise and Vibration** - including: - description of all potential noise and vibration sources generated from construction, operational and traffic noise; - a quantitative assessment of noise and vibration impacts to surrounding receivers from existing on-site activities and the proposed development in accordance with the relevant Environment Protection Authority (EPA) Guidelines; and - details of mitigation, management and monitoring measures for preventing and/or minimising noise emissions. • **Air Quality** - including: - a description of all potential air emission and odour sources; - a quantitative assessment of the air quality (particularly dust and formaldehyde) impacts of the proposed development on surrounding receivers in accordance with relevant EPA Guidelines; and - details of mitigation, management and monitoring measures for preventing and/or minimising emissions. • **Traffic and Access** - including: - accurate predictions of the traffic volumes likely to be generated	**Section 7** **Section 28** **Section 7** **Section 13** **Section 11** **Section 10**

during construction and operation; - consideration of the existing traffic generated by the existing operation; - a detailed traffic impact study of the proposed development in accordance with RMS Guidelines including: o hours and days of construction and operation and how the operations will interact with other road users; and o road transport volumes and types broken down into origin and destination, travel routes and peak hours for the construction and operation of the proposed development. - proposed access arrangements for the proposed development; and - layout of the internal road network, parking facilities and infrastructure within the site boundary.	
• **Soils and Water** - including: - a detailed assessment of potential soil, surface, flooding and groundwater impacts (both quality and quantity); - soil and groundwater contamination arising from previous uses on the site and any proposed management measures; - a detailed and consolidated site water balance for the proposed development; - details of water proposed to be taken from each water and groundwater source and how this relates to any relevant water sharing plans; - an assessment of any volumetric water licensing requirements (including those for ongoing water intake during operation); - description of proposed erosion and sediment controls during construction and operation; - description of the surface and stormwater management system, including on-site detention, and measures to use and reuse water; and - demonstration that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.	**Section 15 and 16**
• **Hazards and Risk** - including: - a preliminary risk screening completed in accordance with State Environmental Planning Policy No. 33 - Hazardous and Offensive Development and Applying SEPP 33, with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the proposal; - a Preliminary Hazard Analysis (PHA), should a preliminary screening indicate that the project is 'potentially hazardous'. The PHA must be prepared in accordance with Hazardous Industry Planning Advisory Paper No.6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi Level Risk Assessment (DoP, 2011); and - justification for whether the whole site should be considered a major hazards facility.	**Section 12**
• **Waste Management** - including: - details of the quantities and classification of all waste streams to be generated on site; - - details of waste storage, handling and disposal; and - - identification of all waste streams that are proposed to be brought to site (for alternative fuel purposes) and identification of the	**Section 17**

appropriate waste legislative framework under which it is permissible to import this waste on to site (e.g resource - recovery exemptions); and - - details of measures that would be implemented for treatment and disposal in accordance with the relevant EPA guidelines. • **Visual Amenity** - including an assessment of the potential visual impacts of the proposed development on the amenity of the surrounding area; • **Greenhouse Gas** - including an assessment of the potential greenhouse gas emissions of the proposed development. • **Biodiversity** - including an assessment of biodiversity impacts arising from the proposed expansion of the facility in accordance with the Framework for Biodiversity Assessment or relevant Office of Environment and Heritage guidelines. • **Heritage and Aboriginal Cultural Heritage** - including an assessment of potential heritage impacts of the proposed development. • **Cumulative** - including the existing on-site operations, all existing industrial facilities in the area and other nearby approved and proposed developments, particularly in relation to noise, air quality, soil, water, traffic, waste and hazards and risk.	**Section 19** **Section 18** **Section 21** **Section 22 and 23** **Section 24**
The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the *Environmental Planning and Assessment Regulation 2000.* These documents should be included as part of the EIS rather than as separate documents.	**Appendix 1**
During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • Oberon Shire Council; • Environment Protection Authority; • Roads and Maritime Services; • Office of Environment and Heritage; • NSW Fire and Rescue; • NSW Office of Water; • NSW Department of Primary Industries; • WorkCover; and • the local community and stakeholders. The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.	**Section 9.2 and 9.3**

Table 5: Matters Raised in SEARs

9.2. Agency Consultation

An initial stakeholder briefing was held on February 5 2016. This was attended by representatives of:

- Roads and Maritime Services (RMS)
- Department of Premier and Cabinet
- Environmental Protection Authority
- Workcover
- Office of Water
- Oberon Council
- Department of Primary Industries
- Office of Environment and Heritage
- NSW Fire Service
- Local Employment Providers

This allowed for background information about the company, the aims for the site, and the environmental and social mitigation measures proposed to be undertaken.

No additional requirements above those identified in the SEARS were requested to be undertaken.

As a result of this consultation, a number of the draft specialist sub-consultant reports have been distributed to the relevant government agencies, including Roads and Maritime Services and Office of Environment and Heritage. This has allowed for these agencies to review the proposal and make suggestions as to how impacts can be minimised, and what additional information they require. This information has been included in the final versions of the report.

9.3. Community Consultation

A number of factsheets have been produced which have been distributed throughout Oberon. These factsheets provide information regarding timelines, number of jobs created, proposed development, possible mitigation measures and the benefits of the Project for the community. These factsheets have included details regarding the formal period for community feedback on the Project. This has ensured that the community is aware of the proposed development, and that they will have an opportunity to provide their views on the Project during the assessment phase.

A meeting was held with the Oberon Timber Complex Community Consultative Committee on December 23 2015 in order to provide information regarding the Project. This allowed for a question and answer session with Borg Panel representatives. Minutes for this meeting are attached in Appendix D. The main area of concern that were raised was the impacts of noise on the caravan park located nearby. The other questions raised were generally around the economic benefits the Project would bring to the region through jobs and investment, and Council requested that consideration be given to the impacts on the road network from the Project.

An open public forum was held in Oberon on Thursday 31 March in Oberon, with any interested parties invited to attend. A total of five (5) local residents attended. This information session was advertised in the local paper. The advertisement for this is shown in Appendix D.

In addition, targeted stakeholder meetings have been held with key community representatives, including members of the Oberon Tourism Association in order to discuss their concerns as one of the other main employment generating groups within the town. The minutes of these meetings are attached as Appendix D.

The majority of the concerns raised at these meetings focussed on noise and air quality impacts from the Project. As a result, a particular focus has been on reducing the impacts of these elements on the community.

PART G – ENVIRONMENTAL IMPACT ASSESSMENT

10.0 TRAFFIC AND TRANSPORT

Borg Panels engaged SMEC Pty Ltd to undertake a traffic and transport study for the project. This report details the existing environment as well as the potential impacts of the Project and is attached as Appendix E.

10.1. Existing Environment

Lowes Mount Road is a two-way single lane road with a north-south alignment. The carriageway width varies between 8 and 15 metres where the latter accommodates a separated right-turn lane into the subject site. Site access is provided off Lowes Mount Road via Gate 4 and Gate 6. A right-turn lane that is 60 metres in length is provided at the Gate 6 entry.

Endeavour Street has a north-south alignment with a 12-metre wide undivided carriageway. Endeavour Street is a no-through road with a U-turn bay at its northern end.

The existing site access arrangements are as follows. Gate 4 for employees and Gate 4 and 6 for distribution trucks. Currently, log trucks access the site via Gate 5, which is to be maintained during future scenarios. This is show in Figure 11 below.

The existing geometry of access points adequately allow for 19 metre semi-trailers and 19-26 metre B-double trucks swept paths.

Figure 11: Site Access

SMEC commissioned traffic surveys at key locations surrounding the subject site. The purpose of the surveys was to determine existing traffic conditions at key intersections.

Surveys were conducted at the following intersections:

- Site 1: Abercrombie Road and Rupert Street (give way)
- Site 2: O'Connell Road and Albion Street (give way)
- Site 3: Lowes Mount Road and Albion Street (give way)
- Site 4: Albion Street and Horace Street (give way)
- Site 5: Albion Street and Endeavour Street (give way)
- Site 6: North Street and Carrington Avenue (give way)
- Site 7: Oberon Street, Ross Street and unnamed road (give way)
- Site 8: Duckmaloi Road and Albion Road (give way).

These surveys were undertaken on Tuesday 25 August 2015 during the morning (6am to 9am) and afternoon (3pm to 6pm) peak periods.

Continuous mid-block traffic surveys were undertaken for a one-week period between Tuesday 25 August and Tuesday 1 September 2015, at the following locations:

- O'Connell Road (north of Albion Street)
- Lowes Mount Road (north of Albion Street)
- Duckmaloi Road (south-east of Albion Street).

All these locations were given an "A" rating, signifying a wait time of less than 14 seconds.

10.2. Potential Impacts

The analysis of the potential impacts was undertaken in two stages. The first was the potential impacts during the construction stage. The second potential impacts during the operation of the facility.

During the construction phase of the project the following traffic generation is anticipated to occur:

Phase	Duration of peak	Vehicle movements per day (two-way trip)	Number of personnel
Site establishment and construction	24 months	240 trips per day (light vehicles) 60 trips per day (heavy vehicles)	Maximum 120 per day

Table 6: Traffic Movements - Construction

In regards to the construction, the traffic report concluded that:

- The construction phase is likely to have minimal impact on the existing transport network, with the majority of the vehicle movements occurring outside of the general peak periods
- No public transport provisions are required to support the construction phase of the works
- There will be no impacts on the existing pedestrian and cyclist network during construction.

The operational phase of the Project will have the following traffic impacts (light vehicles only):

Operational Year	Number of personnel	Vehicle movements per day (one-way trip)	Vehicle movements per day (two-way trip)
Existing	231	146	292
2019	291	184	368
2029	306	194	388

Table 7: Traffic Movements - Operation (light vehicles)

The operational traffic generation for heavy vehicles will be as follows:

Operational Year	Vehicle movements per day (one-way trip)	Vehicle movements per day (two-way trip)	Vehicle Movements per peak hour (one-way trip)	Vehicle Movements per peak hour (two-way trip)
Existing	61	122	6	12
2019	109	218	10	20
2029	160	320	14	28

Table 8: Traffic Movements - Operation (heavy vehicles)

In regards to traffic movements to and from the site as a result of the Project, the traffic report concluded that:

- All impacted intersections surrounding the site are operating at an acceptable level of Service A during AM and PM peak periods
- All intersections experience minor increases in queue lengths and average delays, which are considered to have a negligible impact on the current road network. A comparison of data for existing conditions and 2027 operations indicates the greatest increase in queue length and average delay are 1.2 metres and 2.3 seconds, respectively. This occurs at Site 8 (intersection of Duckmaloi Road and Albion Road).
- Traffic generated due to additional site personnel is to occur outside of AM and PM peak periods, and therefore, is considered to have a negligible impact on the existing road network.

The Project can be undertaken with negligible impacts on the existing road transport network.

10.3. Management and Mitigation Measures

The following management and mitigation measures are proposed by SMEC.

- Preparation of a detailed Construction Traffic Management Plan for the construction phase of the development in accordance with Roads and Maritime's Traffic Control at Worksites Manual (version 4.0 June 2010), which specifies:
    - Hours of haulage, which do not impose on peak periods and school drop-off and pickup times
    - Haulage routes, including the source of locations and their access points for the site
    - Designated areas within the site for truck movements, parking, loading and unloading,
    - Sequence for implementing traffic works and traffic management devices if required
    - Safety principles for construction activities, such as speed limits around the site and procedures for specific activities
    - Procedures for inspections and record keeping for maintaining traffic control measures
    - Undertake a pavement inspection pre- and post-construction to ensure the pavement condition has not been further degraded due to construction traffic.

In addition, the traffic report recommends that as part of the Project, the proponent:

- Undertake a pavement inspection pre- and post-construction to ensure the pavement condition has not been further degraded due to construction traffic.

This should be conditioned as part of the Project approval.

The traffic report concludes that the road network has more than enough capacity to absorb the Project without requiring any additional works.

11.0 AIR QUALITY

An Air Quality Impact Assessment (AQIA) for the proposed Project has been prepared by Stephenson Environmental Management Australia (SEMA) and is provided in Appendix F

11.1. Existing Environment

The air quality in Oberon has remained consistent over recent years. This is due to the ongoing operation of four (4) key manufacturing facilities that form part of the Oberon Timber Complex, and a gas metre station serving the Moomba to Sydney gas pipeline (located adjoining the Project). The key impacts on air quality in the area that can be linked to the existing operations on site are:

- Total suspended particulates (TSP)
- Particulate matter less than 10 microns (PM10)
- Nitrogen Dioxide
- Formaldehyde

A report detailing the current air quality and emission levels from the Borg facility has been prepared by Stephenson Environmental Management Australia, and was carried out in February/March 2016. This report analysed the impacts from the current Borg operations and modelled the projected impact of the Project.

The modelling methodology used was taken from the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. This lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in the state.

These procedures and methodologies are reviewed every five years, and the IAC levels subject to change. As such, there can be inconsistency between current IAC levels and legal levels of pollutants that can be discharged under licence.

The existing MDF plant has an impact on the air quality of the area. It represents a major manufacturer/industry in Oberon, and as such some pollutants are produced. These are generally within the levels under the 27/95 Consent. It is noted that these levels are above the current requirements, however they are generally compliant with all existing approvals and licences issued for the site.

The air pollution generated by the current MDF facility (assessed to the current GLC criteria, not approved levels) are as follows:

Pollutant	Units	Averaging Period	IAC	Existing Facility
TSP (100%ile)	$\mu g/m^3$	Annual	90	7
PM_{10} (100%ile)	$\mu g/m^3$	24 Hours	50	15
	$\mu g/m^3$	Annual	30	2
NO_2* (100%ile)	$\mu g/m^3$	1 Hour	246	182
	$\mu g/m^3$	Annual	62	4
HCHO (99.9%ile)	mg/m^3	1 hour	0.02	0.07

Table 9: Existing Pollutant Levels

Key:
TSP = total suspended particulate matter
PM10 = particulate matter less than 10 microns
IAC = Impact Assessment Criteria
NO2 = nitrogen dioxide

HCHO = formaldehyde
GLC = Ground Level Concentration
□g/m3 = micrograms per cubic metre
mg/m3 = milligrams per cubic metre
* = 40% NOx to NO2 conversion assumed

In regards to establishing receptors, Cartesian grid receptors were setup over the modelling domain at 50 metre intervals. Each 50m block represents a receptor. Figure 12 illustrates these receptors. Additional receptors were setup at the boundary of the Borg site. Receptors inside the boundary of the Borg Oberon site were removed.

Figure 12: Receptor Locations

The meteorological data for the Project was processed in two steps. MM5 (5th-generation Mesoscale Model) which is a prognostic meteorology model developed by Pennsylvania State University and the U.S. National Center for Atmospheric Research (NCAR) was used for modelling 2014 surface and upper air meteorological data for the dispersion modelling domain. Further processing of the MM5 data was then undertaken in AERMET to produce the wind field and weather data suitable for dispersion modelling with AERMOD.

Figure 13 summarises the annual 2014 wind strength, direction and frequency near the site, showing prevailing winds were from a south-westerly direction. The 2014 meteorological data was selected as representative for the purposes of the dispersion modelling.

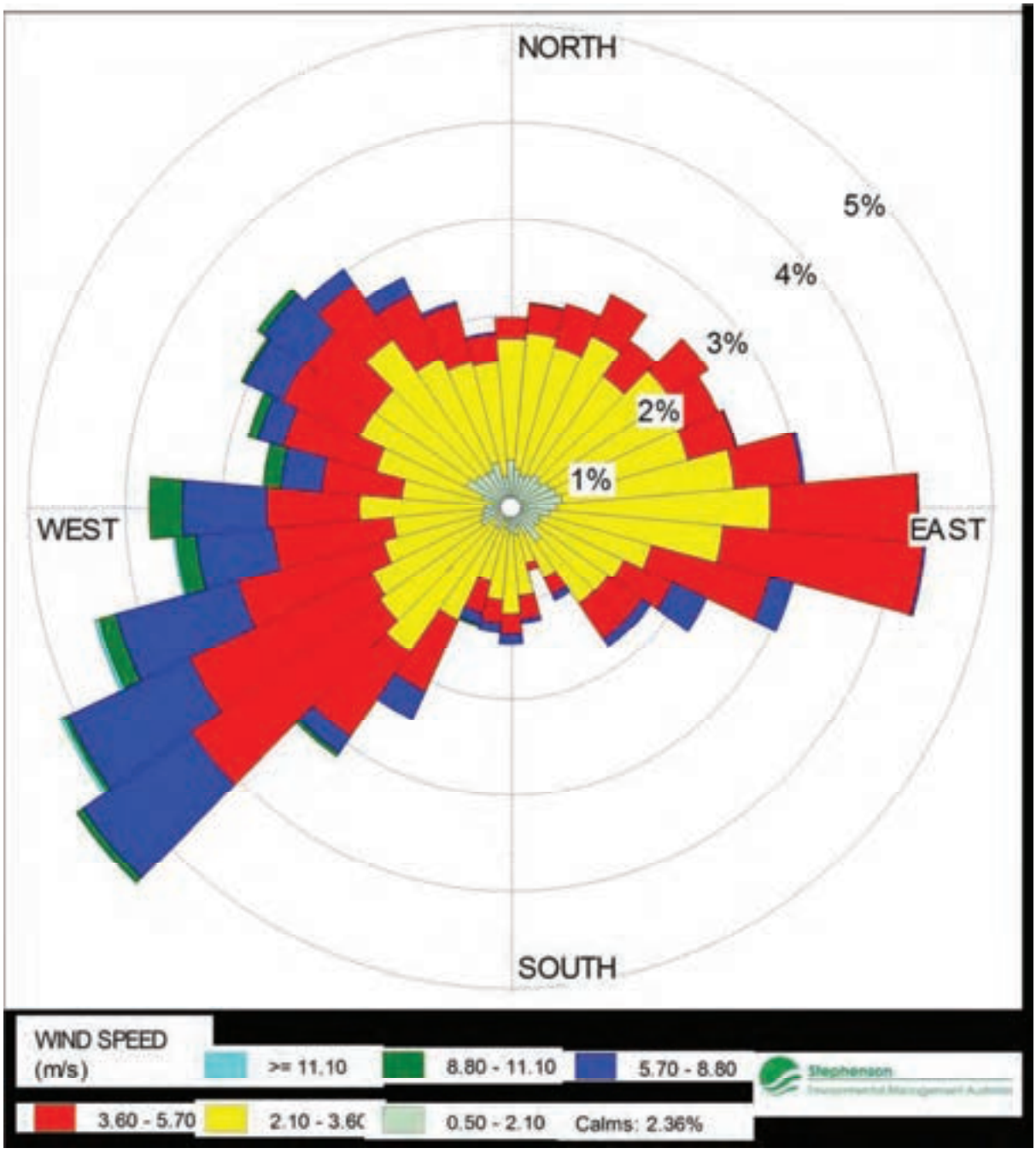

Figure 13: Wind Modelling Data

Generally, Oberon has mild to warm summers and cool to cold winters. Average summer temperatures range from 9C to 25C and average winter temperatures range from 0 to 9C. Frosts occur throughout autumn, winter and spring, and there is regular snowfall throughout winter. On average Oberon records 80.8 clear days per year. As can be seen from the Windrose there are very few periods were there is no wind in the subject area.

Oberon is located on the Central Tablelands on the Oberon Plateau. See Figure 14 below.

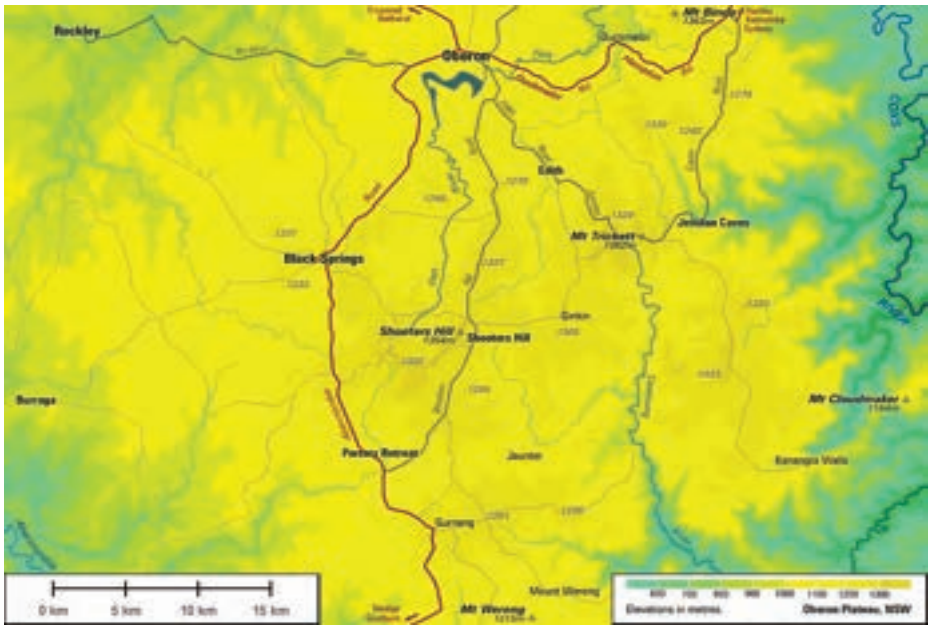

Figure 14: Oberon Plateau (Source: http://weather.ajcmiskelly.id.au/other/gdr/)

11.2. Potential Impacts

The potential impacts from the site (being the particle board facility) can be split in to two distinct phases. Construction and Operation.

11.2.1 Construction

The impacts from construction on air quality are considered to be minimal. A detailed Construction Environmental Management Plan (CEMP) will be prepared for the site prior to any works being undertaken. This will provide details regarding the proposed mitigation measures. However, the following table (table 10) identifies the key site works that may generate air quality impacts, and the general mitigation measures to be adopted.

Activity	Mitigation Measure
Demolition, earthmoving and excavation	• Water sprays for dust suppression • Timing with respect to wind direction • Location and proximity of sensitive land uses
On-site traffic movements	• Water sprays for dust suppression • Gravel or concrete to seal main trafficable areas
Diesel exhaust emissions	• Proper maintenance and tuning of engines • Correct fuel specification • Limiting idling time • Avoiding overloading • Appropriate height of discharge above ground level
Wind erosion from stockpiled material.	• Water sprays • Bunker storage • Limiting size of stockpiles • Vertical barriers (or covering the pile if it is small)

Table 10: Construction air quality impacts and mitigation measures

11.2.2 Operation

In order to establish the overall operational impacts, the potential Project impacts were firstly modelled. The cumulative impacts from the Particle Board plant and the modified MDF plant were then modelled. The following table is the cumulative impact from the Project and the proposed modified MDF facility.

Pollutant	Units	Averaging Period	IAC	Proposed Particle Board Plant	Cumulative Levels (PB Plant and Modified MDF Facility)
TSP (100%ile)	µg/m3	Annual	90	6	8
PM10 (100%ile)	µg/m3	24 Hours	50	21	25
	µg/m3	Annual	30	3	4
NO2* (100%ile)	µg/m3	1 Hour	246	57	225
	µg/m3	Annual	62	1	4
HCHO (99.9%ile)	mg/m3	1 hour	0.02	0.01	0.03

Table 11: Proposed Pollutant Levels

Key:
TSP = total suspended particulate matter
PM10 = particulate matter less than 10 microns
IAC = Impact Assessment Criteria
NO2 = nitrogen dioxide
HCHO = formaldehyde
GLC = Ground Level Concentration
□g/m3 = micrograms per cubic metre
mg/m3 = milligrams per cubic metre
* = 40% NOx to NO2 conversion assumed

It is noted that there is compliance with all relevant IAC criteria for both the Project and the cumulative operation, with the exception of the levels of HCHO. It is important to note that the levels of HCHO are not consistent across the modelling domain. There are minor areas in which the levels creep above 0.02.

These locations are on a hillside to the north east of the site, outside of the main Oberon township. The greater Oberon area is generally located around the 0.02mg/m3 concentration level. However, there is the potential for an increase of up to 0.03mg/m3, with the GLC being in the 0.02-0.03mg/m3 range. The majority of these areas constitute either rural landscape or state forestry plantations, and whilst the modelling has been carried out with worst case manufacturing scenarios the overall levels are still generally towards the lower level of the spectrum. All feasible mitigation measures have been put in place, and the minor non-compliance for one particular form of chemical is not anticipated to cause significant impacts.

Figure 15 below illustrates the potential cumulative HCHO GLC for the modified MDF and Particle Board facility.

Figure 15: Cumulative HCHO Levels

As can be seen above, the Project will create the potential for areas of a cumulative GLC of HCHO above the current IAC level. However, it is important to note that this modelling is based on worst case scenarios (a 24 hours 7 day a week operation), when in reality the Project will have shut days, breakdowns and production stoppages. This represents a significant improvement over current levels.

It is important to note that this is a significant improvement over current levels (which, it has to be noted, comply with the requirements under the existing approval) which are 0.07mg/m3. This reduction has come from the installation of a number of new devices within the existing plant and utilising existing site processes to form part of the integrated site control strategy.

The cumulative annual particulate matter less than 10 microns (PM10) generated from the Project have been modelled as being 4□g/m3, where the IAC is 30 □g/m3. This clearly demonstrates that impacts from PM10 on the area, including the Oberon township are substantially less than the regulated levels. This is achieved by using modern filtration techniques. Figure 16 below demonstrates that annual cumulative averages.

Figure 16: Cumulative Annual Average PM10 GLC

The cumulative annual total solid particulates (TSP) generated from the Project have been modelled as being 8□g/m3, where the IAC is 90 □g/m3. This clearly demonstrates that impacts from TSP on the area, including the Oberon township are substantially less than the regulated levels. This is achieved by using modern filtration techniques. Figure 17 below demonstrates that annual cumulative averages.

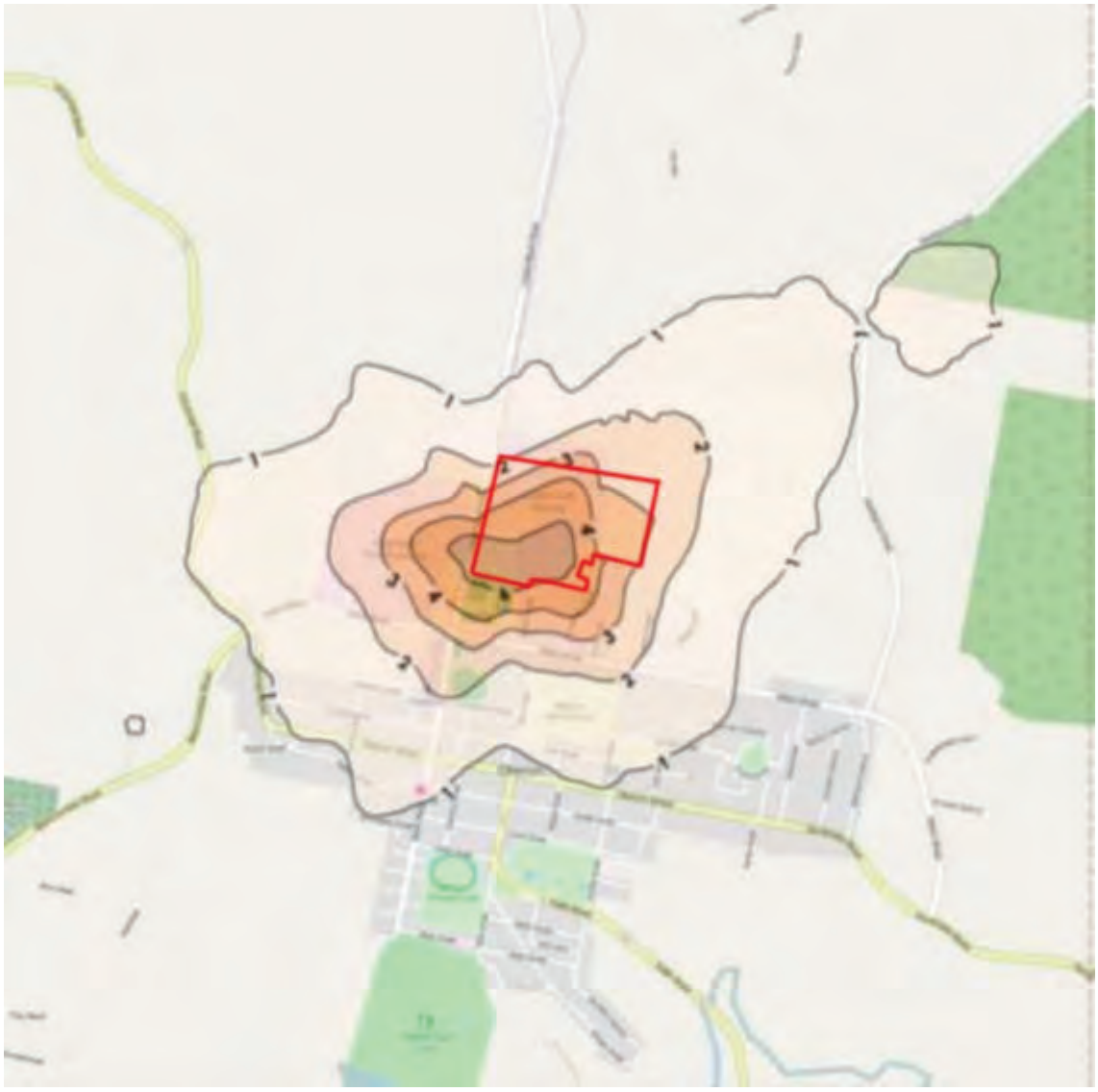

Figure 17: Cumulative Annual Average TSP

11.3. Management and Mitigation Measures

The report details mitigation measures that are to be implemented in to the existing MDF Plant, and the impacts from these modifications. These are:

- EPA ID 23 together with another additional Paper treater (with a total flow rate of 80,000 m3 per hour), will be diverted to EPA ID 11 (Conti-2 heat plant) where 95% of formaldehyde will be removed before discharge to the atmosphere;

- EPA ID 12-2 (Conti 1 roof vent) will be diverted to EPA ID 17 (Conti-1 heat plant) were 95% of formaldehyde will be removed before discharge to the atmosphere;
- A new 'combined stack' will be installed. This stack is proposed to be 40 metres high, 1.5 metres diameter, with a total flow rate of 100,000 m3 per hour;
- EPA ID 4 (DC1 baghouse) and EPA ID 5 (DC2 baghouse) will be discharged to the atmosphere through the proposed combined stack;
- A wet scrubber system will be installed on the Conti 2 press line. This system is designed to emit a maximum of 40 mg/m3 of TSP and 30 mg/m3 of formaldehydes with a total flowrate of 100,000 m3 per hour, which will be emitted through the combined stack.

These works to the existing plant decreases the overall emissions generated by the existing works.

In regards to the Particle Board component of the Project, the following measures are proposed:

- E12 (Baghouse dust filter) will utilise dispersion to reduce impacts.
- Press scrubber does not vent directly to atmosphere as the emissions will be diverted to the Combustion chamber and excess gas will be emitted via the WESP stack.
- Wet Electrostatic Precipitator will be used as particulate control for moisture laden air from dryer.
- Low NOx burner will be used for dryer Hot gas generator.
- Baghouses and cyclofilters will be installed on all other material transport and process applications to reduce particulate emissions.

It is important to note that the levels of formaldehyde produced by the plant have been significantly reduced under the Project. This reduction has been achieved at significant cost through the installation of more modern filtration and the establishment of integrated site emission control strategies.

Overall, the cumulative impacts on air quality (that is, the impacts from the proposed particle board facility) and the modifications of the MDF Plant represent a significant improvement on current air quality. These levels are significantly lower than the current levels (which comply with the licence conditions for the site). This reduction in levels indicates that the mitigation measures (detailed below) will be implemented in both the existing and proposed plant achieve a significant reduction in the levels of HCHO, PM10 and TSP concentration.

[Note: air quality modelling is based on a zero background level, that is, the impacts from the industry surrounding the Project have not been included. The justification for this approach is that baseline OTC air quality data is not readily available and, in any case, Borg's capital improvements will reduce air emissions from the Borg site, thereby improving overall air quality in the OTC environs]

12.0 HAZARD AND RISK

Sherpa Consulting were engaged to undertake an assessment of potential hazard and risk posed by the Project, including consideration under SEPP 33. This report is attached as Appendix G.

12.1. Existing Environment

The existing environment includes an approved timber processing facility which manufactures MDF products and a separate business producing resins. Both are individually located on their own Lot and DP. Access to the Woodchem site is via a registered easement.

12.2. Potential Impacts

The Sherpa Consulting report details the potential impacts from the Project, and how these are assessed under the framework of SEPP 33. To determine whether a proposed development is 'potentially hazardous', the screening in SEPP 33 considers the type and quantity of hazardous materials stored on the site, the distance of the storage area to the nearest site boundary and the expected number of transport movements.

'Hazardous materials' are defined within the Applying SEPP33 guideline as substances that fall within the classification of the Australian Dangerous Goods (ADG) Code.

The following potentially hazardous materials and storage location is summaries in Table 11.

Material	Storage ID	Storage type	UN No.	DG Class	Approximate Quantity	SEPP 33 Threshold	Threshold Exceeded
Diesel	DF 1	Above Ground Tank	OOC. 1	Comb-ustible C1	32m^3	Diesel is not stored with other flammable materials, hence it is not considered to be potentially hazardous based on SEPP 33. The adjacent Woodchem tank farm contains Class 3 and Class 8 materials (e.g. formalin, formaldehydes). However, this is located in a separate bunded area. As diesel is not located in the same area as flammable materials, the SEPP 33 threshold is not applicable.	Not applicable
Fuel, Aviation, Turbine Engine	JET 1	Above Ground Tank	1863	3 PG I	2.5m^3	Based on Figure 8 in Ref. 1, the screening distance is approximately 2.2 m and 3 m from sensitive land uses (including residential) and all other land uses (e.g. commercial or industrial) respectively.	The separation distance between the proposed DG storage to the site boundary is approx. 65 m. Not potentially hazardous.

Petroleum Gases, Liquefied	LPG 1	Above Ground Tank	1075	2.1	6.0m^3	Based on Table 3 in Ref.2, screening threshold is 10 tonne or 16 m3 (if stored above ground).	Total Class 2.1 (LPG) storage does not exceed the SEPP33 threshold. Not potentially hazardous.
Hot Oil		Above Ground Tank		Comb-ustible C1 heated above flash point – treat as Class 3	250m^3	Treated as a Class 3, assuming the worst case of a packing group 1. Based on Figure 8 in Ref.2, the screening distance is approximately 12 m and 20 m from sensitive land uses (including residential) and all other land uses (e.g. commercial or industrial) respectively.	The separation distance between the DG storage to the site boundary is approx. 200 m. Not potentially hazardous.
Environm-entally hazardous substance (liquid N.O.S.)	VA 1	Wareh-ouse	3082	9 PG III	1.0m^3	No threshold identified based on SEPP 33, Ref.2 Class 9 PG III is not classified as potentially hazardous material as per SEPP 33	Not Applicable

Table 12: Potential Hazardous Materials

12.3. Management and Mitigation Measures

The report provides conclusions and recommendations for two (2) separate considerations:

MHF Considerations and Inclusion of Woodchem in the SSD Application,

Borg Panels and Woodchem operate as two independent business and operating entities and hence the dangerous goods considered in the SEPP 33 review of the Borg development are limited to those present at the Borg facility.

The key points are:

- The sites are operated by separate companies.
- The sites undertake different activities.
- The Project is for the expansion of the Borg facility. As part of this application, it is recognised that any expansion to Woodchem will require a separate application, and that the Woodchem site constitutes an MHF. However, the Borg site does not meet the definition of an MHF and as such no further consideration of the Project as an MHF is required.

SEPP 33

The main findings of this SEPP 33 assessment (Section 4.2 and Section 4.4) are summarised below:

- A total of approximately 2 tonnes of Class 3 PG I material (i.e. aviation fuel) will be stored on the site at a distance of approximately 65 m from the site boundary. This is below the SEPP33 separation distance threshold level for 2 tonnes of Class 3 PG I materials.

- A total of approximately 3.1 tonnes of Class 2.1 material (i.e. LPG) will be stored on the site. This is below the SEPP 33 threshold level of 10 tonnes for Class 2.1 materials.
- A total of approximately 27.2 tonnes of combustible material (i.e. diesel) will be stored on the site. Diesel is not stored with other flammable materials, and hence is not considered to be potentially hazardous under SEPP 33.
- A total of approximately 1 tonne of Class 9 PG III material (i.e. environmentally hazardous substance, liquid N.O.S.) will be stored on the site. There is no threshold identified in SEPP 33 for Class 9 materials.
- The operational weekly vehicle movements for hazardous materials are well below the SEPP 33 transport screening threshold levels.
- The drying process is undertaken in a controlled manner with dust extraction, explosion suppression and explosion panels. The site is unlikely to generate a dust explosion causing significant offsite impacts.

Based on these findings:

- The development (accounting for both existing and expansion proposal) is not considered 'potentially hazardous' within the meaning of SEPP 33 and a PHA is not required
- The development is not considered 'potentially hazardous' within the meaning of SEPP 33 with respect to transportation and a route evaluation study is not required.
- The existing site EPL should be reviewed to determine if any updates are required as a result of the expansion.
- Any proposed changes associated with Woodchem will be covered under a separate approval process taking into account the fact Woodchem is an MHF.

Given this, it is considered that no further consideration of the site as an MHF is required. Any changes to Woodchem will be made under separate application, and this will continue to operate as a separate entity, and will be considered as an MHF.

13.0 NOISE AND VIBRATION

Global Acoustics were engaged to undertake an assessment of the noise and vibration impacts of the Project. This report is attached as Appendix H.

13.1. Existing Environment

The site is currently occupied by an existing timber processing facility. This is subject to a number of licenses, with EPL 3035 being of particular relevance to noise generation.

It is also noted that within the Oberon LEP a buffer area is placed around the OTC Complex. Clause 6.6 states:

(1) The objectives of this clause are as follows:

(a) to protect the operational environment of industries operating within the Oberon Timber Complex,

b) to control development near the Oberon Timber Complex and waste disposal facilities to minimise land use conflict.

(2) This clause applies to land identified as "Oberon Timber Complex" on the Industrial Buffer Map.

(3) Before granting development consent to development on land to which this clause applies, the consent authority must consider the following:

(a) the impact that any noise, odour or other emissions associated with existing land uses may have on the development,

(b) any proposed measures incorporated into the development that limit the impact of such noise and other emissions associated with the existing land use,

(c) any opportunities to relocate the development outside the land to which this clause applies,

(d) whether the development is likely to adversely affect the operational environment of any existing development on the land to which this clause applies.

The clause objectives clearly identify that there is recognition of the ongoing importance and role of the OTC within the region. It requires any new development located within the buffer zone to be designed and constructed in such a way so as to minimise the impacts from the ongoing operations of the OTC on any new development. This recognises that the OTC is an important part of Oberon, and that any new development needs to be designed around the impacts.

The Project is located within this buffer zone, therefore consideration will need to be given to the impacts of the OTC on the Project, even though the Project is part of the wider OTC.

Figure 18: Buffer Zone

Figure 19 below illustrates the site, nearby residences, identified sensitive receptors and noise monitoring equipment locations.

Figure 19: Sensitive Noise Receptors and Monitoring Locations

In regards to existing noise generated by the existing development on site, the facility currently operates under Environment Protection Licence (EPL) 3035. This was varied on 25 February 2015. Condition L4 of the EPL provides noise levels and conditions, which are detailed below.

L4 Noise limits

L4.1 Noise from the premises must not exceed:
a) 55 dB(A) $L_{Aeq(15\ minute)}$ during the day (7am to 6pm); and
b) 50 dB(A) $L_{Aeq(15\ minute)}$ during the evening (6pm to 10pm); and
c) at all other times 45 dB(A) $L_{Aeq\ (15\ minute)}$, except as expressly provided by this licence.

Where L_{Aeq} means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L4.2 To determine compliance with condition L4.1, noise must be measured or computed at for at Oberon High School or an other noise sensitve locations (such as a residence/school). A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L4.3 The noise emission limits identified in this licence apply under all meteorological conditions except:
a) during rain and wind speeds (at 10m height) greater than 3m/s; and
b) under "non-significant weather conditions".

Note Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

13.2. Potential Impacts

The potential noise and vibration impacts from the Project need to be considered in a number of separate but interrelated ways. These are:

- Construction Noise.
- Traffic Noise.
- Operational Noise.

Construction Noise

It is anticipated that construction will occur concurrently with the ongoing operation of the site. As such, the noise from construction activities will generally be interwoven with the noise from the operations of the site.

It is proposed to generally restrict all site noise emissions so that they comply with the day period operational noise criterion of LAeq,15minute 55 dB and the evening period operational noise criterion of LAeq,15minute 50 dB, conditioned in EPL 3035. However, there will be times at which this will need to be varied. This will be during short duration high noise emitting tasks as such as rock/concrete breaking, for which the "highly noise affected" construction noise criterion of LAeq,15minute 75 dB is deemed appropriate. Such construction tasks are to be undertaken at the least noise sensitive times of day. It is recommended all potentially affected receivers are notified in advance of any construction tasks where the operational day period criterion is likely to be exceeded.

Traffic Noise

It is anticipated that the traffic noise increase generated by the project will be less than 2 dB. An increase of up to 2 dB is considered to be generally imperceptible to the human ear. As such, no mitigation measures are proposed to minimise traffic noise.

Operational Noise

The main potential area of impact on the amenity of the surrounding area is from an increase in the noise levels being generated by the site. The modelling carried out by Global Acoustics indicates that the site is currently approaching the limits of the existing licence for noise on the site. The proposed additional development, if carried out without the proposed mitigation measures, would increase the noise levels to

above that of the existing licence. The impacts of this would be particularly significant at the Albion St Caravan Park, located adjacent to the existing industrial subdivision to the south of the Project.

13.3. Management and Mitigation Measures

The report prepared by Global Acoustics indicates that the existing site currently is operating close to EPL criteria during certain periods of enhancing meteorological conditions. To allow for the additional noise generating activities (i.e. the Project) to be added to the site, a number of noise attenuation measures for the site are required to be carried out. There are as follows:

- The Conti 1 dryer fan. A sound power reduction from LAeq 121 dB to 114 dB or better is required;
- The booster fan drive. A sound power reduction from LAeq 116 dB to 109 dB or better is required

and

- The main fibre transport fan. A sound power reduction from LAeq 110 dB to 104 dB or better is required.

Borg is committed to achieving these reductions to reduce noise emission from the existing operation. This has included re-instating the previous enclosed chipper to reduce the noise impacts from this area of the site.

In general, operation of both the existing site and the proposed expansion are predicted to comply with current EPL operational noise criteria when recommended management strategies are implemented. A minor 1 dB exceedance is predicted at R09 when a mobile chipper is operated during enhancing meteorological conditions. Operation of mobile chippers does not form part of 'normal' operations, as they will typically be only used during breakdown of electric plant. Exceedances can be avoided through monitoring weather and restricting use of mobile chipping plant during periods of meteorological enhancement.

Borg has committed to achieve the required targets for the new plant to be installed.

It is important to note that Cl 6.6 of the LEP is designed to ensure that the operation of the Oberon Timber Complex can be carried out, and that development within the buffer area needs to respect these important operations, rather than minimising the viability of the OTC. As such, as the Project represents a significant investment in a new timber processing facility in the existing boundary of the OTC it is considered that the proposed development is in accordance with Cl. 6.6.

14.0 SOIL

14.1. Existing Environment

The Project is located on an existing industrial zoned site and has been used for industrial land uses for a significant period of time. Extensive disturbance has occurred across the site, including a former controlled activity on Lot 24 DP 1148073 (124 Lowes Mount Road). The site has been remediated by the previous owner and this remediation was approved by Department of Primary Industries Office of Water on 11 April 2014.

This is shown in Figure 20 below.

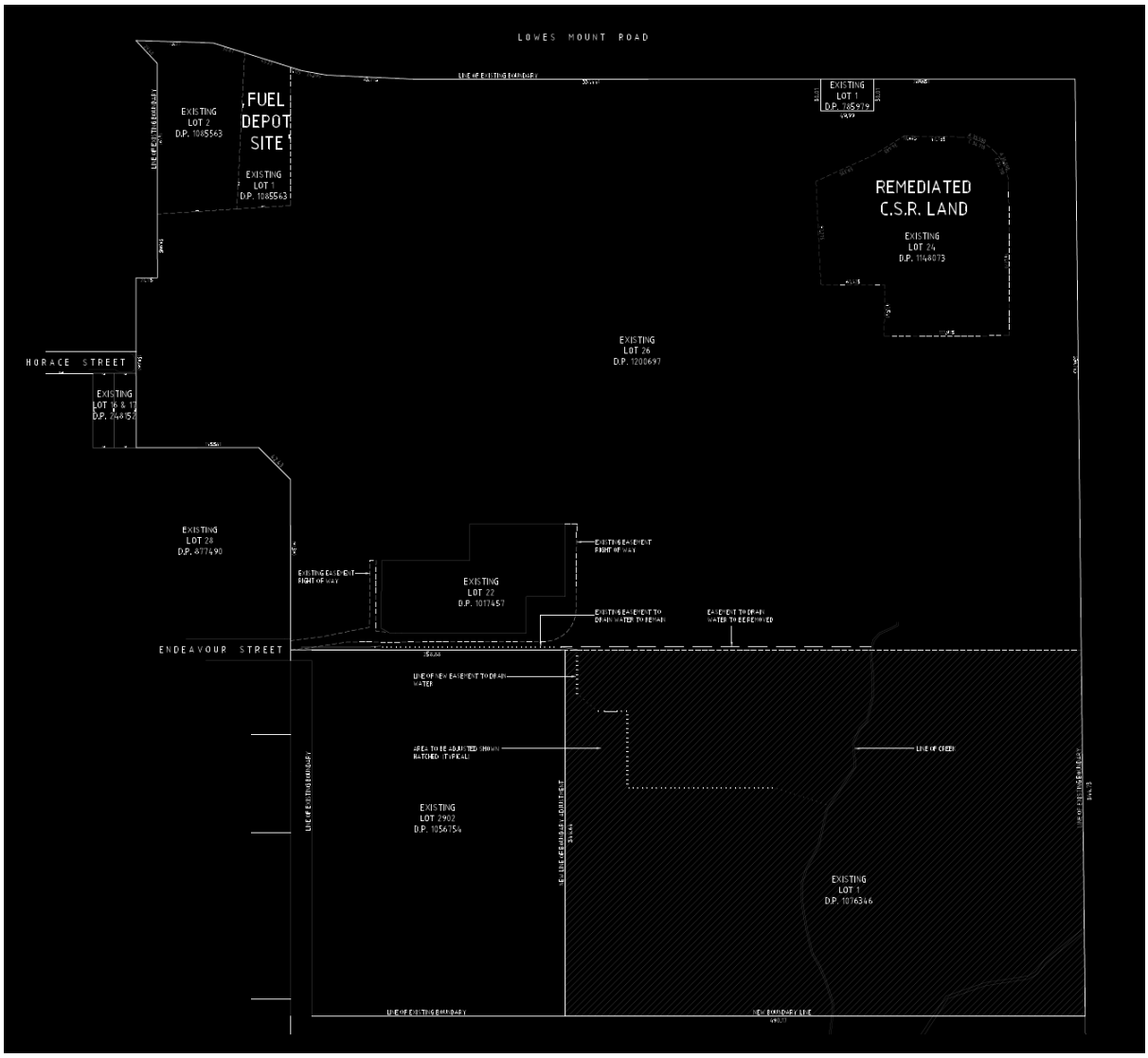

Figure 20: Potentially Contaminated Land

14.2. Potential Impacts

The overall potential for impacts upon soil are generally low. The site has been extensively disturbed through ongoing industrial usage. Generally, the impacts from the Project are related to the potential for erosion during construction and the potential for site contamination at the site of the former fuel depot in the south west of the site (Lot 1 DP 1085563).

In regards to the fuel depot, the probability of contamination is considered to be low given that the tanks are located above ground and within concrete bunded areas. This is illustrated in figure 21 below.

Figure 21: Fuel Depot

Irrespective of the above, a thorough assessment of the soils within the affected lot will be undertaken prior to construction.

14.3. Management and Mitigation Measures

The majority of the land to be developed represents existing disturbed soil. The majority of the site will be sealed, and disturbance post-construction will generally be low.

The first stage of the Project is the expansion of the existing water treatment ponds and drainage swales. These will capture any loose soil material prior to dispersal into Kings Stockyard Creek. In addition, appropriate erosion and sediment control fencing, in accordance with the Blue Book, will be implemented during the construction phase in order to ensure that impacts are minimised.

There is the potential for some soil contamination at the location of the former fuel depot, fronting Lowes Mount Road. Appropriate remediation to this land to the NEPM standard will be required. This can be conditioned by the Department. Any remediation will need to be to a level suitable for the use of the site for the proposed industrial development.

Negligible impacts on soil are anticipated to occur as a result of the Project. Most activities are to be located on hardstand areas.

15.0 WATER

The Sustainability Workshop was engaged by Borg Panels to undertake a Water Cycle Impact Assessment for the Project. This included a thorough review of the existing water cycle on site. This report is attached as Appendix J.

15.1. Existing Environment

As the existing approval for the site is tied in to the existing 1995 consent, that includes adjoining properties in the overall Oberon Timber Complex, there is a complex series of inter relationships. The existing stormwater system operates as follows:

- Runoff from the Carter Holt Harvey facility across Lowes Mount Road is directed onto the site in a "dirty" water swale.
- Clean water also from rural undeveloped parts of Lowes Mount Road are also directed onto the site in a "clean" water swale which runs alongside the dirty water swale.
- Borgs roof runoff and runoff from the western side of the Borgs development is directed into the dirty water swale and then conveyed into an existing stormwater treatment pond.
- Runoff from the eastern and open part of the site which contains fine fibrous wood material is directed first to a gross pollutant trap and then into the stormwater treatment pond.

The existing water treatment regime that operates on site is shown below:

Figure 22: Existing Stormwater Management

In addition to the above, there are a number of existing licenses and approvals in place governing discharge and water usage for the Project.

Pollutant	Permitted Maximum Discharge Concentration (mg/L)
Aldrin and Dieldrin	0.3
BOD	20
Colour (Hazen)	160
Methylene Blue Active substances	0.5
Total Nitrogen (TN)	10
Oil and Grease	10
pH	6.5-8.5
Total Phosphorous (TP)	0.3
Total Suspended Solids (TSS)	50

Table 13: Existing Licence Levels - Water Pollution

All these pollutants are sample either weekly (during discharge) or yearly in accordance with the relevant licence conditions. Of the above, the major pollutants of concern are total suspended solids (TSS), total nutrients (TN) and total phosphorus (TP). The monitoring of Dieldrin and Aldrin are a result of a previous spill on the CHH site, and these are no longer of concern as the affected part of the site has been remediated. This spill occurred during previous ownership, and the contaminated material removed and the creek stabilised.

The following table illustrates the average concentration for TSS, TP and TN for discharge over the site for the years 2010 to 2014.

Pollutant	Average Concentration (mg/L)	Standard Deviation (mg/L)	Permitted Maximum Discharge Concentration (mg/L)
Total Nitrogen (TN)	5.127	8.577	10
Total Phosphorous (TP)	0.155	0.166	0.3
Total Suspended Solids (TSS)	25.08	27.32	50

Table 14: Discharge Levels

These values include run off from surrounding agricultural properties, as well as the CHH facility to the west of the subject site. As discussed above, the existing water treatment process on the Borg Panels site treats this water. The concentrations from the CHH facility are as follows:

Pollutant	Average Concentration (mg/L)
Total Nitrogen (TN)	4.91
Total Phosphorous (TP)	0.215
Total Suspended Solids (TSS)	70.69

Table 15: CHH Concentrations

Overall, the current water treatment system is operating efficiently, and the water being discharged is generally of a higher quality than the water entering the site.

15.2. Potential Impacts

The Sustainability Workshop analysed the Project, and identified the following potential impacts. However, overall, the Project is considered to have minimal impacts upon the water cycle. This is predominately

because the proposed process is predominately covered silos, conveyor belts and storage buildings. The existing operations are largely going to be upgraded to a similar standard. In addition, the size of particles for particle board production is generally greater than 1mm. This means that any particles that enter the water cycle can be easily filtered out.

Storage of logs and woodchip may have the potential to create coarse timber particles as well as create the potential for tannin to leach from logs.

It is noted that the additional roof areas as a result of the Project (approximately 1.7ha) may give rise to an increase in TSS, TN and TP in to the water cycle, as rainwater may cause the disturbance of this from impervious roof areas. However, given the more rural location this is considered to be a significantly lesser impact than if the Project was located in Sydney.

There is the potential for an increase in air born particles from the proposed facility. These airborne particles have the potential to enter the water cycle.

The Sustainability Workshop has identified the following as being the key potential impacts on the water cycle from the Project:

- An increase in roof areas
- Storage of logs in log yards
- Handling and transport of woodchip
- Increase in traffic volumes

They have also identified the following key stormwater pollutants:

- Tannins – tannic acid
- TSS, TP and TN.

No works are proposed within 40m of a creek line, so impacts upon Geomorphology are considered to be negligible. Flood modelling was also carried out and no significant impacts upon the existing environment are considered to be likely.

15.3. Management and Mitigation Measures

The Sustainability Workshop has reviewed the plans prepared and has provided the following management and mitigation measures in a number of different sections:

Predicted Water Quality Results

It is considered that the maximum discharge concentrations will be below current EPL limits. However, should this not be the case after testing, that Borgs will be required to install additional water quality treatment measures. Such measures could include the retrofitting of floating wetlands to the existing ponds, and would further improve the quality of the discharge of water.

It is also recommended that the harvesting of stormwater be investigated. Although there is a strong economic argument for doing so, there is also a positive impact on water quality and geomorphology.

Stormwater harvesting has been included as a key mitigation measure and recommendation for this reason.

Review of the EPL

The report recommends that the EPA review the existing EPL as follows:

- The location of the approved monitoring point be moved downstream to the location shown in Figure 23. The reason for this is to enable discharge from the proposed new pond to be included

while excluding discharge from the ANL site and Endeavour Road which are not part of the Borgs existing or proposed development.

- It is recommended that it is not feasible to have an EPL with 100% limits and that it would be more appropriate to specify a 95th percentile level of discharge. Knowing that one day it is inevitable that this limit would be exceeded, not due to poor practice by Borgs but because this is what happens in nature. It is unreasonable to impose an absolute maximum 50 mg/L discharge limit on Borgs while numerous other business, residential and industrial developments exceed this limit almost every time it rains. Moreover, it is unreasonable to impose this condition on Borgs on the basis of environmental protection – even fully undeveloped forested catchments have higher maximum levels of TSS concentrations in their runoff from time to time. Infrequent discharges of TSS that exceed 50 mg/L not more often than 5% of the time, i.e. 95th percentile, are not likely to result in degradation or harm to the receiving water. It is recommended that EPL be revised so that the same discharge limits are applied at the 95th percentile level rather than the 100th percentile level.

Emergency Spill Control

It is recommended that the spill control measures shown in Figure 23 are put in place. Noting that the existing aerated small dam (which is no longer required for water quality management) be converted into an emergency spill basin. It shall be operated to ensure there is sufficient spill storage capacity within it. This will require it to be drained by either pumping or gravity together with a system of manually operated diversion valves to isolate the basin if it is needed for spill control. It is recommended that spill control procedures be developed, staff trained and the procedures practiced annually.

Geomorphology Impacts

The proposed harvesting and reuse scheme will see the volume of runoff from the site reduced by about 133 ML/year compared to current levels of discharge. This will see both the frequency and volume of runoff from the site reduced.

Water Resources and Licencing

It is recommended that Borgs be granted dispensation from the *Water Management Act* (2000) for the need to acquire a water access licence to harvest the excessive volumes of runoff generated by this highly impervious site.

Soil and Water Management during Construction

It is recommended that the proposed pond be constructed prior to site stripping and used as a temporary sediment basin and converted to a permanent water quality pond once the site has been effectively sealed. Small scale sediment and erosion control measures would be needed to manage local erosion issues.

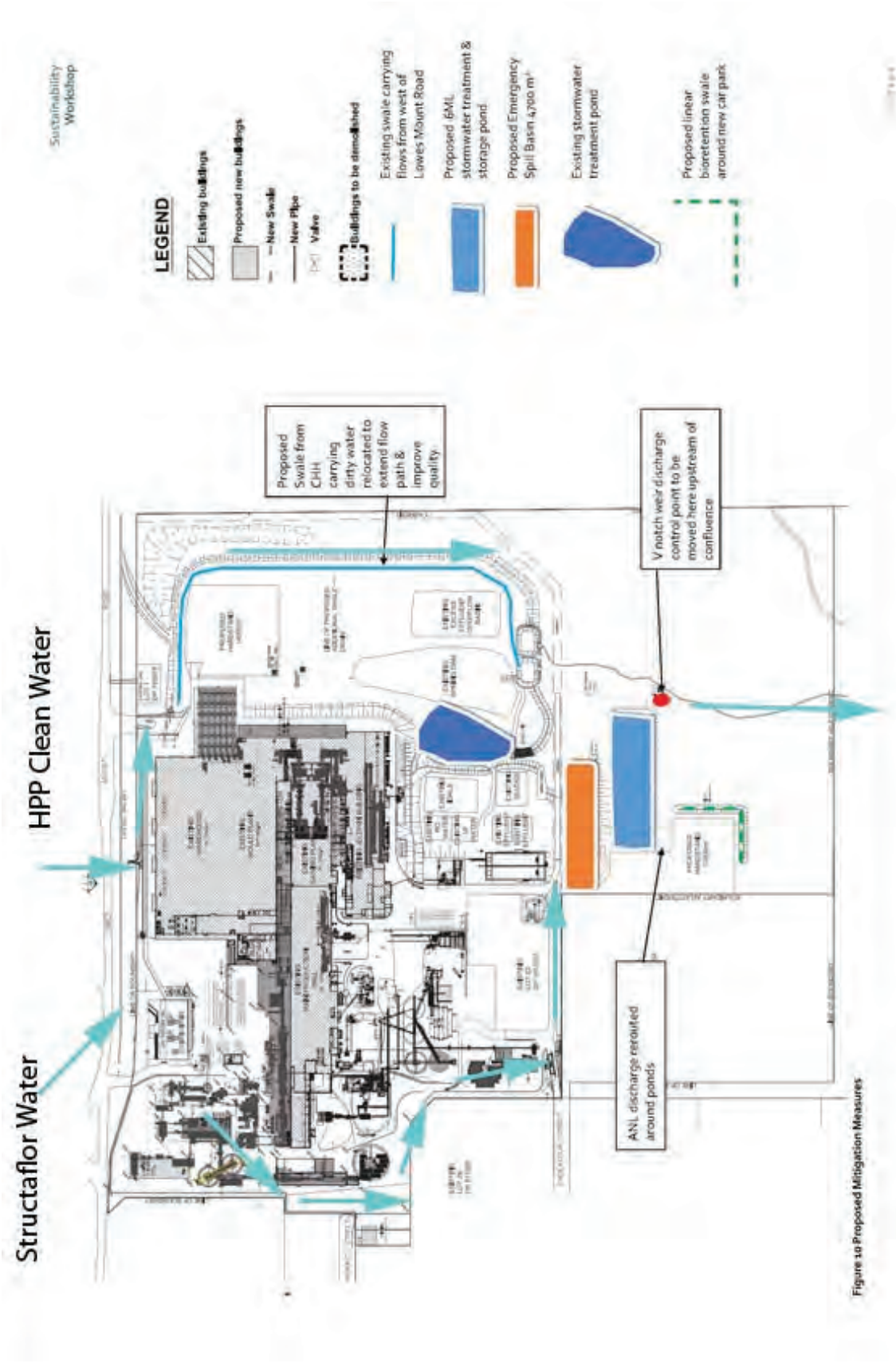

Figure 23: Proposed Water Cycle Mitigation Measures

16.0 WASTE

16.1. Existing Environment

Existing waste on the site is dealt with in a number of ways. Waste generated by staff and typical operations (such as food scraps, paper, and the like) are processed internally, with the refuse taken to the nearby Oberon Tip by Borg staff. Most materials are recycled on site where possible (such as excess timber product), and agreements are in place with both Oberon and Bathurst Council as well as independent contractors for dealing with waste which is not able to be recycled on site, such as brine and used oils.

16.2. Potential Impacts

The following table illustrates the current and proposed annual levels of waste generation as a result of the Project.

Operational Waste	ON Site Disposal (Existing) (m^3)	ON Site Disposal (Proposed) (m^3)	OFF Site Disposal (Existing) (m^3)	OFF Site Disposal (Proposed) (m^3)	Disposal Method	Provider
Waste Virgin Wood	26,176	26,176	N/A	N/A	Fuel for heat plant	Onsite
Oils			20	20	Recycling	Western Oil
Downgrade Product	6,600	6,600	N/A	N/A	Fuel for heat plant	Onsite
Process Waste Water	1,500	1,500	N/A	N/A	Recycled on site	Onsite
Bottom Ash	N/A	N/A	2,500	2,500	Land fill (alternative disposal methods being researched)	Oberon Council Waste Facility
Process wood dust	2,000	5,000	N/A	N/A	Used for combustion in furnaces	Onsite
WESP Sludge	N/A	2,000	N/A	N/A	Used for fuel	To be used in grate fired heat plants
Bark from log processing	21,748	43,496	N/A	N/A	On sold or used for heat plant fuel	Sale or onsite
Spadeable Resin	N/A	N/A	10	10	Transported to Waste facility with leachate pits	Bathurst Tip
Raw Effluent (Squeeze Out)	50,000	50,000	N/A	N/A	Recycled on site through water treatment plant	Onsite
Brine	N/A	N/A	30,690	46,500	Trade Waste	Existing

						Trade Waste agreement with Oberon Council
Large offcuts (ex chipper and CTS Saw	8,500	2,000	N/A	N/A	Fuel for grate burners	Onsite
Condensate (from steam)	N/A	N/A	6,600	6,600	Trade Waste	Existing Trade Waste agreement with Oberon Council
Boiler Blowdown HPP	N/A	N/A	6,600	6,600	Trade Waste	Existing Trade Waste agreement with Oberon Council
Scrubber Waste Water	N/A	32,000	N/A	N/A	Water Treatment Plant – Biological reduction	Onsite
WESP Waste Water	N/A	96,000L	N/A	N/A	Water Treatment Plant – Biological reduction	Onsite

Table 16: Waste Generation

16.3. Management and Mitigation Measures

One of the key aspects of the Project is the implementation of a revised plant to allow for the burning of gas products on site to generate heat and power. This significantly reduces the amount of electricity required by the plant, as well as the amount of waste product generated. As a result, much of the waste generated in the manufacture of both MDF and Particle Board will be re-used on site. As detailed in the GHG assessment, this generates significantly lower levels of GHG than utilising existing supplied utilities such as gas and electricity. This policy of re-use on site is an integral part of the Project, and minimises overall cost on-site, minimises the demand on external suppliers, creates a far more competitive and renewable operation and significantly reduces the overall amount of waste generated by the development.

As a result of these holistic mitigation measures to be implemented, the Project will create significantly lower levels of waste than a similar, traditionally operated wood processing facility. This reduces both the amount of waste generated (by-products are re-used for heating and power rather than disposed of) and the amount of GHG produced.

17.0 GREENHOUSE GAS EMISSIONS

Northmore Gordon was engaged by Borg Panels to undertake a Greenhouse Gas Assessment for the Project. This included a thorough review of the existing water cycle on site. This report is attached as Appendix K.

17.1. Existing Environment

The current operations of the site include older style technology, which uses significantly more energy for production than current technology. As part of the Project, an overall upgrade of the site is to be undertaken, including retrofitting more modern power generating equipment. The current levels of energy used by the plant is 1,167,402 GJ/annum. This is made up of gas, biomass, diesel (used for transport) and electricity. This equates to 94,111 Tonnes CO_2e/annum.

17.2. Potential Impacts

The following table compares the emissions of the existing plant to the Project. The output of the Project is being designed at 500,000m^3 p.a. whereas the existing plant is rated at 280,000m^3 p.a. When comparing two modern manufacturing processes, particleboard plant is about 30-35% more efficient to make than MDF on a GJ/m3 basis. This assessment estimates that the new plant will increase capacity by 182%, and energy use per m^3 by only 67%. The significant improvement in energy efficiency is due to:

- The new plant is able to leverage of some existing infrastructure, and
- The existing plant is not considered energy efficient at this point in time. But is undergoing changes to improve energy efficiency.

Item	Old plant	New plant
Production	220,000 m^3/annum	Additional 500,000 m^3/annum
Scope 1 – Gas	211,718 GJ/annum 10,840 Tonnes CO_2e/annum	313,339 GJ/annum 16,146 Tonnes CO_2e/annum
Scope 1 – Biomass (mix of green and air dried wood)	45,566 tonnes 606,422 GJ/annum 776 Tonnes CO_2e/annum	117,692 tonnes 1,224,000 GJ/annum 1,591 tonnes CO_2e/annum
Scope 1 – Diesel for transport	86 kL/annum 3,320 GJ/annum 233 Tonnes CO_2e/annum	185 kL/annum 7,151 GJ/annum 500 Tonnes CO_2e/annum
Scope 2 – Electricity	96,095 MWh/annum 82,262 Tonnes CO_2e/annum	81,470 MWh/annum 68,435 Tonnes CO_2e/annum
TOTAL Energy	**1,167,402 GJ/annum**	**1,837,782 GJ/annum**

Table 17: Current and proposed GHG Emissions

The majority of the additional energy usage is for diesel to transport the additional production. There is no other option for removing the product from the area. However, this is offset by the significant reduction in

overall fossil fuel powered electricity consumption, replaced by the onsite recycling of what would otherwise be a waste product through the biomass process. Although this does produce GHG, it is at a significantly lower level than the GHG produced by burning fossil fuels.

Total Scope 1 and 2 GHG emissions are estimated to be as follows.

Source	Quantity per annum	Quantity per annum (GJ/annum)	Annual GHG emissions (Tonnes CO2e/annum)
Scope 1 – Gas	313,339 GJ/annum	313,339	16,146
Scope 1 – Biomass	117,692 tonnes	1,224,000	1,591
Scope 1 – Diesel for transport	185 kL/annum	7,151	500
Scope 2 – Electricity	81,470 MWh/annum	293,292	68,435
TOTAL		1,837,782	86,672

Table 18: Total Scope 1 and 2 GHG Emissions

The relationship between GHG concentration and climate change is a very complex and nonlinear one. As such, the direct effect of the emission of this amount of GHGs on the environment, or on climate change, cannot be estimated. The Project represents a minor source of GHG emissions, both in terms of the industrial/manufacturing sector emissions and in terms of the national emissions of Australia. As such, the GHG emissions associated with the Project are not expected to significantly impact upon the environment, and the overall amount of emissions produced have been significantly reduced through the proposed mitigation measures detailed below.

17.3. Management and Mitigation Measures

The following mitigation measures have been identified as being appropriate, and have been implemented in to the design. These all reduce the overall levels of GHG produced by the Project.

- Installation of a 50 MWth biomass heat plant to produce hot air for the flake drying process. This significantly reduces the potential GHG emissions from using fossil fuel for this process, and also utilises a by-product of the production of MDF and particle board.
- A small 8MW oil heater operating with combustion air preheating operating on gas will be used to generate hot oil for the press and other plant and equipment.
- Variable speed drives on fans and pumps to reduce overall electricity demand.
- Extensive use of a SCADA system and sub-metering to assist in monitoring plant performance, provide feedback and improve plant control, allowing for ongoing monitoring and improvement in plant performance.
- Electric chippers have a higher overall efficiency and lower noise compared with diesel chippers when analysed over the full and part load operating cycles, and have been implemented in the Project.

18.0 VISUAL IMPACTS

A Visual Impact Assessment has been carried out by The Design Partnership. This report is attached as Appendix L

18.1. Existing Environment

There are significant existing visual impacts on the area from the operations and infrastructure of the Oberon Timber Complex – both the site operated by Borg Panels as well as other facilities associated with the complex but un-associated with the Project. One of the key visual impacts is the existing chimneys and smoke on site. These are visible through the immediate and surrounding area.

As a result of this, the Visual Impact Assessment has concentrated on the anticipated impacts of the Project, rather than assessing the existing impacts from the wider Oberon Timber Complex.

The viewshed for the existing facility is shown below as Figure 24. This illustrates the potential areas in which the facility can currently be viewed, but does not take into account vegetation or existing buildings.

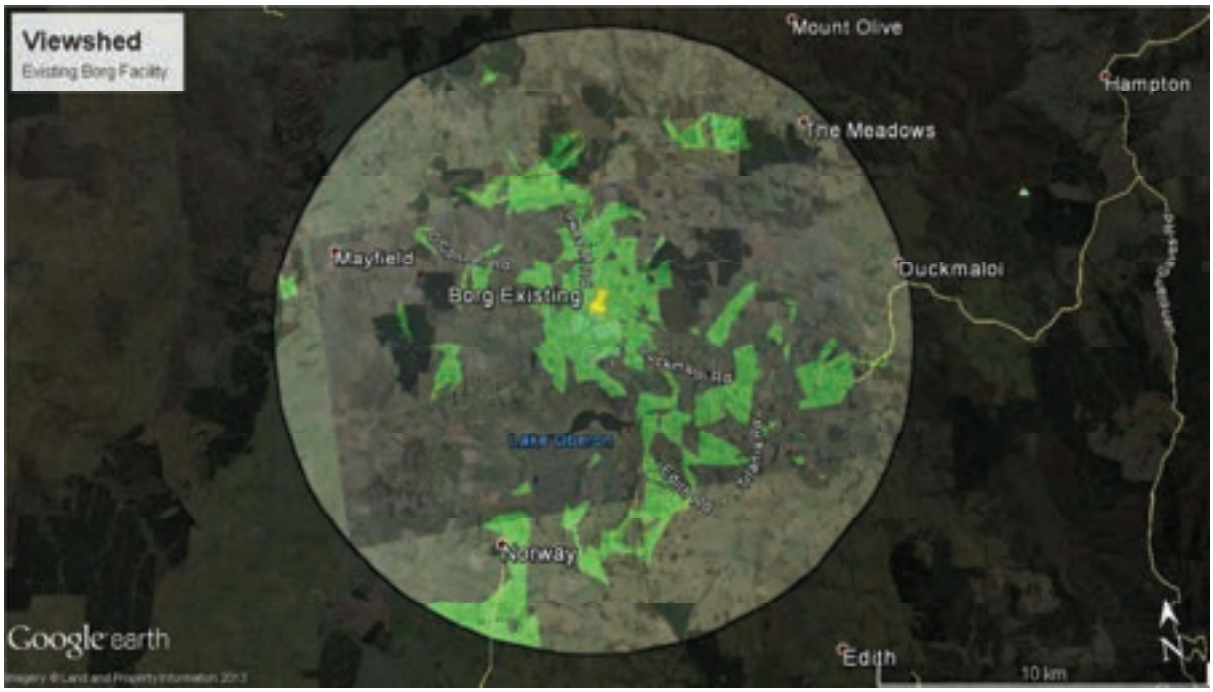

Figure 24: Viewshed

As a result, the viewshed was ground truthed to establish whether or not the site was visible from these areas. This lead to the establishment of Viewshed Limits (Figure 25) and viewpoints (Figure 26)

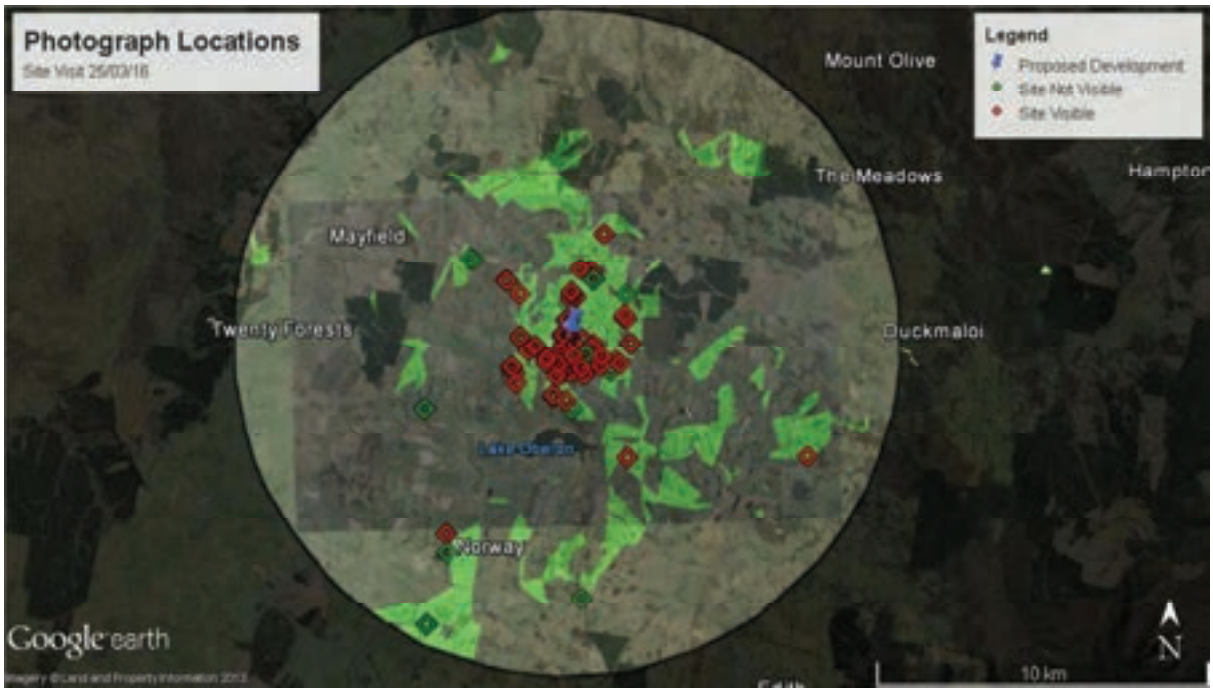

Figure 25: Location of Photographs for VIA

Figure 26: Identified View Points

18.2. Potential Impacts

In order to assess the potential visual impact of the Project, the following methodology was used:

- Describe the location
- Define the project
- Assess the landscape context
- Identify, document and analyse the visual character of the surrounding landscape

- Identify and assess the potential View Points at which the proposed impact may have a visual impact
- Assess the visibility of the site from each View Point
- Assess the Visual Absorption Capacity (VAC) of the site and project
- Calculate the Visual Impact Rating (VIR) and identify potential adverse and positive visual impacts; and
- Recommend mitigation measures where appropriate, which may include:
    - Siting, scale, footprint, form and materials options; and
    - Vegetation alteration.

As part of this, a site inspection was undertaken which included travelling to the identified view shed and viewpoints to analyse potential impacts and ascertain current levels of visual interference. The topography, vegetation, and existing development of the area largely mitigates the impacts of the proposed development. Although it will be visible, it does not represent the significant intensification of visual impacts, and tends to be absorbed by the surrounding landscapes. Overall, the Project was determined to have a LOW visual impact rating.

The site when viewed from Key View Points are shown below:

Figure 27: Abercrombie/O'Connell/Albion Roads Intersection

Figure 28: Oberon St/North St Junction

Figure 29: Ross St near Oberon Golf Club

Figure 30: Oberon St/Ross St Junction

Figure 31: Albion St/Tarana St Junction

18.3. Management and Mitigation Measures

The Project is located within a highly industrialised context. The wider Oberon Timber Complex has been an integral part of Oberon for many years. As such, the existing infrastructure has been a visible part of the Oberon skyline for many years. Large industrial buildings and chimneys are one of the key visual features. As a result,

Given the above, the Project is considered to have an overall low impact on the visual character of the area, and this can be further mitigated through the following mitigation measures:

LANDSCAPING

1. Provide screening vegetation where possible along the boundary and/or around the new warehouse in the northern part of the site.

2. Provide screening vegetation along the western boundary of the site in the south-west corner to screen new development when viewed from the road. The aim should be to replicate the effect of the existing screen planting along Lowes Mount Road.

3. Add screening vegetation along the southern boundary of the site in the south-west corner to match existing landscaping. The aim should be to replicate the effect of the existing screen planting which screens the existing facility from view.

MATERIALS AND COLOURS

For the proposed buildings within the Project Area select:

4. Facade materials that are of low reflectivity.

5. A colour palette that matches the existing development. This will enable the built form to blend in with its landscape context and reduce its visibility from View Points with a medium and long distance of view, such as VP2 and VP9.

VISUAL INTEREST

6. Provide an entry feature at the southern entrance on Lowes Mount Road (Gate 4). This could be a landscape statement, a signage element or a public art element. This feature should provide visual interest in the landscape and enhance views along Lowes Mount Road (VP16).

LIGHTING

7. The facility operates twenty hour hours per day. Lighting must be designed to minimise impacts on surrounding residential development and local roads. Recommended mitigation measures are:

- only lighting required spaces within the Project Area;
- focusing lights down, not up or out;
- providing minimum lux levels to achieve the desired outcomes of safety and security;
- minimising reflective material throughout the Project Area.

19.0 SOCIAL AND ECONOMIC

19.1. Existing Environment

The current operations of Borg Panels, along with other operations within the Oberon Timber Complex and the wider forestry/timer industry are one of the major employers within the Oberon region; in the 2011 census, the combined total of those employed in "Other Product Manufacturing", "Log Sawmilling and Timber Dressing" and "Forestry and Logging" represented a total of 15.6% of employment in the Oberon Local Government Area. This does not include those who live outside of the immediate Oberon Local Government Area, such as in the Lithgow or Bathurst Local Government Areas.

This high level of employment in these industries results in an overall low rate of unemployment in the Oberon LGA; in the 2011 Census, the overall unemployment rate in Oberon was 4.8%, below the state-wide average of 5.9% and the Australia-wide average of 5.6%.

This does not take in to account the beneficial flow on effects and increase in discretionary spending in the area.

19.2. Potential Impacts

The expansion of the operations will see an increase in the workforce, both during construction and during operation of the expanded facility. The estimated increase in employment is approximately 760 during construction and 70-80 during operations. It is noted that not all of the employment during construction will be located within Oberon. As Borg Panels manufactures a large amount of the physical infrastructure themselves, some of these jobs will be located on the NSW Central Coast. However, this is only a small component of the overall job creation from the Project.

Oberon is largely a timber town, with milling, forestry and wood processing being the major employers in the region. Expanding these operations will seek to further increase the levels of employment

19.3. Management and Mitigation Measures

Given the positive impacts on local employment levels, and the resultant positive social impacts from the Project, no management or mitigation measures are proposed to be undertaken.

20.0 ECOLOGY

Peak Land Managed was engaged by Borg Panels to undertake a Biodiversity Assessment for the Project. This report is attached as Appendix M.

20.1. Existing Environment

The Project is located on existing industrial zoned land. There is significant disturbance and development over the site.

Despite the limited areas of vegetation on the Project site, an ecological assessment was undertaken as part of this EIS. This report concluded that the Project site is severely disturbed, with most native vegetation under and around the existing facility being cleared, and exotics or planted species occurring around the northern, western and parts of the eastern sides of the site.

The proposed areas of expansion occur primarily over disturbed land with no native species present, being formerly levelled/modified. The remainder of the hardstand, emergency & first flush basins are located over modified native Grassland. This is shown in Figure 32 below.

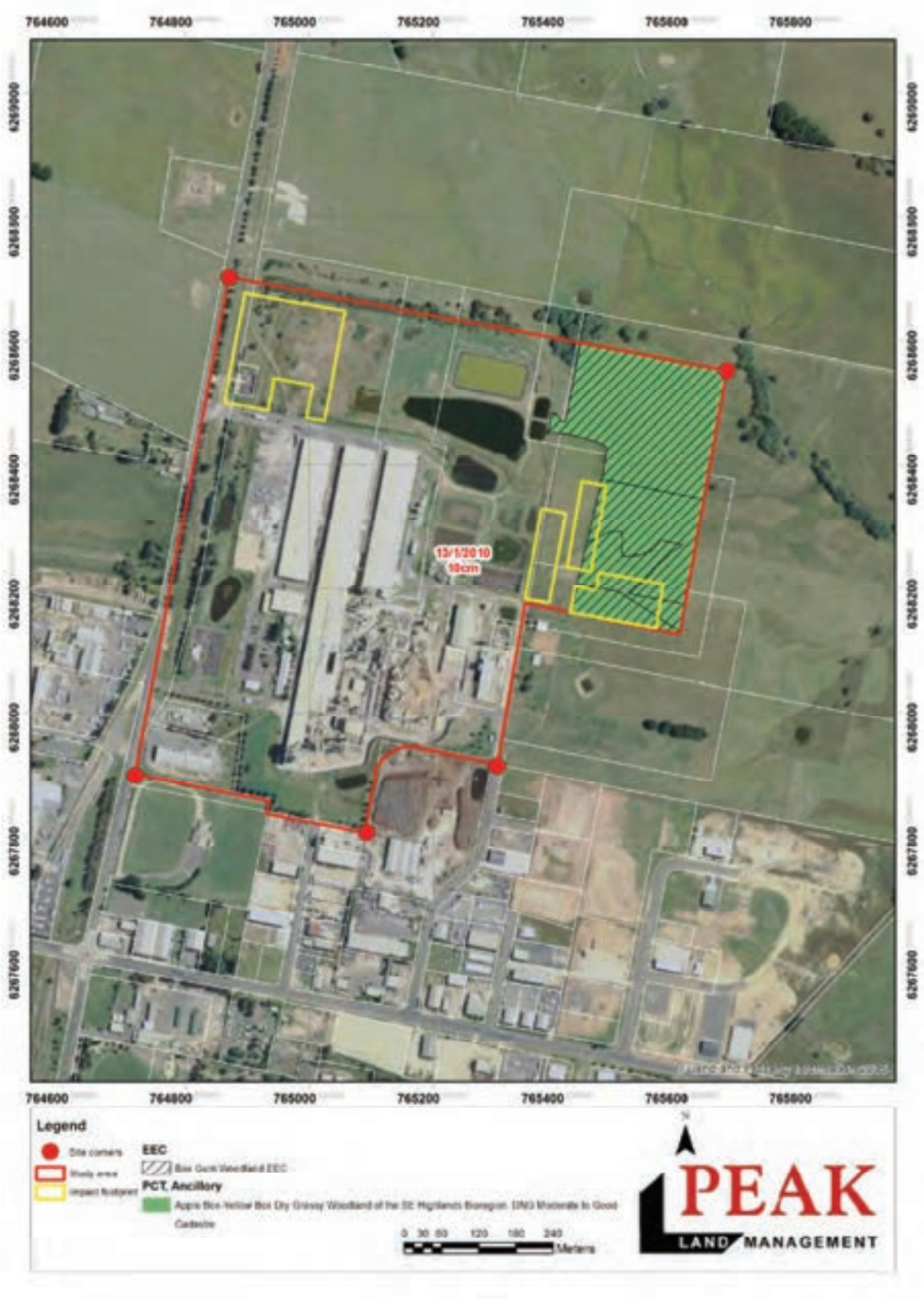

Figure 32: Development Footprint and Vegetation Map

20.2. Potential Impacts

The Project is located on land that has been used for either industrial or agricultural purposes for a long period of time. As such, much of the area has been extensively cleared.

The Ecological assessment undertaken by Peak Land Management for the Project concluded that no significant impacts were anticipated to occur. The overall impacts were assessed to be 10.42 for the development site and 0 for the future site. Under the Framework for Biodiversity Assessment (FBA) any result under 17 does not require further assessment.

20.3. Management and Mitigation Measures

Given the largely cleared nature of the site, there being no endangered ecological communities nor species found on site, and the majority of construction being located within an existing disturbed area, no negative ecological impacts are anticipated to occur as a result of the Project. The following recommendations were included within the Peak Land Management Report for further consideration:

- Implement standard erosion and sediment control measures over the development site whilst construction works are underway as part of CEMP.
- Retain all remaining native vegetation within proposed development site where feasible.
- Noxious weeds should be controlled/eradicated where feasible.
- Consider native revegetation within development site with endemic native species.
- Develop and implement a Vegetation Management Plan for the development site.

It is noted that the Office of Environment and Heritage has approved this report and does not require any further information regarding the Project. As such, it is considered that the proposed development will have no negative impact on the flora and fauna of the site, and no further consideration of this item is required.

21.0 INDIGENOUS HERITAGE

21.1. Existing Conditions

A search of the Office of Environment and Heritage Aboriginal Heritage Information Management System (AHIMS)) database was carried out on 12 May 2015 during the preparation of this EIS. The subject site was identified via Latitude and Longitude, and a 200m buffer zone identified.

The AHIMS search found 4 Aboriginal Sites were recorded in or around the location, and 0 Aboriginal Places were identified.

As a result, a more detailed search was requested. This provided the eastings and northings that mapped these locations. This is shown in Figure 33 below

Figure 33: Aboriginal Artefact Location

The reports that these items were recorded in were requested from the Office of Environment and Heritage. These artefacts were recorded in a 1986 archaeological survey, carried out by Brayshaw and Associates, undertaken prior to the construction of the existing facility on site.

This survey was carried out over a large area of the site. Four (4) scattered artefacts were identified on site during the survey. The Brayshaw and Associates report concluded that:

In view of the disturbance sustained to the area, the apparent sparseness of the artefacts, and the clay deposit which would make excavation and accurate provenance extremely difficult, excavation of the area is not appropriate.

The land to which this application applies has been extensively disturbed by both agricultural and industrial activities, land uses which were identified in the 1986 report as significantly decreasing the likelihood of any artefacts or items of cultural heritage being located on site.

No other locations were identified through the AHIMS search within 200m of the property boundary.

The detailed results of this search are shown in Appendix N

21.2. Potential Impacts

Given the scattered artefacts previously identified on site, and the extensive disturbance on the site, it is considered that the site has a general low sensitivity in terms of Aboriginal site location, and as such the Project is not anticipated to have any significant impacts in terms of Aboriginal heritage significance.

21.3. Management and Mitigation Measures

Given the scatted nature of artefacts identified during the previous study carried out, the soil type and general topography of the site and the conclusions of that report, no further studies are considered to be necessary. However, if any indigenous artefacts are uncovered during earthworks, then work will be stopped, and a suitable representative from the indigenous community contacted. Works would only recommence when an appropriate and approved management strategy has been agreed to by all of the relevant stakeholders.

22.0 EUROPEAN HERITAGE

22.1. Existing Conditions

No heritage items are located within close proximity to the Project; the closest being the Oberon Station Precinct, which is approximately 500m from the site. These are located at Lot 2 DP DP875942, 1 Herborn St, Oberon.

The Oberon Station Precinct is a State Heritage Item, and includes the Oberon Railway Stockyard, a separately listed item. The NSW Heritage database entry for the Station Precinct is as follows:

The railway precinct at Oberon includes a good example of a precast concrete station building, timber faced platform, and a stockyard. The stockyard is a good, intact, representative and accessible example of a T5 (type 5) railway stockyard. The stockyard features a complex arrangement of cattle races for sheep and cattle, unloading areas and facilities for stock handlers. The trucking race/unloading ramp is an unusual example of its type and includes an upper sheep race and a cattle race.

The entry for the Railway Stockyard is as follows:

> *The stockyard at Oberon is a good, intact, representative and accessible example of a T5 railway stockyard. The stockyard features a complex arrangement of cattle races for sheep and cattle, unloading area(s) and facilities for stock handlers. The unloading ramp (added c1960s) is an unusual example of its type and includes an upper sheep race and a cattle race. The stockyard can be accessed via a cycle/walking trail and has good potential for further interpretation*

The description for the Station Precinct is as follows:

> *Extant items at Oberon include the precast concrete station building, WC, lamp room, timber platform face, station signs (all of which date from 1923), and stockyard.*
>
> *The T5 (type 5) stockyard at Oberon is principally of timber construction and is similar to the c1912 Nimmitabel stockyard. The most prominent feature is the long and complex series of stock races and the unloading area facing the track. It includes an upper sheep race with room for stock handlers, a low sheep race, cattle race, one or two unloading areas, room for stock handlers, and a series of associated gates. The main perimeter fences at the front section of the stockyard consist of timber posts with five timber rails. The rear section (near the trucking race) consists of metal posts and five timber rails. The trucking race/unloading ramp is unusual having both an elevated sheep race and a separate cattle race. The stockyard features several timber arches, metal gates, and some narrow refuges.*

The description for the Railway Stockyard is as follows:

> *The T5 (Type 5) stockyard at Oberon is principally of timber construction. The most prominent feature is the long and complex series of stock races and the unloading area facing the track. It includes an upper sheep race with a working platform for stock handlers, a lower sheep race, cattle race, one or two unloading areas, additional room for stock handlers, and a series of associated gates. The main perimeter fences at the front section of the stockyard consist of timber posts with five timber rails. The rear section (near unloading ramp) consists of metal posts with five timber rails. The unloading ramp is unusual having both an elevated sheep race and a separate cattle race. The stockyard features several timber arches, metal gates, and refuges (narrow gates). The stockyard is currently being conserved by Oberon Tarana Heritage Railway Inc. (OTHR).*

No other items of European Heritage are located in proximity to the Project. The only other heritage item within Oberon is the Malachi Gilmore Memorial Hall, located in the centre of Oberon. See Figure 34 below.

Figure 34: Heritage Items

22.2. Potential Impacts

Given the distance between the Project and the items (a minimum of approximately 300metres) and the other development located between the Project and the heritage items (being an oval, light industrial development and other components of the wider Oberon Timber Complex (not in Borg Panels ownership) the Project is not considered to have any adverse effect on the heritage significance of the Oberon Station Precinct nor the Oberon Railway Stockyard. The development will not create any additional visual impact from the heritage item over what is currently visible on site.

In addition, an integral part of the heritage of the Oberon Station Precinct is the relationship between the establishment of Oberon and the timber industry, whether it be logging or the production of timber products. As such, the Project represents the continuation of the context that surrounds the heritage item.

22.3. Management and Mitigation Measures

Given the distance from the site of these items of European heritage, no mitigation measures are considered to be necessary. Existing Oberon Timber Complex activities (not part of the Borg Panels operations) are located on a lot adjoining these items, and although the Project brings the Borg activities closer to the heritage item there is still significant physical separation.

23.0 CUMULATIVE IMPACTS

The cumulative impacts can be summarised as follows:

Negative

Green House Gas

The overall proposal, although significantly mitigated through the implementation of onsite bio mass generation, and the gradual movement towards more fuel efficient trucks in the trucking fleet and purely electric forklifts, will have an increase in overall GHG levels. However, in the broader context the Project has been designed to significantly minimises the impacts of GHG, and the overall impact on a broader level is considered to be largely negligible.

Visual Amenity

There will be a minor negative impact on the visual amenity of the area. This is heavily mitigated by the existing visual environment; there is very little change on the overall visual amenity of the area, except to the immediate west and south west of the site. This is due to the new works largely integrating with existing industrial developments on the site. All materials will be designed to match the existing development on site, and the noise attenuation walls proposed will also shield potential receptors.

The impacts to the north, east and south are generally minimal, as the Project is generally of a lower height than existing development on site. As such, from these areas the

Positive

Social and Economic

The Project will have a significant economic and social impact upon the immediate Oberon Local Government Area, the wider Orana region, the state of New South Wales and indeed will have a positive economic impact upon the wider Australian economy. By increasing the amount of product manufactured inside Australia, by an Australian owned company, there is a much more positive economic impact than continuing to purchase materials from a mix of local and imported sources.

In addition, the ongoing, permanent, jobs created by the Project will have a significant impact in the immediate area. Oberon currently has an unemployment rate below the national average. However, the wider region is dependent on manufacturing as the main employer. Much of this manufacturing is in mining related industries. The Project represents a more stable employment base, less affected by broad scale global economic movements. The increase in capacity will also result in an increase in the amount of raw plantation timber required. As much of this is sourced from the immediate area this will also increase the economic base of the area.

Air Quality

It is noted that there will still be pollution generated by the Project. However, the overall levels of pollution are a significant reduction over the current approved levels on site. In particular, the GLC of formaldehyde is significantly lower than at the current plant. This has been achieved through bringing the existing site up to modern standards, as well as the ensuring that new plant installed meets or exceeds the required standards.

As such, it can be considered that the Project has an overall positive impact upon air quality.

Neutral

There are a number of area in which the Project will have a Neutral impact on surrounding land uses. These are:

Heritage:

The existing separation between the site and the closest heritage item will be largely retained, and no additional impacts are to occur as a result of the Project.

The likelihood of Indigenous heritage items being located on the subject site has been assessed to be low, based on previous studies done in the area. As the majority of works are located on existing disturbed and developed areas the overall likelihood of any such item being located is considered to be low.

Traffic:

The Project will have no negligible impact on traffic levels within the area. All intersections will still operate well within capacity, and there is scope within the existing road network to accommodate the potential increase in vehicle movements.

Hazard and Risk:

The Project is not considered to fall under SEPP 33, and represents the continuation of an existing industrial operation. Although there is an increase in the storage of potentially dangerous goods, modern control technologies for fire and explosion suppression to an international standard has been implemented, meaning that the overall impacts are neutral.

Soil:

The site is an existing industrial facility, operating in an appropriate zone. Provided that appropriate erosion and sediment control measures are implemented, then no adverse impacts are anticipated to occur. It is noted that there have been previous site contamination concerns raised over the site, particularly on land in the north. However, this has since been remediated.

There is an existing fuel depot in the south western corner of the site. This land is to be remediated to a level suitable for the proposed industrial use of the site.

Water:

The existing approval regime sets out stringent water quality control measures to ensure that the water discharged from the site is treated to an appropriate level. This is not just for the stormwater from the Borg site but the wider Oberon Timber Complex. The Project modifies this approach, utilising stormwater harvesting and storage. This decreases the use of potable water for industrial activities, reduces reliance on Council supplies and improves the overall quality of water discharged from the site.

Noise

There has been ongoing concern raised in regards to noise generated at the existing facility, especially from the operators of the caravan park located in close proximity to the subject site. Extensive noise modelling has been undertaken in order to ascertain the impacts, and find ways of minimising those impacts. Without limiting operations on site, the Project could be undertaken without increasing overall noise impacts on the area. However, in order to minimise impacts on surrounding land users, businesses and visitors to the region, a number of noise reduction measures, including limiting the amount of plant operating at any one

time, and enclosing plant in noise attenuating enclosures, have been proposed. This will ensure the ongoing acceptable levels of noise generation will continue, despite the significant increase in plant capacity.

Overall

Overall, the Project will have some impact upon the immediate area, through additional visual and GHG impacts. The impacts from traditional areas of concern (air and noise), have been significantly minimised where possible, through screening measures, noise enclosures and upgrading of existing and proposed infrastructure to meet current guidelines. In many cases, the completed Project will have a significantly better outcome than the current manufacturing operations on site.

Significant mitigation measures across the site and across these areas of impact have been put in place to ensure that the overall impacts of the Project are low, and that the site activities can be undertaken without creating any additional impacts upon either adjoining properties or the wider area.

Given these mitigation measures, and the significant positive economic and social impact of the plant, it is considered that the overall impacts of the Project are beneficial to Oberon, the larger Orana region and indeed the overall state.

24.0 RESIDUAL RISK ANALYSIS

24.1. Methodology

This risk analysis for the Project is based on a process adapted from AS/NZS ISO 31000:2009 Risk management – principles and guidelines. The process is qualitative and based on the residual risk matrix shown in Table 18.

Significance	Receiving Environment
Extreme	Undisturbed receiving environment, type or extent of impacts unknown, substantial community concern
High	Sensitive receiving environment, type or extent of impacts not well understood; high level of community concern.
Moderate	Resilient receiving environment, type and extent of impacts understood; community interest
Minor	Disturbed receiving environment; type and extent of impacts well understood; some local community interest.
Low	Degraded receiving environment; type and extent of impacts fully understood; uncontroversial project.

Table 19: Significance of Effects

Residual environmental risk is assessed on the basis of the significance of environmental effects of the Project and the ability to confidently manage those effects to minimise the risk of harm to the environment.

The significance of environmental effects is given a numerical value between one and five, based on:

- The receiving environment (its sensitivity and values);

- The level of understanding of the type and extent of impacts; and

- Likely community response to the environmental consequences of the Project (refer to Table 19).

The manageability of environmental effects is similarly given a numerical value between one and five based on the complexity of mitigation measures, the known level of performance of the safeguards proposed, and the opportunity for adaptive management (refer to Table 9)

Significance	Mitigation Measures
Complex	Complicated array of mitigation measures required; safeguards or technology are unproven; adaptive management inappropriate.
Substantial	Significant mix of mitigation measures required; past performance of safeguards is understood; adaptive management feasible.
Straightforward	Straightforward range of mitigation measures required; past performance of safeguards is understood; adaptive management feasible.
Standard	Simply suite of mitigation measures required; substantial track record of effectiveness of safeguards; adaptive management unlikely to be required
Minimal	Little or no mitigation measures required; safeguards are standard practice; adaptive management not required.

Table 20: Manageability of Effects

Significance of	Manageability of Effects

Effects	Minimal	Standard	Straightforward	Substantial	Complex
Low	Low	Low	Low/Medium	Low/Medium	Medium
Minor	Low	Low/Medium	Low/Medium	Medium	High/Medium
Moderate	Low/Medium	Low/Medium	Medium	High/Medium	High/Medium
High	Low/Medium	Medium	High/Medium	High/Medium	High
Extreme	Medium	High/Medium	High/Medium	High	High

Table 21: Risk Rating

24.2. Analysis

The analysis of residual environmental risks for issues related to the Project is shown in Table 9.

This analysis indicates the environmental risk profile of the Project based on the assessment of environmental effects, the identification of appropriate mitigation measures and the Summary of Mitigation Measures provided in Section 27 of this EIS.

Issue	Initial Risk Rating – No Mitigation Measures Implemented			Risk Rating – Mitigation Measures in Place
	Significance of Effects	Manageability of Effects	Risk Score	Residual Risk
Traffic	Minor	Minimal	Low	Low
Air Quality	Moderate	Straightforward	Medium	Low/Medium
Hazard and Risk	Low	Minimal	Low	Low
Noise and Vibration	Moderate	Straightforward	Medium	Low/Medium
Soil	Low	Minimal	Low	Low
Water	Minor	Standard	Low/Medium	Low
Waste	Low	Minimal	Low	Low
Greenhouse Gas Emissions	Low	Standard	Low	Low
Visual Impacts	Low	Standard	Low	Low
Social and Economic	Low	Minimal	Low	Low
Ecology	Low	Minimal	Low	Low
Indigenous Heritage	Low	Minimal	Low	Low
European Heritage	Low	Minimal	Low	Low

Table 22: Residual Risk Analysis

24.3. Conclusion

The above residual risk analysis indicates that the Project, including appropriate mitigation measures as outlined in this EIS, would give rise to predominately a low to low/medium risk in relation to the identified environmental issues.

PART H – ENVIRONMENTAL MANAGEMENT AND MONITORING

25.0 ENVIRONMENTAL MANAGEMENT

25.1. Environmental Management and Monitoring Plan

Borg panels have a current Environmental Management and Monitoring Plan that applies to the current development on site. This will be updated to reflect the changes under this approval, as well as reflecting any changes to the conditions of consent.

25.1.1. Construction Environmental Management Plan

A Construction Environmental Management Plan will be required to be produced in order to minimise the impacts of the Project. One of the key components of this will be ensuring that all works carried out at an early stage, such as site preparation and grading, is undertaken in accordance with Landcom's '*Blue Book*' *(Managing Urban Stormwater Soils and Construction)*. Compliance with this industry standard should be conditioned by the Department.

25.1.2. Operational Environmental Management Plan

Borg Panels has an existing environmental management plan which governs the day to day operations of the site, as well as detailing the methodology for dealing with emergency events. This will be updated to reflect the changes in the site. The Water Management Plan prepared for the Project has made a number of recommendations regarding new basins and catchment areas for fire water or for collecting spills. These will be incorporated into this document.

25.1.3. Environmental Auditing and Reporting

Ongoing environmental auditing and reporting is likely to be a condition imposed by the Department. Currently, the requirement is for an Environmental Audit to be carried out every five (5) years. This is considered to be appropriate for the expanded Project. Ongoing discussions with the EPA and the Department will guide the required reporting. Any condition relating to the ongoing auditing and reporting of site activities will be complied with.

26.0 SUMMARY OF MITIGATION MEASURES

The following mitigation measures are proposed:

Traffic and Transport:

- Preparation of a detailed Construction Traffic Management Plan for the construction phase of the development in accordance with Roads and Maritime's Traffic Control at Worksites Manual (version 4.0 June 2010), which specifies:
    - Hours of haulage, which do not impose on peak periods and school drop-off and pickup times
    - Haulage routes, including the source of locations and their access points for the site
    - Designated areas within the site for truck movements, parking, loading and unloading,
    - Sequence for implementing traffic works and traffic management devices if required
    - Safety principles for construction activities, such as speed limits around the site and procedures for specific activities
    - Procedures for inspections and record keeping for maintaining traffic control measures
    - Undertake a pavement inspection pre- and post-construction to ensure the pavement condition has not been further degraded due to construction traffic.

Further to the above, the following mitigation measures may be implemented to monitor and enhance the safety of pedestrian and vehicle movements around the site during operation:

- Appropriate implementation of accessible parking as specified in Sections 5.1.1 and 5.2 of the traffic report and allocation for use by staff and visitors as required.

Noise

The following management and mitigation techniques are proposed for the existing plant:

- Plant listed in Table 12 (of acoustic report, see below) should be provided with further noise control (attenuation).

The following management measures and mitigation techniques are recommended for the Project:

- Mobile chipping plant should be phased out from permanent use. When required, mobile chipping plant should be restricted to the day period, and should not be operated during periods of meteorological enhancement towards R09;
- No chipping plant should operate during the night period; and
- Plant listed in Table 12 (of acoustic report, see below) should be provided with further noise control (attenuation).

Plant listed in Table 12:

- Conti 1 Drier Fan
- Fibre Transport 1 (230M1)
- Booster Fan Drive

These measures will significantly reduce overall noise generation from the Project.

Air

The following mitigation measures are to be installed in to the existing MDF plant:

- EPA ID 23 (Paper treater) together with another additional treater (with a total flow rate of 80,000 m3 per hour), will be diverted to EPA ID 11 (Conti-2 heat plant) where 95% of formaldehyde will be removed before discharge to the atmosphere;
- EPA ID 12-2 (Conti 1 roof vent) will be diverted to EPA ID 17 (Conti-1 heat plant) were 95% of formaldehyde will be removed before discharge to the atmosphere;
- 3. A new 'combined stack' will be installed. This stack is proposed to be 40 metres high, 1.5 metres diameter, with a total flow rate of 100,000 m3 per hour;
- 4. EPA ID 4 (DC1 baghouse) and EPA ID 5 (DC2 baghouse) will be discharged to the atmosphere through the proposed combined stack;
- A wet scrubber system will be installed on the Conti 2 press line. This system is designed to emit a maximum of 40 mg/m3 of TSP and 30mg/m3 of formaldehydes with a total flowrate of 100,000 m3 per hour, which will be emitted through the combined stack.

The following mitigation measures have been provisioned for the proposed particle board plant to reduce ground level impact:

- E12 will utilise dispersion to reduce impacts.
- Press scrubber does not vent directly to atmosphere as the emissions will be diverted to the Combustion chamber and excess gas will be emitted via the WESP stack.
- Wet Electrostatic Precipitator will be used as particulate control for moisture laden air from dryer.
- Low NOx burner will be used for dryer Hot gas generator.
- Baghouses and cyclofilters will be installed on all other material transport and process applications.

Flora and Fauna

- Implement standard erosion and sediment control measures over the development site whilst construction works are underway as part of CEMP.
- Retain all remaining native vegetation within proposed development site where feasible.
- Noxious weeds should be controlled/eradicated where feasible.
- Consider native revegetation within development site with endemic native species.
- Develop and implement a Vegetation Management Plan for the development site.

Water

The Sustainability Workshop has reviewed the plans prepared and has provided the following management and mitigation measures:

- A new swale with a longer flow path to convey the CHH runoff around the site an in to a new treatment pond should be constructed. This will provide for the additional reduction of TSS and remove tannins. This swale should be vegetated using either appropriate greases or macrophytes.
- Construction of a new stormwater treatment pond with a minimum volume of 6 ML. This is to be located downstream of the existing pond and will accept runoff for the whole of the subject site, including any overflows from the existing stormwater treatment pond.
- Both ponds should have a daily demand for stormwater reuse of 200m^3/day, and any increase in this would generally improve the discharge concentration values. In order to achieve this, a Water Access Licence granting the right to harvest 133ML/annum will need to be granted.
- Given the size of TSS generated (generally larger than 1mm in size), the TSS generated from the Project, particularly during the wood handling process, can easily be filtered out of the water cycle.

In much the same way, the forms of TP and TN associated with the Project will largely be of a larger size and can be filtered out, and are therefore unlikely to pose a significant water quality risk.

In order to minimise the impacts from any accidental spills, the following recommendations were included within this report

- The existing aerated pond should be converted into an emergency catch dam. This will require the dam to be continually drained to ensure there is adequate capacity to absorb either a spill or any firefighting water. This would prevent fire water or spills from entering in to the stormwater treatment ponds.
- This is in addition to the already proposed additional emergency spill basin.
- Any stormwater treatment pond should have a valve controlled outlet which could be closed to contain the contents of the spill in the new treatment pond as a last point of containment.

Greenhouse Gases

- Installation of a 50 MWth biomass heat plant to produce hot air for the flake drying process. This significantly reduces the potential GHG emissions from using fossil fuel for this process, and also utilises a by-product of the production of MDF and particle board.
- A small 8MW oil heater operating with combustion air preheating operating on gas will be used to generate hot oil for the press and other plant and equipment.
- Variable speed drives on fans and pumps to reduce overall electricity demand.
- Extensive use of a SCADA system and sub-metering to assist in monitoring plant performance, provide feedback and improve plant control, allowing for ongoing monitoring and improvement in plant performance.
- Electric chippers have a higher overall efficiency and lower noise compared with diesel chippers when analysed over the full and part load operating cycles, and have been implemented in the Project.

Soil

The existing site is largely disturbed and used for industrial purposes. No change is proposed to occur and the majority of the site is to be sealed.

An existing fuel depot is to be removed at the south western corner of the site, and this will require remediation.

Heritage

No mitigation measures are proposed for European Heritage. No adverse impacts on listed European heritage items are anticipated to occur as a result of the Project being undertaken.

It is considered that the probability of Indigenous heritage items being located on site is low. However, if such items are found then all works will be stopped and consultation with the Local Aboriginal Land Council and National Parks and Wildlife Service representatives will be undertaken.

Visual Impacts

Due to the existing industrial context of the site and surrounding areas, no significant visual impacts are anticipated to occur as a result of the Project. Those visual impacts that are likely to occur are concentrated to the west of the site, immediately along Lowes Mount Road, and to the immediate south west of the Project, impacting upon the adjoining oval.

In both instances, the visual impact will be an extension of the existing visual impact. That is, the new works from the Project will blend with the existing visual context of the site. Mitigation measures are proposed to limit these impacts. These are generally focussed on landscaping treatments along the property boundary, carrying on the existing landscaping regime, and ensuring that all new works are painted in a similar, non-reflective colour scheme as the existing works.

These mitigation measures are considered to be appropriate given the wider context of the site, and the limited views of the Project (from outside of the industrial area, that are not blocked by existing and surrounding industrial development.

PART I – PROJECT JUSTIFICATION

27.0 JUSTIFICATION FOR APPROVAL

27.1. Biophysical, Economic and Social Considerations

27.1.1. Biophysical Factors

The potential biophysical effects associated with the proposed modification were assessed in Part G of this EIS. This EIS concludes that the residual risk associated with these potential impacts is low, once the appropriate mitigation and management measures included in the EIS are implemented. The Project is therefore justifiable in terms of the biophysical elements of the environment. As detailed in Sections 11 and 13, the Project would operate within the relevant air quality and noise criteria.

27.1.2. Sociocultural Factors

The potential effects of the Project on social and cultural values and the aspects that affect them are examined in Part G of this EIS. The assessment presented in this EIS regarding heritage, traffic and visual amenity indicates that, provided appropriate mitigation and management measures as outlined in the Statement of Commitments are implemented, the Project would have a minimal impact on sociocultural factors. Furthermore, the Project is considered to be in accordance with planning requirements. The Project is therefore justifiable on social and cultural grounds.

27.1.3. Economic

The proposed development will provide strong economic benefits to the local, regional and State economies. The additional jobs created at both the plant and in supporting industries will create significant additional employment in the region, and will provide a source of manufacturing employment that is not reliant on the mining sector.

In addition to the direct employment generated as a result of the Project, significant flow on employment is anticipated to occur in service industries, as well as in supporting industries such as construction.

Given that the current unemployment levels in Oberon are low compared to other regional areas, the Project will create additional economic strength and certainty for regional areas.

27.2. Ecologically Sustainable Development

The objectives of the EP&A Act include the encouragement of the principles of Ecologically Sustainable Development (ESD). Supplementary to the EP&A Act objectives, section 7 (1(f)) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 requires a proponent to include in an EIS the reasons justifying the development, including the principles of ESD.

Section 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 defines the principles of ESD as follows:

(a) The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

> *(i) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
>
> *(ii) An assessment of the risk-weighted consequences of various options,*

(b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) Improved valuation, pricing and incentive mechanism, namely, that environmental factors should be included in the valuation of assets and services, such as:

> *(i) Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
>
> *(ii) The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
>
> *(iii) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

The following sections provide the evaluation of the Project with regard to ESD.

27.2.1. Precautionary Principle

The precautionary principle requires careful evaluation of potential environmental damage and risk-weighted consequences of such damage to avoid serious or irreversible harm. In this sense the precautionary principle promotes proactive environmental protection as opposed to reactive measures following environmental damage. In order to satisfy the precautionary principle, the potential for serious or irreversible environmental damage must be anticipated, measured and prevented from the outset to ensure a level of scientific certainty has been achieved in relation to the proposed development.

Accordingly, this EIS has undertaken an evaluation of all key environmental components, as well as secondary components with the potential to influence environmental damage including social and economic considerations. Detailed assessment of key issues and proposed mitigation and management procedures have been conducted as documented in the previous sections of the EIS. Through the adoption of an anticipatory approach, each potential issue arising from the Project has been identified, evaluated and mitigated through a series of design or management solutions.

The assessment process has involved a detailed study of the existing environment and the use of engineering and scientific modelling and study to assess and determine potential impacts as a result of the Project. The process also relied on the experience and expertise of the specialists engaged throughout the assessment phase. To this end, there has been careful consideration to avoid, where possible, irreversible damage to the environment, including the following measures:

- The best available scientific information for the Project area has been relied upon. Where uncertainty in data has been identified, modelling and assessment have been based on an objectively 'worst-case scenario' case analysis with appropriate contingency measures;
- The location and footprint of the Project is on industrial zoned land within an established industrial estate, in the same complex as an existing MDF production facility; and
- Modelling of reasonable worst case scenario air quality emissions, noise emissions, traffic impacts and greenhouse gas emissions has provided greater scientific certainty about the potentially adverse impacts of the Project. This has subsequently resulted in conservative mitigation measures to manage and monitor anticipated environmental impacts

The EIS has anticipated, assessed and managed the potential impacts and uncertainties arising from the Project. It is considered that the uncertainties do not pose a risk of serious or irreversible damage to the environment and is therefore in accordance with the precautionary principle.

27.2.2. Intergenerational Equity

The concept of inter-generational equity requires that the present generation preserves or enhances the health, diversity and productivity of the environment for the benefit of future generations. Essentially it refers to equality between generations. The concept includes both intra-generational equity, i.e. within generations, and inter-generational equity, i.e. between generations. This means that the principle extends beyond the requirement of environmental protection and enhancement for inter-generations, but also requires that the economic and social benefits of the proposal are equally distributed among members of a community intra-generationally.

Throughout the assessment, the type and extent of potential impacts caused by the Project have been analysed and mitigated. The assessment methodologies have adopted a risk-based and worst case scenario approach to ensure improved environmental, social and economic protection for current and future generations. The environmental management and mitigation measures have been developed to minimise the impact of the Project on the environment for future generations.

One very significant issue around inter-generational equity is human-induced climate change driven by atmospheric emissions. Climate change is directly threatening large human populations, especially in low lying countries, and those where rainfall patterns are expected to change to the detriment of food production. The Project will have net beneficial impact on GHG owing to the significant GHG reductions from the replacement of outdated technology, with new mitigation measures and pollution control devices. This is likely to reduce the overall percentage of GHG when viewed in terms of overall output and production.

27.2.3. Biological Diversity and Ecological Integrity

The conservation of biological diversity refers to the maintenance of species richness, ecosystem diversity and health and the links and processes between them. The Project site is located on filled land within a heavy industrial estate and has very limited biodiversity value. An ecological assessment has been undertaken by a qualified specialist to identify the extent of biological diversity on site and the surrounding area, and also to confirm that no significant adverse impacts are expected as a result of the Project.

27.2.4. Valuation and Pricing of Environmental Resources

The principle of improved valuation and pricing mechanisms refers to the need to determine proper values of services provided by the natural environment. The objective is to apply economic terms and values to the elements of the natural environment.

The current facility has a number of licences, trade waste permits and the like applied. These allow for the implementation of monetary value to environmental elements. This approach is to continue under the new approval.

27.3. The Objects of the *Environmental Planning and Assessment Act 1979*

This EIS has been prepared having regard to the objects of the EP&A Act. The objects of the Act are found in
Section 5 of the Act and are outlined below:

(a) to encourage:

(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns

and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
The Project is located within the context of an existing industrial area, on industrial zoned land, in an area already specified as being a key timber producing area in the Oberon Local Environmental Plan. The Project has been designed to minimise the impacts of both the existing and proposed development on surrounding development. As such it is considered that this object is met.

(ii) the promotion and co-ordination of the orderly and economic use and development of land,
The Project represents the sensible use of appropriately zoned land in an area with a history of such development. This object is considered to be met.

(iii) the protection, provision and co-ordination of communication and utility services,
Not applicable to the Project.

(iv) the provision of land for public purposes,
Not applicable to the Project.

(v) the provision and co-ordination of community services and facilities, and
Not applicable to the Project.

(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
The Project has been located on existing cleared areas adjoining the existing factory facility. The land has already been significantly disturbed, and a flora and fauna report has been prepared, which indicates that there will be no negative impact on native flora and fauna.

(vii) ecologically sustainable development, and
The Project represents the expansion to an ecologically sustainable product, made of 100% plantation timber. The impacts of the Project in terms of air and noise pollution are to be lower than that currently produced on site.

(viii) the provision and maintenance of affordable housing, and
Not applicable to the Project.

(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and
Ongoing discussions have been held between Borg Panels, Oberon Shire Council, and relevant state government agencies, including the Department of Planning and Environment. This has ensured that the appropriate approval body has been involved in the project from the outset.

(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.
The Project has had ongoing community engagement and stakeholder consultation. This is detailed in Appendix C and Section 9 of this EIS.

As can be seen from the above, the Project can be seen to demonstrate compliance with the objects of the Act.

27.4. Justification Summary

As can be seen from the above, the project can be undertaken with generally positive or neutral outcomes. Ongoing consideration has been given to minimising the impacts of noise and the impacts on air quality, which are the two major identified areas of concern.

The Project:

- Can be undertaken without adversely impacting upon the existing road network,
- Will have no impact upon existing items of European heritage
- Is located on a site with an extensive industrial history and extensive site disturbance, with little probability of any items of indigenous heritage being located
- Is located in an existing industrial context, significantly minimising visual impacts
- Will not significantly increase greenhouse gas emissions from the region
- Significantly decreases levels of air pollution currently generated from the facility
- Will generate significant levels of employment in a regional area that has recently suffered from a number of factory closures
- Will generate significant economic benefits in the region, including substantial flow-on employment generation
- Is part of the ongoing fabric of timber production in the Oberon region
- Utilises significant on site re-use and recycling to minimise overall environmental impacts
- Can be undertaken without adversely impacting upon native vegetation
- Decreases existing noise levels from the facility that currently operates

PART J – EIS FINDINGS

28.0 CONCLUDING STATEMENT

28.1. The Proposal

The Project is for:

- Allow for the construction of a dedicated Particle Board Manufacturing Line to allow Borg to continue their growth and remain internationally competitive
- Create a significant increase in long term employment opportunities within a regional area
- Provide additional infrastructure within existing buildings to value add to existing product
- Modernise the existing facility
- Allow for expansion to Lot 1 and 2 DP 1085563 for the purposes of a wood flake preparation area
- Construct a new automated storage warehouse part on Lot 24 DP 1148073 and part on Lot 26 DP 1200697
- Construction of hardstand on Lot 24 DP 1148073
- Allow for expansion to Lot 1 DP 1076346 for hardstand, water quality ponds and emergency catchment
- Rationalise the current Conditions of Consent under DA 27/95 that apply to a number of different lots, all under fragmented ownership and operation
- Allow for an increase in production by up to 500,000m^3, with a commensurate increase in staff levels
- Boundary adjustment of Lot 1 DP 1076346 to rectify the current split zoning, consolidating the IN1 zoned land into Lot 26, retaining all the RU1 zoned land under the current Lot and DP
- Lot consolidation of all lots the subject of this application.

28.2. Alternatives

A number of alternatives have been considered during the preliminary planning stages of the Project. These included:

- "Do Nothing"
- An alternative location within NSW
- An alternative location within Australia
- Importation of product from overseas

In each of these alternatives a number of shortcomings were identified. Options 1 and 4 were the first to be rejected as viable alternatives. There is an ongoing demand for MDF and timber laminate products within Australia, and Borg Panels is one of the largest suppliers. By adding a Particle Board production facility to the existing MDF facility they are able to meet ongoing production demands and continue to diversify their market base, as well as ensuring a steady supply of raw materials. The importation of product from overseas has a number of shortcomings, including significantly higher overall environmental impacts, through the lower environmental enforcement regimes of the countries in which the product would be manufactured as well as the significant impacts from transporting the product to Australia, and then transporting the product by road to Oberon for processing at the existing facility.

Options 2 requires more detailed consideration. Borg is committed to undertaking ongoing development in regional, rather than metropolitan areas. This is evidenced by the head office and major operations being located on the Central Coast rather than in Sydney. As such, any alternative location would need to be in a

regional area, with reliable access to plantation timber. This significantly restricts the options for other sites within NSW; areas around Tumut, in the south of the state, are a potential location, however, no other suitable site is currently under the ownership of Borg, and no other site already has existing operations. As such it is considered that the Oberon site is the only potential site within NSW.

Option 3 is also a feasible option. Areas within Victoria in particular have large amounts of timber plantations that can provide the raw materials needed for the production of MDF. However, as with Option 2, the current ownership of the Oberon facility provides for a significant reason to expand these operations rather than purchase an alternative site.

Given the above, the existing ownership of the site, the proximity of plantation timber, the history and heritage of Oberon and the existing development on the site, the proposal represents the most appropriate location for such a development.

28.3. Justification for the Proposal

As detailed above in Part G, the Project is able to be carried out with minimal adverse environmental impacts, and significant positive economic and social impacts.

28.4. Sustainability of the Proposal

The overall sustainability of the Project is considered to be generally high, and a number of decisions and technologies have been implemented to increase the overall sustainability. All timber used in the production of both MDF and Particle Board is plantation timber, with no old growth forests used. Plantation timber is a highly renewable resource, and is also an integral part of the regional economy.

A number of pieces of plant have also been proposed as part of the Project. These are used to create heat and power for the production lines and treatments that the product goes through. This plant allows for the waste product of the production line to be used for fuel. This significantly reduces the overall amount of greenhouse gases generated as a result of the Project being undertaken.

28.5. Conclusion

The Project represents the significant investment in manufacturing in a regional area, and will create a world class, fully integrated plant. As an existing major employer in the region, operating outside of the market dependent mining sphere, the Project represents a continuation of a proven, stable, employment generating industry that has been operating within Oberon for a number of years.

The Project can be undertaken with minimal adverse impacts, and those adverse impacts that are created, such as noise and air quality impacts have been significantly minimised during the design process. Other areas, such as traffic, heritage, ecological and water cycle impacts will have no significant adverse impacts as a result of the Project.

Overall the Project can be undertaken in a way which is respectful to the existing environment of Oberon, whilst still allowing for a significant increase in production with a commensurate increase in employment and regional investment. Given this, it is requested that the positive assessment of the Project is provided, and the ongoing investment from Borg in to regional New South Wales is allowed to continue.

NSW GOVERNMENT | Planning & Environment

Contact: Pamela Morales
Phone: 02 9228 6386
Fax: 02 9228 6455
Email: pamela.morales@planning.nsw.gov.au
Our ref: SSD 7016

Mr Tony Preston
Borg Panels Pty Ltd
2 Wella Way
Somersby NSW 2250

Dear Mr Preston

Secretary's Environmental Assessment Requirements
Borg Panels Timber Panel Processing Facility Expansion, Oberon (SSD 7016)

Please find attached a copy of the Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the Borg Panels Timber Panel Process Facility Expansion Project. These requirements have been prepared in consultation with relevant government authorities based on the information you have provided to date. I have also attached a copy of the government authorities' comments for your information. Please note that the Secretary may alter these requirements at any time.

Prior to exhibiting the EIS that you submit for the development, the Department will review the document in consultation with relevant authorities to determine if it addresses the requirements in Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

I wish to emphasise the importance of effective and genuine community consultation and the need for proposals to proactively respond to the community's concerns. Accordingly a comprehensive, detailed and genuine community consultation and engagement process must be undertaken during preparation of the EIS. This process must ensure that the community is both informed of the proposal and is actively engaged in issues of concern to them. Sufficient information must be provided to the community so that it has a good understanding of what is being proposed and of the potential impacts.

Further, the Department understands that Borg intends to consolidate its existing and proposed operations into a new development consent, should approval be given. The Department requests that you provide a description in the EIS of how the existing and proposed operations will operate under any new consent and its interaction with any existing development consents for the site (particularly DA 27/95). Consequently, you may also be required to modify and/or surrender any existing development consents for the site.

I would appreciate it if you would contact the Department at least two weeks before you propose to lodge your DA and EIS. This will enable the department to:

- confirm the applicable fee (see Division 1AA, Part 15 of the *Environmental Planning and Assessment Regulation 2000*); and
- determine the number of copies (hard-copy and CD-ROM) of the EIS that will be required for reviewing purposes.

If your development is likely to have a significant impact on matters of National Environmental Significance, it will require an approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval would be in addition to any

approvals required under NSW legislation and it is your responsibility to contact the Commonwealth Department of the Environment to determine if an approval under the EPBC Act is required (http://www.environment.gov.au or 6274 1111).

Your contact officer, Ms Pamela Morales, can be contacted on 9228 6386 or at pamela.morales@planning.nsw.gov.au. Please mark all correspondence regarding the proposal to the attention of the contact officer.

Yours sincerely

Chris Ritchie 28/5/15
Manager
Industry Assessments
as delegate for the Secretary

Secretary's Environmental Assessment Requirements

Section 78A(8A) of the *Environmental Planning and Assessment Act 1979*

State Significant Development

Application Number	SSD 7016
Development	The expansion of the existing Borg Panels Timber Panel Processing Facility to include: - construction and operation of a particle board facility; - construction and operation of a chipper facility; - additional site improvements to existing infrastructure including construction of new buildings to house new machinery plant and additional warehouse space; and - consolidation of Borg's operations and landownership into the SSD consent.
Location	124 Lowes Mount Road, Oberon in the Oberon local government area
Applicant	Borg Panels Pty Ltd
Date of Issue	May 2015
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*. Notwithstanding the key issues specified below, the EIS must include: • a detailed description of the development including: - need for the proposed development; - justification of the proposed development; - proposed output and scope of works; - sequence or stage/s of the proposed development during construction and operation; - likely interactions between the proposed development, the existing operation and other neighbouring developments; and - plans of any proposed building works. • consideration of all relevant environmental planning instruments, including identification and justification of any inconsistencies with these instruments; • a risk assessment of the potential environmental impacts of the proposed development, identifying the key issues for further assessment; • a detailed assessment of the key issues specified below, and any other significant issues identified in this risk assessment which includes: - a description of the existing environment, using sufficient baseline data; - an assessment of the potential impacts of all stages of the proposed development, including any cumulative impacts, taking into consideration relevant guidelines, policies, plans and statutes; and - a description of the measures that would be implemented to

	avoid, minimise and if necessary, offset the potential impacts of the proposed development, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment. • a consolidated summary of all proposed environmental mitigation, management and monitoring measures, highlighting commitments included in the EIS. The EIS must also be accompanied by a report from a qualified quantity surveyor providing: • a detailed calculation of the capital investment value (CIV) as defined in clause 3 of the *Environmental Planning and Assessment Regulation 2000*) of the proposal, including details of all assumptions and components from which the CIV calculation is derived; • a close estimate of the jobs that will be created during the construction and operational phases of the proposed development; and • certification that the information provided is accurate at the date of preparation.
Key issues	The EIS must address the following specific matters: • **Consolidation of Operations** – including: - a clear description, including figures and plans, of Borg's existing and proposed operations which would apply to any new SSD consent; and - details of how any new SSD consent and any existing development consents for the site would interact, including any conditions that may no longer apply. • **Strategic Context** – including: - justification for the proposed development and suitability of the site; and - demonstration that the proposed development is generally consistent with all relevant planning strategies including but not limited to, the *Oberon Local Environmental Plan 2013*, *State Environmental Planning Policy (Infrastructure) 2012* and relevant Development Control Plans (DCPs). • **Noise and Vibration** – including: - description of all potential noise and vibration sources generated from construction, operational and traffic noise; - a quantitative assessment of noise and vibration impacts to surrounding receivers from existing on-site activities and the proposed development in accordance with the relevant Environment Protection Authority (EPA) Guidelines; and - details of mitigation, management and monitoring measures for preventing and/or minimising noise emissions. • **Air Quality** – including: - a description of all potential air emission and odour sources; - a quantitative assessment of the air quality (particularly dust and formaldehyde) impacts of the proposed development on surrounding receivers in accordance with relevant EPA Guidelines; and - details of mitigation, management and monitoring measures for preventing and/or minimising emissions.

	• **Traffic and Access** – including: - accurate predictions of the traffic volumes likely to be generated during construction and operation; - consideration of the existing traffic generated by the existing operation; - a detailed traffic impact study of the proposed development in accordance with RMS Guidelines including: o hours and days of construction and operation and how the operations will interact with other road users; and o road transport volumes and types broken down into origin and destination, travel routes and peak hours for the construction and operation of the proposed development. - proposed access arrangements for the proposed development; and - layout of the internal road network, parking facilities and infrastructure within the site boundary. • **Soils and Water** – including: - a detailed assessment of potential soil, surface, flooding and groundwater impacts (both quality and quantity); - soil and groundwater contamination arising from previous uses on the site and any proposed management measures; - a detailed and consolidated site water balance for the proposed development; - details of water proposed to be taken from each water and groundwater source and how this relates to any relevant water sharing plans; - an assessment of any volumetric water licensing requirements (including those for ongoing water intake during operation); - description of proposed erosion and sediment controls during construction and operation; - description of the surface and stormwater management system, including on-site detention, and measures to use and reuse water; and - demonstration that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary. • **Hazards and Risk** – including: - a preliminary risk screening completed in accordance with *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* and Applying SEPP 33, with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the proposal; - a Preliminary Hazard Analysis (PHA), should a preliminary screening indicate that the project is 'potentially hazardous'. The PHA must be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis* (DoP, 2011) and *Multi Level Risk Assessment* (DoP, 2011); and - justification for whether the whole site should be considered a major hazards facility. • **Waste Management** – including: - details of the quantities and classification of all waste streams to be generated on site;

	- details of waste storage, handling and disposal; and - identification of all waste streams that are proposed to be brought to site (for alternative fuel purposes) and identification of the appropriate waste legislative framework under which it is permissible to import this waste on to site (e.g resource recovery exemptions); and - details of measures that would be implemented for treatment and disposal in accordance with the relevant EPA guidelines. • **Visual Amenity** – including an assessment of the potential visual impacts of the proposed development on the amenity of the surrounding area; • **Greenhouse Gas** – including an assessment of the potential greenhouse gas emissions of the proposed development. • **Biodiversity** – including an assessment of biodiversity impacts arising from the proposed expansion of the facility in accordance with the Framework for Biodiversity Assessment or relevant Office of Environment and Heritage guidelines. • **Heritage and Aboriginal Cultural Heritage** – including an assessment of potential heritage impacts of the proposed development. • **Cumulative** – including the existing on-site operations, all existing industrial facilities in the area and other nearby approved and proposed developments, particularly in relation to noise, air quality, soil, water, traffic, waste and hazards and risk.
Plans and Documents	The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*. These documents should be included as part of the EIS rather than as separate documents.
Consultation	During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular you must consult with: • Oberon Shire Council; • Environment Protection Authority; • Roads and Maritime Services; • Office of Environment and Heritage; • NSW Fire and Rescue; • NSW Office of Water; • NSW Department of Primary Industries; • WorkCover; and • the local community and stakeholders. The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided
Further consultation after 2 years	If you do not lodge a development application and EIS for the development within two years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.

References	The assessment of the key issues listed above must take into account relevant guidelines, policies, and plans as identified. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.

ATTACHMENT 1

Technical and Policy Guidelines

The following guidelines may assist in the preparation of the Environmental Impact Statement. This list is not exhaustive and not all of these guidelines may be relevant to your proposal.

Many of these documents can be found on the following websites:
http://www.planning.nsw.gov.au
http://www.bookshop.nsw.gov.au
http://www.publications.gov.au

Policies, Guidelines & Plans	
Plans and Documents	
	The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the Environmental Planning and Assessment Regulation 2000. Provide these as part of the EIS rather than as separate documents. In addition, the EIS must include the following: 1. An existing site survey plan drawn at an appropriate scale illustrating: • the location of the land, boundary measurements, area (sq.m) and north point; • the existing levels of the land in relation to buildings and roads; • location and height of existing structures on the site; • location and height of adjacent buildings and private open space; and • all levels to be to Australian Height Datum (AHD). 2. A locality/context plan drawn at an appropriate scale should be submitted indicating: • significant local features such as heritage items; • the location and uses of existing buildings, shopping and employment areas; and • traffic and road patterns, pedestrian routes and public transport nodes. 3. Drawings at an appropriate scale illustrating: • detailed plans, sections and elevations of the existing building, which clearly show all proposed internal and external alterations and additions.
Documents to be Submitted	
	Documents to submit include: • 1 hard copy and 1 electronic copy of all the documents and plans for review prior to exhibition; and • Other copies as determined by the Department once the development application is lodged

Hazards and Risk	
	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
	Applying SEPP 33 – Hazardous and Offensive Development Application Guidelines (DUAP)
	Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis
	AS/NZS 4360:2004 Risk Management (Standards Australia)
	HB 203: 203:2006 Environmental Risk Management – Principles & Process (Standards Australia)
	Hazardous Industry Planning Advisory Paper No 3 – Risk Assessment
	Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning
	Hazardous Industry Planning Advisory Paper No 6 – Hazard Analysis
	Hazardous Industry Planning Advisory Paper No 10 – Land Use Safety Planning
	Multi-level Risk Assessment Guideline
Traffic	
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RTA)
Soil and Water	
Soil	Managing Urban Stormwater: Soils & Construction (Landcom)
	Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC & NHMRC)
	National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC)
	State Environmental Planning Policy No. 55 – Remediation of Land
	Managing Land Contamination - Planning Guidelines SEPP 55 – Remediation of Land (DUAP and EPA)
Surface Water	National Water Quality Management Strategy: Water quality management - an outline of the policies (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Policies and principles - a reference document (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Implementation guidelines (ANZECC/ARMCANZ)
	National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (EPA, 2006)
	State Water Management Outcomes Plan
	NSW Government Water Quality and River Flow Environmental Objectives (DECC)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC)
	Sorting and Handling Liquids: Environmental Protection – Participants Manual (DECC)
	Managing Urban Stormwater: Council Handbook. Draft (EPA)
	Managing Urban Stormwater: Treatment Techniques (EPA, 1997)
	Managing Urban Stormwater: Source Control. Draft (EPA)
	Managing Urban Stormwater: Soils & Construction (Landcom, 2004)
	Technical Guidelines: Bunding & Spill Management (DECC)

Groundwater	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC, 1995)
	NSW State Groundwater Policy Framework Document (DLWC, 1997)
	NSW State Groundwater Quality Protection Policy (DLWC, 1998)
	NSW State Groundwater Dependent Ecosystems Policy (DLWC, 2002)
Waste	
	NSW Waste Avoidance and Resource Recovery Strategy 2014-21 (EPA, 2014)
	Waste Classification Guidelines (EPA)
	Environmental Guidelines: Assessment Classification and Management of Non-Liquid and Liquid Waste (NSE EPA)
Air Quality	
	Protection of the Environment Operations (Clean Air) Regulation 2010
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2005)
	Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA, 2005)
	Action for Air (DECC)
	Assessment and Management of Odour from Stationary Sources in NSW (EPA, 2006)
Odour	
	Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DEC)
	Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DEC)
Noise and Vibration	
	NSW Industrial Noise Policy (EPA, 2000) and Industrial Noise Policy Application Notes
	NSW Road Noise Policy (EPA, 2011)
	Environmental Noise Control Manual (DECC)
	Assessing Vibration: a Technical Guide (EPA, 2006)
	Interim Construction Noise Guidelines (EPA, 2009)
Greenhouse Gas	
	AGO Factors and Methods Workbook (AGO)
	Guidelines for Energy Savings Action Plans (DEUS, 2005)
Visual	
	Control of Obtrusive Effects of Outdoor Lighting (Standards Australia, AS 4282)
	State Environmental Planning Policy No 64 - Advertising and Signage
Biodiversity	
	NSW Biodiversity Offsets Policy for Major Projects (OEH, 2013)
	Framework for Biodiversity Assessment (OEH, 2013)
Aboriginal Cultural Heritage	
	Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010)
	Code of Practice for the Archaeological Investigation of Aboriginal Objects in NSW (DECCW, 2010)
	Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW (OEH, 2011)

ATTACHMENT 2
Agency Input into Key Assessment Issues

Pamela Morales

From: Gary Wallace <Gary.Wallace@oberon.nsw.gov.au>
Sent: Tuesday, 19 May 2015 4:46 PM
To: Pamela Morales
Subject: RE: Request for SEARs input (SSD 7016) - Borg Panels Timber Panel Processing Facility, Oberon - Oberon LGA

Pamela

I refer to your email in relation to the SEARS for the proposed Borg extension at its current facility in Oberon. It is advised that Council staff have met with representatives of Borgs in relation to the proposal and have investigated the documentation forwarded by the applicant.

It is advised that a local clause within the Oberon LEP 2013 relates to an industrial noise buffer around Oberon. As part of any EIS prepared Council would request information in compliance with the current Industrial noise buffer standards from the proposed development.

Council looks forward to reviewing any application for extensions to the existing Borg development.

Regards

Gary .

Gary Wallace
Planning & Development Director

OBERON Celebrating 150 Years 1863-2013

OBERON COUNCIL

Oberon Council
Phone : +61 2 63298122
Fax : +61 2 63298142
Email : gary.wallace@oberon.nsw.gov.au
Website : www.oberon.nsw.gov.au

Please consider the environment before printing this email

From: Pamela Morales [mailto:pamela.morales@planning.nsw.gov.au]
Sent: Friday, 24 April 2015 3:52 PM
To: planning.matters@environment.nsw.gov.au; Development Western; council; landuse.enquiries@dpi.nsw.gov.au; BFS
Cc: water.referrals@dpi.nsw.gov.au; Gary Wallace; Andrew Helms
Subject: Request for SEARs input (SSD 7016) - Borg Panels Timber Panel Processing Facility, Oberon - Oberon LGA

Hello,

The Department has received a request for Secretary's Environmental Assessment Requirements (SEARs) from Borgs Panels Pty Ltd for the proposed expansion to its existing timber panel processing facility at Lowes Mount Road, Oberon LGA (SSD 7016).

The proposal is State Significant Development as it is development for the purposes of timber milling, timber processing, paper and pulp processing that has a capital investment value of more than $30,000,000.

Please find attached the documentation lodged with the request to assist in providing input for the SEARs.

It would be greatly appreciated if you can provide comments and nominate any issues to be addressed in the EIS for the proposal by **COB Monday 11 May 2015.**

If you have any questions, please do not hesitate to contact me.

Regards,

Pamela Morales
Planning Officer
Industry Assessments
Department of Planning & Environment
23-33 Bridge Street SYDNEY NSW 2000 | GPO Box 39 SYDNEY NSW 2001
T 02 9228 6386 | E Pamela.Morales@planning.nsw.gov.au

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NSW EPA

Your reference :
Our reference : EF13/3921; DOC15/136409-01
Contact : Mr Andrew Helms; (02) 6332 7604

Mr Chris Ritchie
Manager – Industry Assessments
Department of Planning & Infrastructure
GPO Box 39
SYDNEY, NSW, 2001

Attention: Ms Pamela Morales

6 May 2015

Dear Mr Ritchie

OBERON TIMBER PANEL PROCESSING FACILITY (SSD 7016)
EPA SECRETARY ENVIRONMENTAL ASSESSMENT REQUIREMENTS

I refer to an email from Ms Pamela Morales of the Department of Planning & Environment to the Environment Protection Authority (EPA), dated 24 April 2015, seeking Secretary Environmental Assessment Requirements for an Environment Impact Assessment for the proposed extensions and modifications to the Borg Panel's Oberon facility (SSD No. 7016).

The EPA has reviewed the document titled "*Borg Panels – Request for Secretary's Environmental Assessment Requirements – Timber Panel Processing Facility – April 2015*", that accompanied the abovementioned email, and has identified the information that it requires to adequately assess the proposal in Attachment A. General Guidance material is provided in Attachment B. In summary, the EPA's key information requirements for the proposal include an adequate assessment of:

- Air quality impacts;
- Noise impacts;
- Water Management including site water management;
- Management of chemicals & wastes.

Should you have any further enquiries in relation to this matter please contact Mr Andrew Helms at the Central West Regional Office (Bathurst) of the EPA by telephoning (02) 6332 7604.

Yours sincerely

DARRYL CLIFT
Head Central West Unit
Environment Protection Authority

Enclosures: Attachment A – EPA's requirements for EIS
Attachment B – General Guidance Material

PO Box 1388 Bathurst NSW 2795
Level 2, 203 – 209 Russell Street Bathurst NSW 2795
Tel: (02) 6332 7600 Fax: (02) 6332 7630
ABN 43 692 285 758
www.epa.nsw.gov.au

ATTACHMENT A

EPA's RECOMMENDED SECRETARY ENVIRONMENTAL ASSESSMENT REQUIREMENTS (May 2015)

1. Environmental impacts of the project

Environmental Impact Statements (EIS) should address the specific requirements outlined under each heading below and assess impacts in accordance with the relevant guidelines mentioned. A full list of guidelines is provided in **Attachment B**.

2. Air issues

The EIS should include a detailed air quality impact assessment (AQIA). The AQIA must:

1. Identify all potential discharges of fugitive and point source emissions of pollutants, including dust and formaldehyde, for all stages of the proposal and assess the risk associated with those emissions. All processes that could result in air emissions must be identified and described. Sufficient detail to accurately communicate the characteristics and quantity of all emissions must be provided. Assessment of risk relates to environmental harm, risk to human heath and amenity.
2. Justify the level of assessment undertaken on the basis of risk factors, including but not limited to:
   a. proposal location;
   b. characteristics of the receiving environment; and
   c. type and quantity of pollutants emitted.
3. Describe the receiving environment in detail. The proposal must be contextualised within the receiving environment (local, regional and inter-regional as appropriate). The description must include but need not be limited to:
   a. meteorology and climate;
   b. topography;
   c. surrounding land-use; receptors; and
   d. ambient air quality.
4. Include a consideration of 'worst case' emission scenarios and impacts at proposed emission limits.
5. Account for cumulative impacts associated with existing emission sources as well as any currently approved developments linked to the receiving environment.
6. Include air dispersion modelling where there is a risk of adverse air quality impacts, or where there is sufficient uncertainty to warrant a rigorous numerical impact assessment. Air dispersion modelling must be conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005) http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf.
7. Demonstrate the proposal's ability to comply with the relevant regulatory framework, specifically the *Protection of the Environment Operations (POEO) Act (1997)* and the *POEO (Clean Air) Regulation (2010).*
8. Provide an assessment of the project in terms of the priorities and targets adopted under the NSW State Plan 2010 and its implementation plan Action for Air.
9. Detail emission control techniques/practices that will be employed by the proposal.

3. Noise

In relation to noise, the following matters must be addressed (where relevant) as part of the Environmental Assessment.

1. Construction noise associated with the proposed development should be assessed using the *Interim Construction Noise Guideline* (DECC, 2009). (http://www.epa.nsw.gov.au/resources/noise/09265cng.pdf).
2. Operational noise from all industrial activities to be undertaken on the premises should be assessed using the guidelines contained in the *NSW Industrial Noise Policy* (EPA, 2000) and *Industrial Noise Policy Application Notes.* (http://www.epa.nsw.gov.au/resources/noise/ind_noise.pdf and http://www.epa.nsw.gov.au/noise/ applicnotesindustnoise.htm).
3. Noise on public roads from increased road traffic generated by project should be assessed using the guidelines contained in the *NSW Road Noise Policy* (EPA, 2011). (http://www.epa.nsw.gov.au/resources/noise/2011236nswroadnoisepolicy.pdf)

The noise assessment must include a statement on the likely contribution to the local noise environment of the proposed additional plant and equipment and whether the existing noise limits on the premises' Environment Protection Licence (No. 3035) can be achieved.

4. Waste, chemicals and hazardous materials and radiation

The EIS must:

1. Identify, characterise and classify all waste that will be generated onsite as a result of both the construction of the proposed development and the ongoing operations of the facility and provide information of how this material will be stored, classified and disposed of.
2. Identify all waste streams that are proposed to be brought on to the site (for alternative fuel purposes) and identify the appropriate waste legislative framework under which it is permissible to import this waste on to site (e.g. resource recovery exemptions).

5. Water and soils

5.1 Soil issues

The EIS must include:

1. An assessment of potential impacts on soil and land resources should be undertaken, being guided by *Soil and Landscape Issues in Environmental Impact Assessment* (DLWC 2000). The nature and extent of any significant impacts should be identified. Particular attention should be given to:
   a. Soil erosion and sediment transport - in accordance with *Managing urban stormwater: soils and construction,* vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; B Waste landfills; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC 2008).
2. A description of the mitigation and management options that will be used to prevent, control, abate or minimise identified soil and land resource impacts associated with the project. This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

5.2 Water Issues

The EIS must:

1. Describe water usage for the proposal including the position of any intakes and discharges, volumes, water quality and frequency of all water discharges.
2. Demonstrate that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.
3. Where relevant include a water balance for the development including water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.
4. Describe existing surface and groundwater quality. An assessment needs to be undertaken for any water resource likely to be affected by the proposal.
5. Describe the nature and degree of impact that any proposed discharges will have on the receiving environment.
6. Describe how stormwater will be managed both during and after construction.
7. Describe how predicted impacts will be monitored and assessed over time.

ATTACHMENT B: EPA GUIDANCE MATERIAL

Title	Web address
Relevant Legislation	
Contaminated Land Management Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+140+1997+cd+0+N
Environmentally Hazardous Chemicals Act 1985	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+14+1985+cd+0+N
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Licensing	
EPA Guide to Licensing	http://www.epa.nsw.gov.au/resources/licensing/09719licenceguideA.pdf
Air Issues	
Air Quality	
Approved methods for modelling and assessment of air pollutants in NSW (2005)	http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf
POEO (Clean Air) Regulation 2002	http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+642+2002+cd+0+N
Noise and Vibration	
Interim Construction Noise Guideline (DECC, 2009)	http://www.epa.nsw.gov.au/resources/noise/09265cng.pdf
Assessing Vibration: a technical guideline (DEC, 2006)	http://www.epa.nsw.gov.au/resources/noise/vibrationguide0643.pdf
Australian and New Zealand Environment Council – Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZEC, 1990)	http://www.epa.nsw.gov.au/resources/noise/ANZECBlasting.pdf
Industrial Noise Policy Application Notes	http://www.epa.nsw.gov.au/noise/applicnotesindustnoise.htm
NSW Road Noise Policy (2011)	http://www.epa.nsw.gov.au/resources/noise/2011236nswroadnoisepolicy.pdf
Rail Infrastructure Noise Guideline (EPA, 2013)	http://www.epa.nsw.gov.au/resources/noise/20130018eparing.pdf

Title	Web address
Waste, Chemicals and Hazardous Materials and Radiation	
Waste	
Environmental Guidelines: Solid Waste Landfills (EPA, 1996)	http://www.epa.nsw.gov.au/resources/waste/envguidlns/solidlandfill.pdf
Draft Environmental Guidelines - Industrial Waste Landfilling (April 1998)	http://www.epa.nsw.gov.au/resources/waste/envguidlns/industrialfill.pdf
Waste Classification Guidelines (DECC, 2009)	http://www.epa.nsw.gov.au/resources/waste/091216classifywaste.pdf
EPA Resource recovery exemptions	http://www.epa.nsw.gov.au/waste/RRecoveryExemptions.htm
Water and Soils	
Soils – general	
Soil and Landscape Issues in Environmental Impact Assessment (DLWC 2000)	http://www.shop.nsw.gov.au/pubdetails.jsp?publication=839
Managing urban stormwater: soils and construction, vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; B Waste landfills; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC 2008)	Vol 1 - Available for purchase at http://www.shop.nsw.gov.au/pubdetails.jsp?publication=11533 Vol 2 - http://www.environment.nsw.gov.au/resources/stormwater/08208soilsconststorm2e.pdf
Landslide risk management guidelines	http://www.australiangeomechanics.org/resources/downloads/
Site Investigations for Urban Salinity (DLWC, 2002)	http://www.environment.nsw.gov.au/resources/salinity/booklet3siteinvestigationsforurbansalinity.pdf
Local Government Salinity Initiative Booklets	http://www.environment.nsw.gov.au/salinity/solutions/urban.htm
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	http://www.environment.gov.au/system/files/resources/53cda9ea-7ec2-49d4-af29-d1dde09e96ef/files/nwqms-guidelines-4-vol1.pdf
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

NSW GOVERNMENT | Department of Primary Industries

OUT15/11177

Ms Pamela Morales
Industry Assessments
NSW Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

Pamela.Morales@planning.nsw.gov.au

Dear Ms Morales,

Borg Timber Panel Processing Facility, Oberon [SSD_7016]
Request for input into Secretary's Environmental Assessment Requirements

I refer to your email dated 24 April 2015 to the Department of Primary Industries in respect to the above matter.

Comment by NSW Office of Water
The NSW Office of Water (Office of Water) has reviewed the supporting documentation accompanying the request for Secretary's Environmental Assessment Requirements (SEARs) and provides the comments below, and further detail in **Attachment A**.

It is recommended that the EIS be required to include:

- Details of water proposed to be taken (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan.
- Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).
- The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased.
- A detailed and consolidated site water balance.
- Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts.
- Full technical details and data of all surface and groundwater modelling.

- Proposed surface and groundwater monitoring activities and methodologies.
- Assessment of any potential cumulative impacts on water resources, and any proposed options to manage the cumulative impacts.
- Consideration of relevant policies and guidelines.
- A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table).

For further information please contact Tim Baker, Senior Water Regulation Officer (Dubbo Office) on 6841 7403 or at tim.baker@water.nsw.gov.au.

Fisheries NSW and Agriculture NSW advise no issues.

Yours sincerely

Kristian Holz
Director Policy, Legislation and Innovation

Attachment A

Borg Timber Panel Processing Facility, Oberon [SSD_7016]
Request for Input into Secretary's Environmental Assessment Requirements
Additional Comment by the NSW Office of Water

The following detailed assessment requirements are provided to assist in adequately addressing the assessment requirements for this proposal.

For further information visit the NSW Office of Water website, www.water.nsw.gov.au

Key Relevant Legislative Instruments

This section provides a basic summary to aid proponents in the development of an Environmental Impact Statement (EIS), and should not be considered a complete list or comprehensive summary of relevant legislative instruments that may apply to the regulation of water resources for a project.

The EIS should take into account the objects and regulatory requirements of the *Water Act 1912* (WA 1912) and *Water Management Act 2000* (*WMA 2000*), and associated regulations and instruments, as applicable.

Water Management Act 2000 (WMA 2000)
Key points:

- Volumetric licensing in areas covered by water sharing plans,
- Works within 40m of waterfront land,
- SSD & SSI projects are exempt from requiring water supply work approvals and controlled activity approvals as a result of the *Environmental Planning & Assessment Act 1979 (EP&A Act)*,
- No exemptions for volumetric licensing apply as a result of the *EP&A Act*,
- Basic landholder rights, including harvestable rights dams,
- Aquifer interference activity approval and flood management work approval provisions have not yet commenced and are regulated by the *Water Act 1912,*
- Maximum penalties of $2.2 million plus $264,000 for each day an offence continues apply under the *WMA 2000.*

Water Act 1912 (WA 1912)
Key points:

- Volumetric licensing in areas where no water sharing plan applies,
- Monitoring bores,
- Aquifer interference activities that are not regulated as a water supply work under the *WMA 2000*,
- Flood management works,
- No exemptions apply to licences or permits under the *WA 1912* as a result of the *EP&A Act*,
- Regulation of water bore driller licensing.

Water Management (General) Regulation 2011
Key points:

- Provides various exemptions for volumetric licensing and activity approvals,
- Provides further detail on requirements for dealings and applications.

Water Sharing Plans – these are considered regulations under the *WMA 2000*

Access Licence Dealing Principles Order 2004

Harvestable Rights Orders

Water Sharing Plans

The proposal is located within the area covered by the Water Sharing Plan for the Macquarie Bogan Unregulated and Alluvial Water Sources 2012 and the Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Water Sources 2011. The EIS is required to:

- Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection (including groundwater dependent ecosystems), water quality and surface-groundwater connectivity.
- Provide a description of any site water use (amount of water to be taken from each water source) and management including all sediment dams, clear water diversion structures with detail on the location, design specifications and storage capacities for all the existing and proposed water management structures.
- Provide an analysis of the proposed water supply arrangements against the rules for access licences and other applicable requirements of any relevant WSP, including:
    - Sufficient market depth to acquire the necessary entitlements for each water source.
    - Ability to carry out a "dealing" to transfer the water to relevant location under the rules of the WSP.
    - Daily and long-term access rules.
    - Account management and carryover provisions.
- Provide a detailed and consolidated site water balance.
- Further detail on licensing requirements is provided below.

Relevant Policies and Guidelines

The EIS should take into account the following policies (as applicable):

- NSW Guidelines for Controlled Activities on Waterfront Land (NOW, 2012)
- NSW Aquifer Interference Policy (NOW, 2012)
- Risk Assessment Guidelines for Groundwater Dependent Ecosystems (NOW, 2012)
- Australian Groundwater Modelling Guidelines (NWC, 2012)
- NSW State Rivers and Estuary Policy (1993)
- NSW State Groundwater Policy Framework Document (1997)
- NSW State Groundwater Quality Protection Policy (1998)
- NSW State Groundwater Dependent Ecosystems Policy (2002)
- NSW Water Extraction Monitoring Policy (2007)

Office of Water policies can be accessed at the following links:
http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/default.aspx
http://www.water.nsw.gov.au/Water-licensing/Approvals/Controlled-activities/default.aspx

An assessment framework for the NSW Aquifer Interference Policy can be found online at: http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference.

Licensing Considerations

The EIS is required to provide:

- Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site – such as evaporative loss from open voids or inflows).
- Details of the water supply source(s) for the proposal including any proposed surface water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water.
- Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc).
- Information on the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions, etc).
- Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licensing.
- Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages
- Details on the location, purpose, size and capacity of any new proposed dams/storages.
- Applicability of any exemptions under the *Water Management (General) Regulation 2011* to the project.

Water allocation account management rules, total daily extraction limits and rules governing environmental protection and access licence dealings also need to be considered.

The Harvestable Right gives landholders the right to capture and use for any purpose 10% of the average annual runoff from their property. The Harvestable Right has been defined in terms of an equivalent dam capacity called the Maximum Harvestable Right Dam Capacity (MHRDC). The MHRDC is determined by the area of the property (in hectares) and a site-specific run-off factor. The MHRDC includes the capacity of all existing dams on the property that do not have a current water licence. Storages capturing up to the harvestable right capacity are not required to be licensed but any capacity of the total of all storages/dams on the property greater than the MHRDC may require a licence.

For more information on Harvestable Right dams, including a calculator, visit:
http://www.water.nsw.gov.au/Water-licensing/Basic-water-rights/Harvesting-runoff/Harvesting-runoff

Dam Safety

Where new or modified dams are proposed, or where new development will occur below an existing dam, the NSW Dams Safety Committee should be consulted in relation to any safety issues that may arise. Conditions of approval may be recommended to ensure safety in relation to any new or existing dams.

See www.damsafety.nsw.gov.au for further information.

Surface Water Assessment

The predictive assessment of the impact of the proposed project on surface water sources should include the following:

- Identification of all surface water features including watercourses, wetlands and floodplains transected by or adjacent to the proposed project.
- Identification of all surface water sources as described by the relevant water sharing plan.
- Detailed description of dependent ecosystems and existing surface water users within the area, including basic landholder rights to water and adjacent/downstream licensed water users.
- Description of all works and surface infrastructure that will intercept, store, convey, or otherwise interact with surface water resources.
- Assessment of predicted impacts on the following:
    - flow of surface water, sediment movement, channel stability, and hydraulic regime,
    - water quality,
    - flood regime,
    - dependent ecosystems,
    - existing surface water users, and
    - planned environmental water and water sharing arrangements prescribed in the relevant water sharing plans.

Groundwater Assessment

To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources.

Where it is considered unlikely that groundwater will be intercepted or impacted (for example by infiltration), a brief site assessment and justification for the minimal impacts may be sufficient, accompanied by suitable contingency measures in place in the event that groundwater is intercepted, and appropriate measures to ensure that groundwater is not contaminated.

Where groundwater is expected to be intercepted or impacted, the following requirements should be used to assist the groundwater assessment for the proposal.

- Works likely to intercept, connect with or infiltrate the groundwater sources.
- Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes.
- Bore construction information is to be supplied to the Office of Water by submitting a "Form A" template. The Office of Water will supply "GW" registration numbers (and licence/approval numbers if required) which must be used as consistent and unique bore identifiers for all future reporting.
- A description of the watertable and groundwater pressure configuration, flow directions and rates and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources).
- Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and GDEs to establish a baseline incorporating typical temporal and spatial variations.
- The predicted impacts of any final landform on the groundwater regime.

- The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts.
- An assessment of groundwater quality, its beneficial use classification and prediction of any impacts on groundwater quality.
- An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal).
- Measures proposed to protect groundwater quality, both in the short and long term.
- Measures for preventing groundwater pollution so that remediation is not required.
- Protective measures for any groundwater dependent ecosystems (GDEs).
- Proposed methods of the disposal of waste water and approval from the relevant authority.
- The results of any models or predictive tools used.

Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:

- Any proposed monitoring programs, including water levels and quality data.
- Reporting procedures for any monitoring program including mechanism for transfer of information.
- An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal.
- Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category).
- Description of the remedial measures or contingency plans proposed.
- Any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period.

Groundwater Dependent Ecosystems

The EIS must consider the potential impacts on any Groundwater Dependent Ecosystems (GDEs) at the site and in the vicinity of the site and:

- Identify any potential impacts on GDEs as a result of the proposal including:
  - the effect of the proposal on the recharge to groundwater systems;
  - the potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connections; and
  - the effect on the function of GDEs (habitat, groundwater levels, connectivity).
- Provide safeguard measures for any GDEs.

Watercourses, Wetlands and Riparian Land

The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal, including:

- Scaled plans showing the location of:
  - wetlands/swamps, watercourses and top of bank;
  - riparian corridor widths to be established along the creeks;

- existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);
- the site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and
- proposed location of any asset protection zones.

- Photographs of the watercourses/wetlands and a map showing the point from which the photos were taken.
- A detailed description of all potential impacts on the watercourses/riparian land.
- A detailed description of all potential impacts on the wetlands, including potential impacts to the wetlands hydrologic regime; groundwater recharge; habitat and any species that depend on the wetlands.
- A description of the design features and measures to be incorporated to mitigate potential impacts.
- Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.

Landform rehabilitation

The Environmental Impact Statement report should include:

- Justification of the proposed final landform with regard to its impact on local and regional surface and groundwater systems;
- A detailed description of how the site would be progressively rehabilitated and integrated into the surrounding landscape;
- Outline of proposed construction and restoration of topography and surface drainage features if affected by the project; and
- An outline of the measures to be put in place to ensure that sufficient resources are available to implement the proposed rehabilitation.

End Attachment A

Office of Environment & Heritage

Date	11 May 2015
Your reference:	SSD 7016
Our reference:	DOC15/144446
Contact:	Michelle Howarth (02) 6883 5339

Pamela Morales
Planning Officer
Department of Planning and Environment
GPO Box 39
SYDNEY 2001

Dear Ms Rose

RE: Borg Panels Timber Panel Processing Facility expansion

I refer to your e-mail dated 24 April 2015 seeking input into the Department of Planning and Environment Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Assessment (EIS) for the proposed expansion of the existing timber panel processing facility at Lowes Mount Road, Oberon.

The Office of Environment and Heritage (OEH) understands that the proposal involves the construction of new industrial buildings and the installation of plant to increase capacity, workforce and product range of the existing Borg facility in Oberon.

OEH has considered your request and provides SEARs for the proposed development in Attachments A and B.

OEH recommends the EIS needs to appropriately address the following, if applicable:

1. Biodiversity and offsetting
2. Aboriginal cultural heritage
3. Water and soils
4. Flooding

Please note that the NSW Biodiversity Offsets Policy for Major Projects, available at http://www.environment.nsw.gov.au/resources/biodiversity/140672biopolicy.pdf is now being implemented. The Biodiversity Offsets Policy clarifies and standardises biodiversity impact assessment and offsetting for major project approvals in NSW.

The Biodiversity Offsets Policy is underpinned by the Framework for Biodiversity Assessment (FBA), available at: http://www.environment.nsw.gov.au/resources/biodiversity/140675fba.pdf. The FBA contains the assessment methodology that is adopted by the policy to quantify and describe the impact assessment requirements and offset guidance that applies to Major Projects. The FBA must be used by a proponent to assess all biodiversity values on the development site.

If you have any questions regarding this matter further please contact Michelle Howarth on 02 68835339 or email michelle.howarth@environment.nsw.gov.au .

Yours sincerely,

SONYA ARDILL
Senior Team Leader Planning, North West Region
Regional Operations

Attachment A - Standard Environmental Assessment Requirements
Attachment B - Guidance material

Attachment A – Standard Environmental Assessment Requirements

Biodiversity
1. Biodiversity impacts related to the proposed expansion of the Borg timber panel processing facility are to be assessed and documented in accordance with the Framework for Biodiversity Assessment, unless otherwise agreed by OEH, by a person accredited in accordance with s142B(1)(c) of the *Threatened Species Conservation Act 1995.*
Aboriginal cultural heritage
2. The EIS must identify and describe the tangible and intangible Aboriginal cultural heritage values that exist across the whole area that will be affected by the expansion of the facility and document these in the EIS. This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the *Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW* (DECCW, 2011) and consultation with OEH regional officers.
3. Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS.
4. Impacts on Aboriginal cultural heritage values are to be assessed and documented in the EIS. The EIS must demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, the EIS must outline measures proposed to mitigate impacts. Any objects recorded as part of the assessment will be documented and notified to OEH.
Water and soils
5. The EIS must map the following features relevant to water and soils including: a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map). b. Rivers, streams, wetlands, estuaries (as described in Appendix 2 of the Framework for Biodiversity Assessment). c. Groundwater. d. Groundwater dependent ecosystems. e. Proposed intake and discharge locations.
6. The EIS must describe background conditions for any water resource likely to be affected by the project, including: a. Existing surface and groundwater. b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations. c. Water Quality Objectives (as endorsed by the NSW Government http://www.environment.nsw.gov.au/ieo/index.htm) including groundwater as appropriate that represent the community's uses and values for the receiving waters.

d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the ANZECC (2000) Gudielines for Fresh and Marine Water Quality and/or local objectives, criteria or targets endorsed by the NSW Government.
7. The EIS must assess the impacts of the expansion of the processing facility on water quality, including: a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the expansion protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction. b. Identification of proposed monitoring of water quality.
8. The EIS must assess the impact of the expansion on hydrology, including: a. Water balance including quantity, quality and source. b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas. c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems. d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (eg river benches). e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water. f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options. g. Identification of proposed monitoring of hydrological attributes.
Flooding and coastal erosion
9. The EIS must map the following features relevant to flooding as described in the Floodplain Development Manual 2005 (NSW Government 2005) including: a. Flood prone land b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas).
10. The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.
11. The EIS must model the effect of the proposed expansion (including fill) on the flood behaviour under the following scenarios: a. Current flood behaviour for a range of design events as identified in 8) above. The 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall

intensity of flood producing rainfall events due to climate change.
12. Modelling in the EIS must consider and document: a. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood. b. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories. c. Relevant provisions of the NSW Floodplain Development Manual 2005.
13. The EIS must assess the impacts on the proposed expansion on flood behaviour, including: a. Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure. b. Consistency with Council floodplain risk management plans. c. Compatibility with the flood hazard of the land. d. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land. e. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site. f. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses. g. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council. h. Whether the proposal incorporates specific measures to manage risk to life from flood. i. Emergency management, evacuation and access, and contingency measures for the development considering the full range or flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES. j. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

Attachment B – Guidance material

Title	Web address
Relevant Legislation	
Coastal Protection Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+13+1979+cd+0+N
Commonwealth Environment Protection and Biodiversity Conservation Act 1999	http://www.austlii.edu.au/au/legis/cth/consol_act/epabca1999588/
Environmental Planning and Assessment Act 1979	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+203+1979+cd+0+N
Fisheries Management Act 1994	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+38+1994+cd+0+N
Marine Parks Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+64+1997+cd+0+N
National Parks and Wildlife Act 1974	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
Protection of the Environment Operations Act 1997	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+156+1997+cd+0+N
Threatened Species Conservation Act 1995	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+101+1995+cd+0+N
Water Management Act 2000	http://www.legislation.nsw.gov.au/maintop/view/inforce/act+92+2000+cd+0+N
Wilderness Act 1987	http://www.legislation.nsw.gov.au/viewtop/inforce/act+196+1987+FIRST+0+N
Biodiversity	
NSW Biodiversity Offsets Policy for Major Projects (OEH, 2013)	http://www.environment.nsw.gov.au/biodivoffsets/1480biofpolmp.htm
Framework for Biodiversity Assessment (OEH, 2013)	http://www.environment.nsw.gov.au/biodivoffsets/1480biofpolmp.htm
Fisheries NSW policies and guidelines	http://www.dpi.nsw.gov.au/fisheries/habitat/publications/policies,-guidelines-and-manuals/fish-habitat-conservation
List of national parks	http://www.environment.nsw.gov.au/NationalParks/parksearchatoz.aspx
Revocation, recategorisation and road adjustment policy (OEH, 2012)	http://www.environment.nsw.gov.au/policies/RevocationOfLandPolicy.htm
Guidelines for developments adjoining land and water managed by the Department of Environment, Climate Change and Water (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/parks/policyRevocations.pdf
Aboriginal Cultural Heritage	
Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09781ACHconsultreq.pdf

Title	Web address
Code of Practice for the Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010)	http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf
Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH 2011)	http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf
Aboriginal Site Recording Form	http://www.environment.nsw.gov.au/resources/parks/SiteCardMainV1_1.pdf
Aboriginal Site Impact Recording Form	http://www.environment.nsw.gov.au/resources/cultureheritage/120558asirf.pdf
Aboriginal Heritage Information Management System (AHIMS) Registrar	http://www.environment.nsw.gov.au/contact/AHIMSRegistrar.htm
Care Agreement Application form	http://www.environment.nsw.gov.au/resources/cultureheritage/20110914TransferObject.pdf
Water and Soils	
Acid sulphate soils	
Acid Sulfate Soils Planning Maps	http://canri.nsw.gov.au/download/
Acid Sulfate Soils Manual (Stone et al. 1998)	Manual available for purchase from: http://www.landcom.com.au/whats-new/the-blue-book.aspx Chapters 1 and 2 are on DPI's Guidelines Register at: Chapter 1 Acid Sulfate Soils Planning Guidelines: http://www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Planning%20Guidelines.pdf Chapter 2 Acid Sulfate Soils Assessment Guidelines: http://www.planning.nsw.gov.au/rdaguidelines/documents/NSW%20Acid%20Sulfate%20Soils%20Assessment%20Guidelines.pdf
Acid Sulfate Soils Laboratory Methods Guidelines (Ahern et al. 2004)	http://www.derm.qld.gov.au/land/ass/pdfs/lmg.pdf This replaces Chapter 4 of the Acid Sulfate Soils Manual above.
Flooding and Coastal Erosion	
Reforms to coastal erosion management	http://www.environment.nsw.gov.au/coasts/coastalerosionmgmt.htm
Floodplain development manual	http://www.dnr.nsw.gov.au/floodplains/manual.shtml
Guidelines for Preparing Coastal Zone Management Plans	Guidelines for Preparing Coastal Zone Management Plans http://www.environment.nsw.gov.au/resources/coasts/101019GdlnsCZMPs.pdf
NSW Climate Impact Profile	NSW Climate Impact Profile
Climate Change Impacts and Risk Management	Climate Change Impacts and Risk Management: A Guide for Business and Government, AGIC Guidelines for Climate Change Adaptation
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
ANZECC (2000) Guidelines for Fresh and Marine Water Quality	http://www.mincos.gov.au/publications/australian_and_new_zealand_guidelines_for_fresh_and_marine_water_quality

Title	Web address
Applying Goals for Ambient Water Quality Guidance for Operations Officers – Mixing Zones	http://deccnet/water/resources/AWQGuidance7.pdf
Approved Methods for the Sampling and Analysis of Water Pollutant in NSW (2004)	http://www.environment.nsw.gov.au/resources/legislation/approvedmethods-water.pdf

WorkCover Authority of NSW Hazardous Chemical Services – Major Hazard Facilities
Level 4, 2 Burbank Place
Baulkham Hills NSW 2153
mhf@workcover.nsw.gov.au
WorkCover Assistance Service **13 10 50**
workcover.nsw.gov.au

Date: 21 May 2015
Our Ref: 2008/040669-03
Your Ref: 14.072

Pamela Morales
Planning Officer
Industry Assessments
Department of Planning & Environment
23-33 Bridge Street
SYDNEY NSW 2000
T 02 9228 6386

UNCLASSIFIED

Dear Pamela,

RE: BORG PANELS REQUEST FOR SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS - TIMBER PANEL PROCESSING FACILITY

Thank you for the opportunity to review and comment on the *Borg Panels - Request for Secretary's Environmental Assessment Requirements* (SEARs) and associated *Borg Panels - Addendum to SEARs,* submitted in April 2015 to the Department on behalf of Borg Panels - Timber Panels Processing Facility, Oberon.

The applicant proposes to continue to operate the existing major hazard facility (MHF) located on Lot 22, DP 1017454 (Woodchem) in isolation to the other applicant owned and controlled sites, nominated by the applicant to be included in the proposed new Development Application (DA).

Sites proposed for inclusion in the new DA include *(refer to SEARs - page 8):*

- MDF Site (owned by Borg)
- Lot 22 DP 1017454 - Woodchem (owned by Borg)
- Lot 2902 DP 10567654 (owned by Borg)
- Lot 15 DP 749692 (owned by Borg)

The development aims to increase the storage capacity and production output of Schedule 15 Hazardous Chemicals at Woodchem to facilitate the increase in production and efficiency for the whole of site, being the overall aim of the project. As a result Woodchem will be linked by ownership and business activities to the sites proposed by the new DA.

Requirement:

WorkCover NSW requires the applicant to justify the rationale for not considering the total area in the proposal as an MHF.

Note WorkCover NSW is prepared to meet with the Department and the applicant to discuss this issue if necessary.

Yours sincerely,

Andrew Battye
Team Coordinator
Dangerious Goods & Explosive Materials
WorkCover Authority of NSW

DRAWING LIST	
No.	Drawing Title
	Coversheet
DA 01	Existing Site Plan
DA 02	Site Plan Proposed
DA 03	Staging Site Plan
DA 04	Consolidation Plan
DA 05	Site Survey
DA 06	Site Demolition
DA 07	Landscape Plan
DA 08	Internal Road Network and Parking Facilities
DA 09	Site Elevations
DA 101	New Additional Swale
DA 102	Stormwater Management & Carpark
DA 103	Conveyor Awning & Carpark. Sheet 1
DA 104	Awning Over Wood Chip. Sheet 2
DA 105	Awning Over Wood Chip. Sheet 3
DA 201	Detail Plan Stage 2
DA 210	Materials Handling Sheet 1
DA 211	Materials Handling Sheet 2
DA 220	Silos. Sheet 1
DA 221	Silos. Sheet 2
DA 222	Silos. Sheet 3
DA 223	Silos. Sheet 4
DA 230	Flakers Building. Sheet 1
DA 231	Flakers Building. Sheet 2
DA 232	Flakers Building. Sheet 3
DA 240	Log Store/Load, Debarker,Chipper. Sheet 1
DA 241	Log Store/Load, Debarker,Chipper. Sheet 2
DA 242	Log Store/Load, Debarker,Chipper. Sheet 3
DA 243	Log Store/Load, Debarker,Chipper. Sheet 4
DA 250	Air Graders, Screening. Sheet 1
DA 251	Air Graders, Screening. Sheet 2
DA 252	Air Graders, Screening. Sheet 3
DA 260	Burner & Dryer. Sheet 1
DA 261	Burner & Dryer. Sheet 2
DA 270	Press Building. Sheet 1
DA 271	Press Building. Sheet 2
DA 272	Press Building. Sheet 3
DA 273	Press Building. Sheet 4
DA 274	Press Building. Sheet 5
DA 275	Press Building. Sheet 6
DA 276	Press Building. Sheet 7
DA 280	Retaining Wall, Hardstand & Gatehouse
DA 281	New Administration Building
DA 282	New Gatehouse
DA 290	New Additional Sander
DA 301	Detail Plan Stage 3
DA 310	Automated Storage. Sheet 1
DA 311	Automated Storage. Sheet 2
DA 312	Automated Storage. Sheet 3
DA 313	Automated Storage. Sheet 4
DA 320	Extension to Production Buildings
DA 330	Laminating Line
DA 340	Paper Impregnating Lines
DA 401	Log Storage, Debarker & Chipper. Sheet 1
DA 402	Log Storage, Debarker & Chipper. Sheet 2

BORG CONSTRUCTION

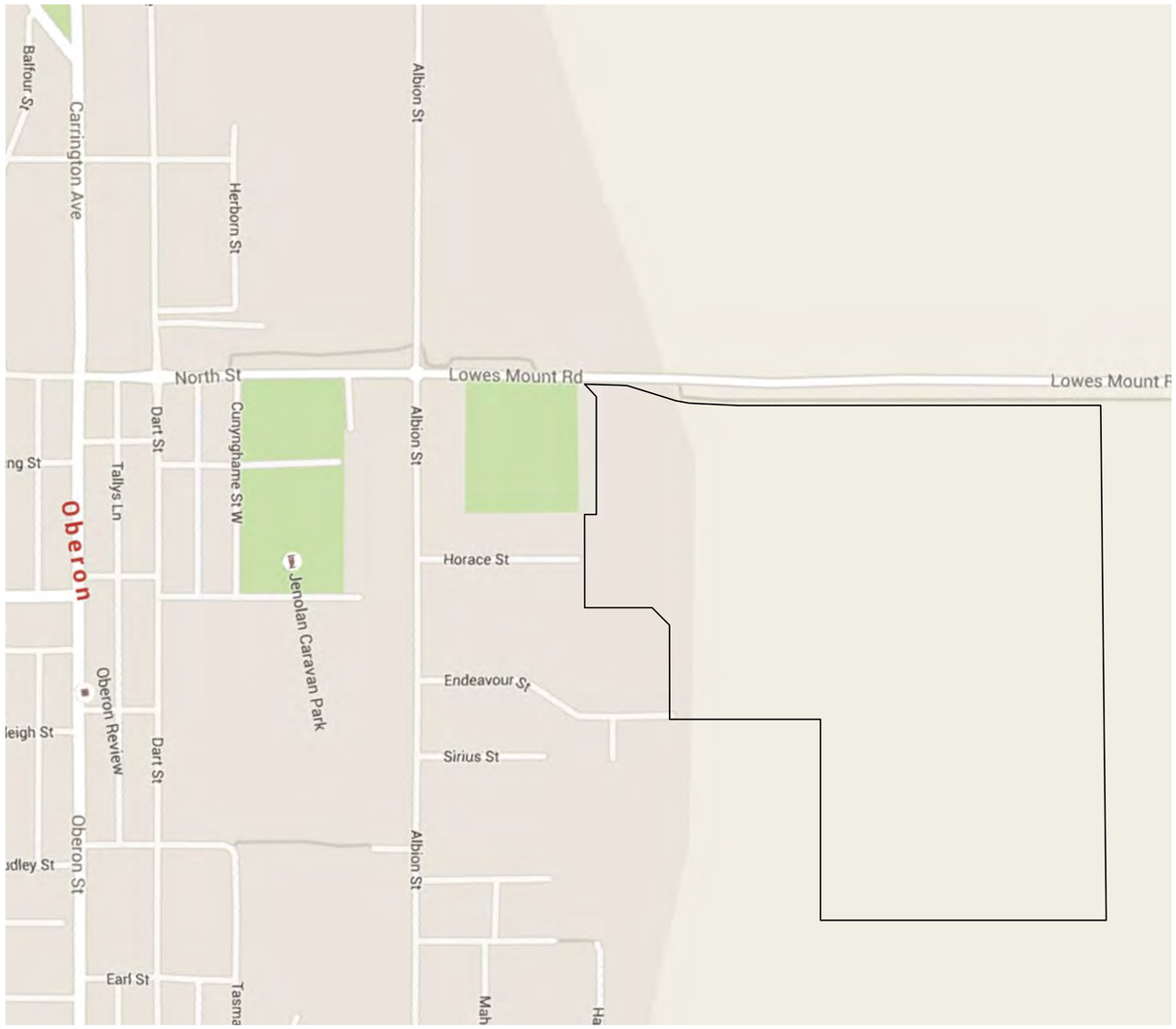
DEVELOPMENT APPLICATION

FOR THE

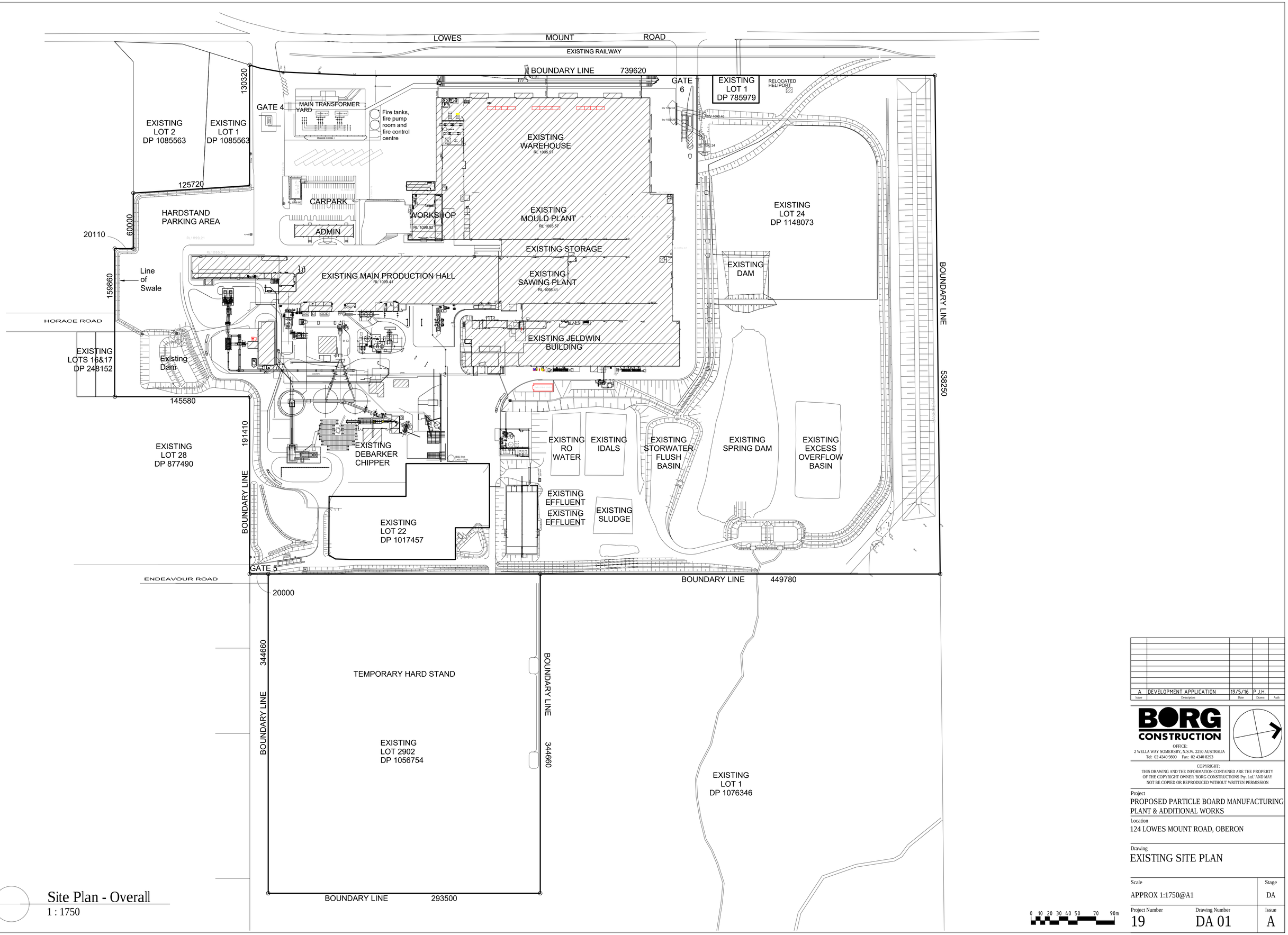
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS

TO THE EXISTING BORG PANELS MANUFACTURING FACILITY

AT 124 LOWES MOUNT ROAD, OBERON



LOCATION MAP



Site Plan - Overall

1 : 1750

0 10 20 30 40 50 70 90m

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H	

BORG CONSTRUCTION

OFFICE:
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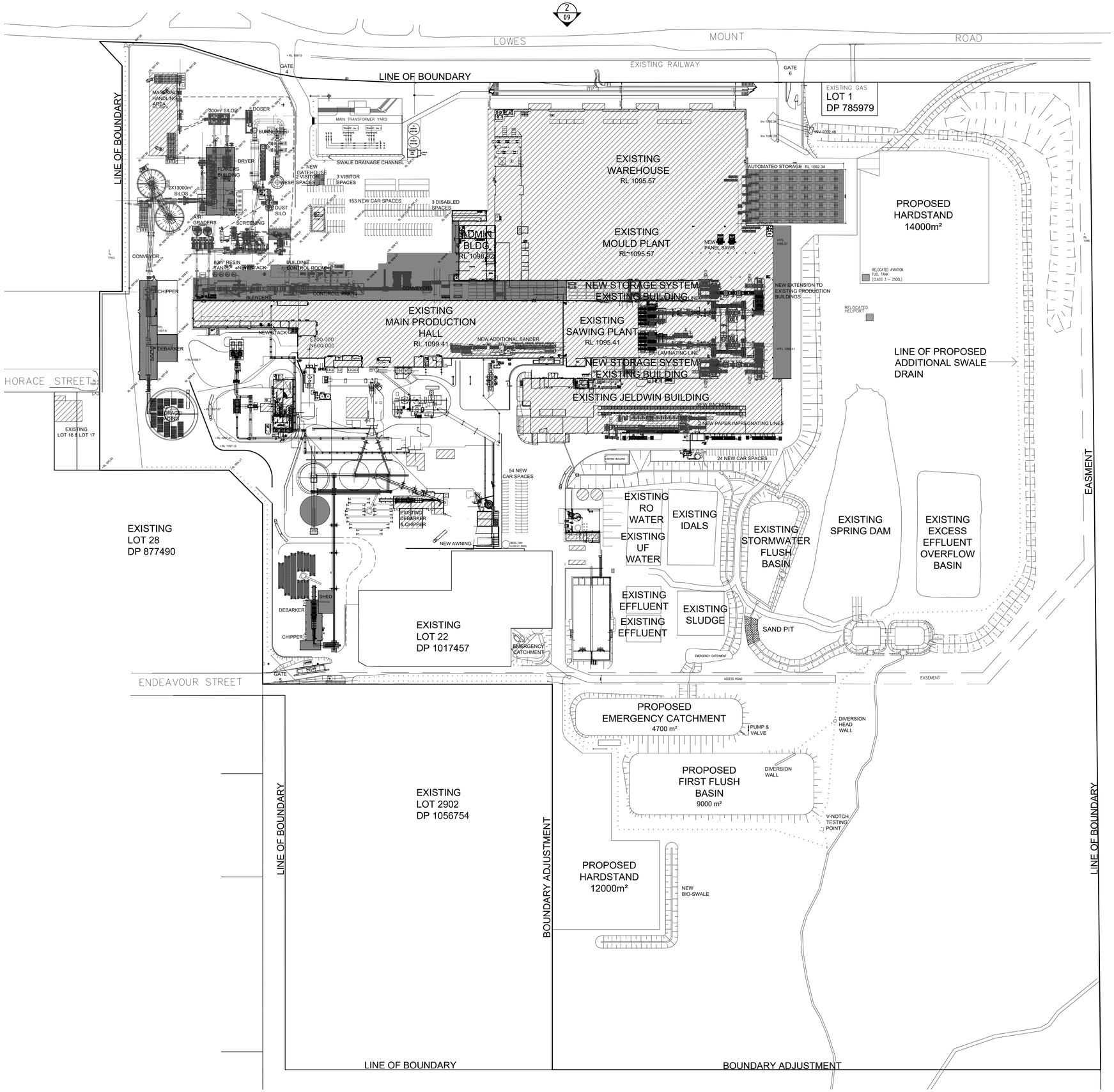
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON

Drawing
EXISTING SITE PLAN

Scale	Stage
APPROX 1:1750@A1	DA

Project Number	Drawing Number	Issue
19	DA 01	A



NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DA 04 CONSOLIDATION PLAN FOR DETAIL

REFER TO KEY PLAN FOR REFERENCES TO DOCUMENTATION OF NEW WORKS

LEGEND:

- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- NEW SWALE
- NEW PIPE
- VALVE

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE PLAN

Scale
APPROX 1:1750 (@ A1)

Stage
DA

Project Number
19

Drawing Number
DA 02

Issue
A

0 10 20 30 40 50 70 90m

NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER TO DA04 CONSOLIDATION PLAN FOR DETAIL

DO NOT RELY ON THIS DRAWING FOR ANYTHING OTHER THAN REFERENCES TO DOCUMENTATION SERIES (SEE SITE PLAN)

LEGEND:

EXISTING BUILDINGS

PROPOSED NEW BUILDINGS

LOWES MOUNT ROAD

EXISTING RAILWAY

301

201

401

101

LINE OF BOUNDARY

EXISTING LOT 1 DP 785979

EXISTING LOT 28 DP 877490

EXISTING LOT 22 DP 1017457

EXISTING LOT 2902 DP 1056754

HORACE STREET

ENDEAVOUR STREET

GATE 4

GATE 2

GATE 1

MAIN TRANSFORMER YARD

SWALE DRAINAGE CHANNEL

NEW GATEHOUSE 2 VISITOR SPACES

3 VISITOR SPACES

153 NEW CAR SPACES

3 DISABLED SPACES

MATERIAL HANDLING AREA

300m³ SILOS

DOZER

BURNER

DRYER

FLAKERS BUILDING

2X1300m³ SILOS

DUST SILO

AIR GRADERS

SCREENING

CONVEYOR

80m³ RESIN TANKS

NEW STACK

BUILDING CONTROL ROOM

CHIPPER

BLENDERS

CONTINUOUS PRESS

DEBARKER

LOG GRADE LOADING

EXISTING WAREHOUSE RL 1095.57

EXISTING MOULD PLANT RL 1095.57

ADMIN BLDG. RL 1098.82

AUTOMATED STORAGE RL 1092.34

NEW PANEL SAWS

NEW STORAGE SYSTEM EXISTING BUILDING

NEW EXTENSION TO EXISTING PRODUCTION BUILDINGS

EXISTING MAIN PRODUCTION HALL RL 1099.41

NEW ADDITIONAL SANDER

EXISTING SAWING PLANT RL 1095.41

EX. LAMINATING LINE

NEW STORAGE SYSTEM EXISTING BUILDING

EXISTING JELDWIN BUILDING

NEW RACKING

NEW RACKING/LAMINATING LINE

24 NEW CAR SPACES

54 NEW CAR SPACES

EXISTING DEBARKER & CHIPPER

NEW DEBARKING FLOOR

EXISTING RO WATER

EXISTING UF WATER

EXISTING IDALS

EXISTING STORMWATER FLUSH BASIN

EXISTING SPRING DAM

EXISTING EXCESS EFFLUENT OVERFLOW BASIN

EXISTING EFFLUENT

EXISTING EFFLUENT

EXISTING SLUDGE

SAND PIT

EMERGENCY CATCHMENT

ACCESS ROAD

EASEMENT

PROPOSED HARDSTAND 14000m²

RELOCATED AVIATION FUEL TANK (CLASS 3 - 2500L)

LINE OF PROPOSED ADDITIONAL SWALE DRAIN

PROPOSED EMERGENCY CATCHMENT 4700 m²

PUMP & VALVE

DIVERSION HEAD WALL

PROPOSED FIRST FLUSH BASIN 9000 m²

DIVERSION WALL

V-NOTCH TESTING POINT

PROPOSED HARDSTAND 12000m²

NEW BIO-SWALE

BOUNDARY ADJUSTMENT

STAGE 1

STAGE 2

STAGE 3

STAGE 4

0 10 20 30 40 50 70 90m

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
STAGING SITE PLAN

Scale	Stage
APPROX 1:1750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 03	A

LOWES MOUNT ROAD

LINE OF EXISTING BOUNDARY

EXISTING LOT 2 D.P. 1085563

EXISTING LOT 1 D.P. 1085563

EXISTING LOT 1 D.P. 785979

EXISTING LOT 24 D.P. 1148073

EXISTING LOT 26 D.P. 1200697

HORACE STREET

EXISTING LOT 16 & 17 D.P. 248152

EXISTING LOT 28 D.P. 877490

EXISTING LOT 22 D.P. 1017457

EXISTING EASEMENT RIGHT OF WAY

EXISTING EASEMENT TO DRAIN WATER TO REMAIN

EASEMENT TO DRAIN WATER TO BE REMOVED

ENDEAVOUR STREET

LINE OF NEW EASEMENT TO DRAIN WATER

AREA TO BE ADJUSTED SHOWN HATCHED (TYPICAL)

LINE OF CREEK

EXISTING LOT 2902 D.P. 1056754

NEW LINE OF BOUNDARY ADJUSTMENT 344.64

EXISTING LOT 1 D.P. 1076346

LINE OF EXISTING BOUNDARY 344.73

LINE OF EXISTING BOUNDARY

NEW BOUNDARY LINE 490.17

0 10 20 30 40 50 70 90m

NOTE:

CONSOLIDATE LOTS 1 & 2 D.P.1085563 INTO LOT 26 D.P.1200697

CONSOLIDATE LOT 24 D.P. 1017457 INTO LOT 26 D.P.1200697

ADJUST EASTERN BOUNDARIES, INCREASING LOT 26 D.P.1200697 AND REDUCING LOT 1 D.P.1076346

ADJUST SOUTHERN BOUNDARY LOT 1 DP 1076346, REDUCING LOT 2902 DP 1056754 & INCREASING LOT 1 DP 1076346

PROPOSED SIZE FOR LOT 26 D.P.1200697 IS APPROX. 60.5ha

LEGEND

EASEMENT TO DRAIN WATER TO BE REMOVED

NEW AND EXISTING EASEMENT TO DRAIN WATER

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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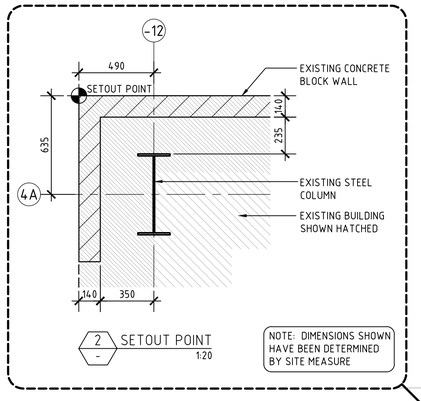
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
CONSOLIDATION PLAN

Scale	Stage
1:1750 (@ A1)	DA
Project Number: 19	Drawing Number: DA 04 / Issue: A



2 - SETOUT POINT 1:20

NOTE: DIMENSIONS SHOWN HAVE BEEN DETERMINED BY SITE MEASURE

LOWES MOUNT ROAD

EXISTING RAILWAY

GATE 4

GATE 6

LINE OF BOUNDARY

EXISTING GAS

MAIN TRANSFORMER YARD

EXISTING WAREHOUSE
RL 1095.57

EXISTING WORKSHOP
RL 1098.92

EXISTING MOULD PLANT
RL 1095.57

EXISTING MAIN PRODUCTION HALL
RL 1099.48

EXISTING SAWING PLANT
RL 1095.41

EX. LAMINATING PLANT
RL 1095.41

EXISTING DOOR SKIN PLANT
RL 1095.41

HORACE STREET

EXISTING LOT 16 & 17

EXISTING DEBARKER/CHIPPER
RL 1099.56

EXISTING LOT 28
D.P. 877490

EXISTING LOT 22
D.P. 1017457

DEDICATION AVIATION (NOT TANK CLASS 3 - FLAM.)

RELOCATED HELIPORT

EASEMENT

GATE 5

ENDEAVOUR ROAD

745.310

441.8

EXISTING LOT 2902
D.P. 1056754

LINE OF BOUNDARY

BOUNDARY ADJUSTMENT

344.68

888.0

1 SITE SURVEY

0 10 20 30 40 50 70 90m

NOTE:

LEGEND:

- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- NEW SWALE
- NEW PIPE
- VALVE

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE SURVEY

Scale	Stage
1:1750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 05	A

NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DRAWING DA-04 FOR DETAIL

NEW WORKS GENERALLY NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DRAWING DA-02 FOR DETAIL

LEGEND:

EXISTING BUILDINGS

LOWES MOUNT ROAD

EXISTING RAILWAY

GATE 4

GATE 6

LINE OF BOUNDARY

EXISTING GAS

MAIN TRANSFORMER YARD

DEMOLISH EXISTING CARPARK (RETAIN SUBSTATION)

DEMOLISH EXISTING FUEL DEPOT

DEMOLISH EASTERN END OF EX. STRUCTURE TO EXTENT SHOWN

EXISTING WAREHOUSE RL 1095.57

DEMOLISH EXISTING GATEHOUSE STRUCTURES, WEIGHBRIDGE AND ASSOCIATED KERBS, ETC. (EX. GATE & KERB TO BE RETAINED TO EXTENT SHOWN)

EXISTING WORKSHOP RL 1098.92

EXISTING MOULD PLANT RL 1095.57

EX. ADMIN BUILDING

DEMOLISH EXISTING ADMINISTRATION BUILDING

REMOVE AMENITIES, WALL CLADDING, ROLLER SHUTTERS, WALL GIRTS, POSTS AND THE LIKE

RELOCATED AVIATION FUEL TANK (CLASS 3 - 2500L)

RELOCATED HELIPORT

INFILL EXISTING DAM

PARTIALLY DEMOLISH EXISTING SCREEN WALL TO EXTENT SHOWN

EXISTING MAIN PRODUCTION HALL RL 1099.48

E 300.000 N600.000

EXISTING SAWING PLANT RL 1095.41

EX. LAMINATING PLANT RL 1095.41

EXISTING DOOR SKIN PLANT RL 1095.41

HORACE STREET

EXISTING LOT 16 & 17

EASEMENT

PARTIALLY DEMOLISH EXISTING SCREEN WALL TO EXTENT SHOWN

EXISTING DEBARKER CHIPPER

EXISTING LOT 28 D.P. 877490

EXISTING LOT 22 D.P. 1017457

GATE 5

ENDEAVOUR ROAD

LINE OF BOUNDARY

BOUNDARY ADJUSTMENT

EXISTING LOT 2902 D.P. 1056754

LINE OF BOUNDARY

BOUNDARY ADJUSTMENT

LINE OF BOUNDARY

0 10 20 30 40 50 70 90m

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H	

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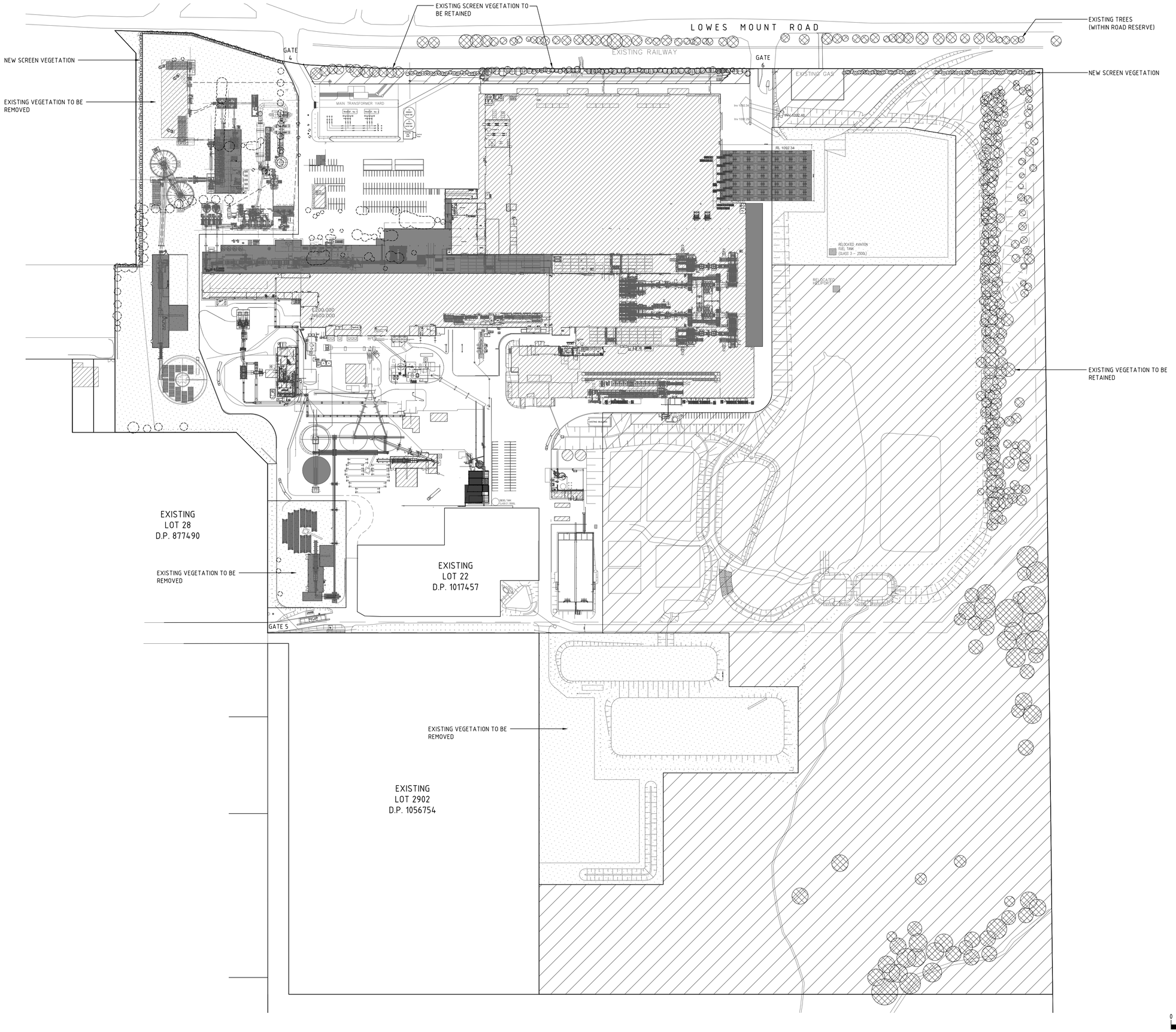
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE DEMOLITION

Scale	Stage
1:1750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 06	A



NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER CONSOLIDATION PLAN FOR DETAIL

DO NOT RELY ON THIS DRAWING FOR ANYTHING OTHER THAN LANDSCAPING DOCUMENTATION (SEE SITE PLAN)

EXISTING TREES HAVE MOSTLY BEEN ESTABLISHED FROM AERIAL IMAGERY NOT SURVEY - SIZE AND NUMBER ARE INDICATIVE ONLY

LEGEND:

- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- EXISTING TREES ON SITE
- EXISTING PLANTING - PHOTINIA FRASERI "RED ROBIN" SCREENING HEDGE (TYPICAL GROWTH: UP TO 15m TALL)
- PROPOSED NEW PLANTING - PHOTINIA FRASERI "RED ROBIN" SCREENING HEDGE (TYPICAL GROWTH: UP TO 15m TALL)
- EXISTING VEGETATION TO BE RETAINED
- EXISTING VEGETATION TO BE REMOVED
- EXISTING TREES TO BE REMOVED

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS.

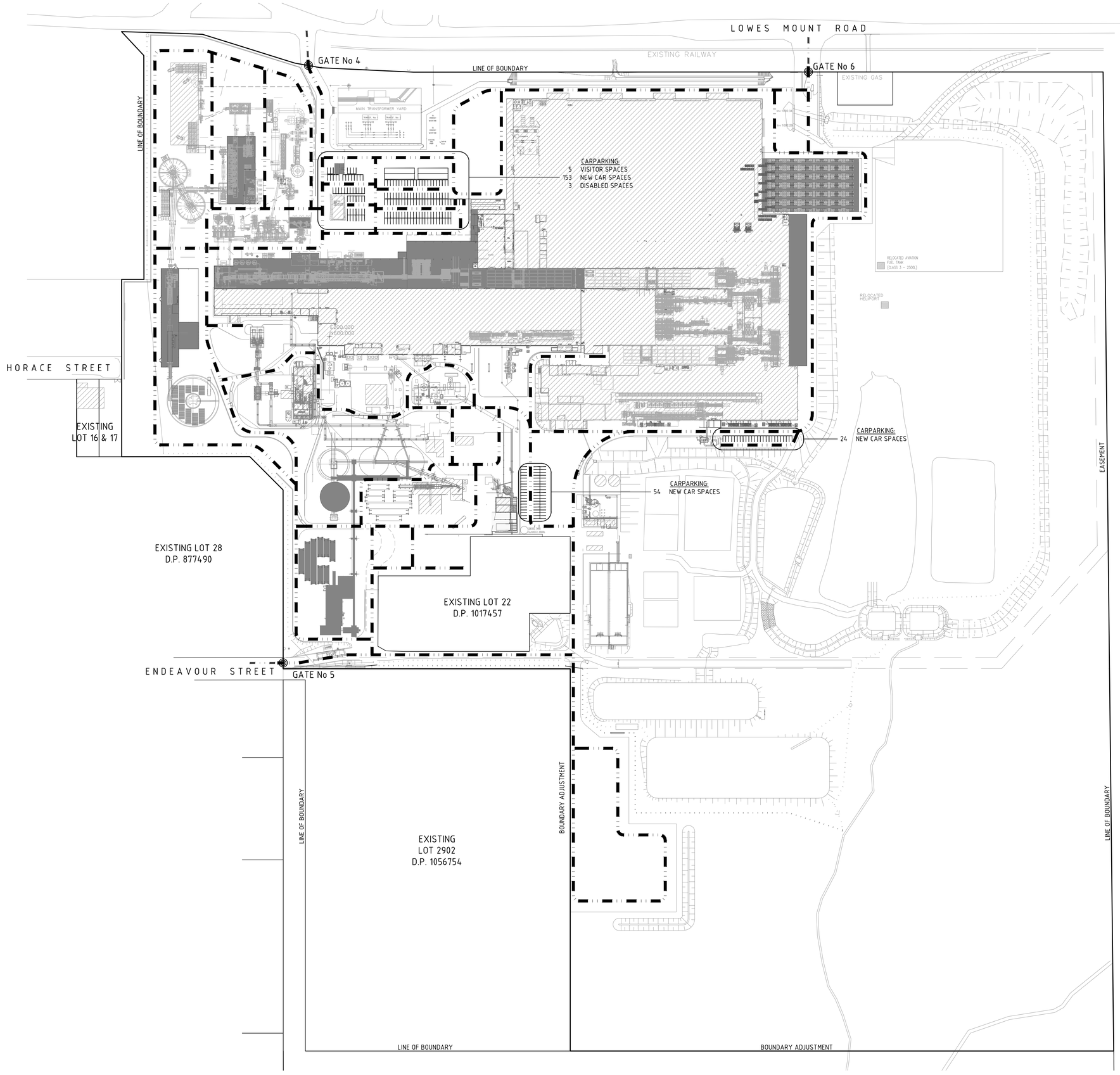
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
LANDSCAPE PLAN

Scale: APPROX 1:1750 (@ A1)
Stage: DA

Project Number: 19
Drawing Number: DA 07
Issue: A

0 10 20 30 40 50 70 90m



NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DRAWING DA-04 FOR DETAIL

LEGEND:

- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- ROAD NETWORK

CARPARKING SUMMARY:
5 VISITOR SPACES
231 NEW CAR SPACES
3 DISABLED SPACES

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
INTERNAL ROAD NETWORK AND PARKING FACILITIES

Scale	Stage
1:1750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 08	A

0 10 20 30 40 50 70 90m

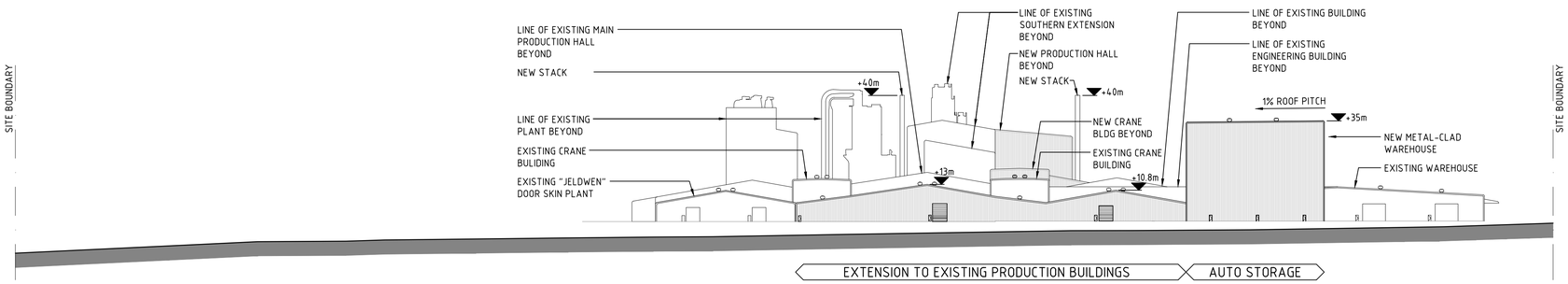
NOTE:

EXISTING GROUND LINES ARE SHOWN AT SITE BOUNDARY UNLESS NOTED OTHERWISE

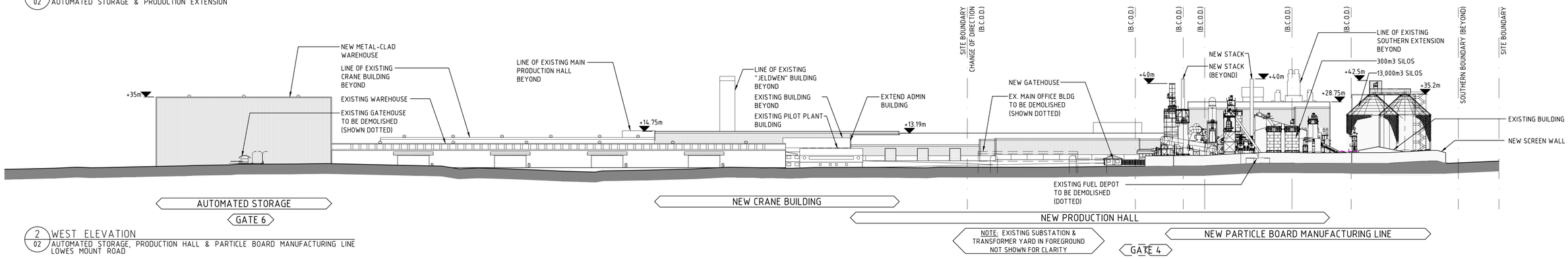
PLANT IN BACKGROUND IS SHOWN DIAGRAMATICALLY ONLY

LEGEND:

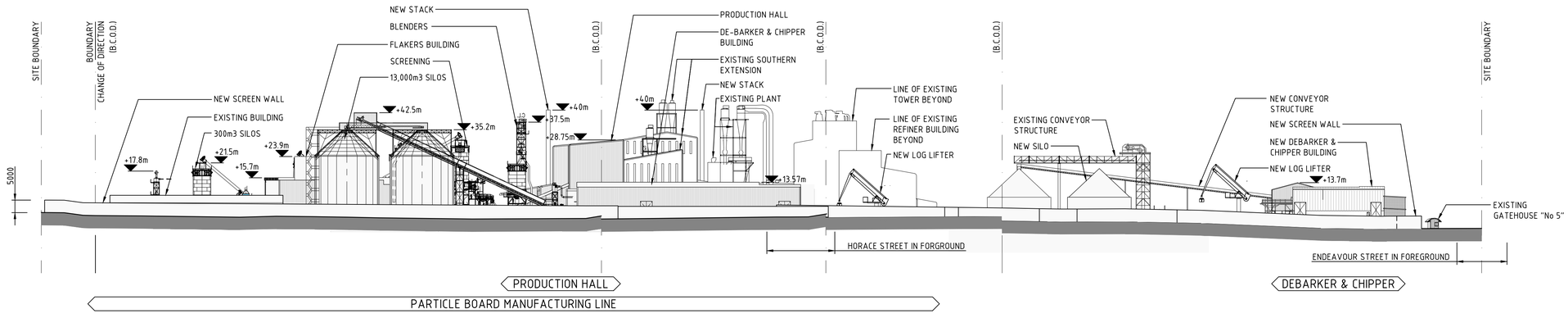
NEW WORKS:
WAREHOUSE & PRODUCTION BUILDINGS



1 NORTH ELEVATION
02 AUTOMATED STORAGE & PRODUCTION EXTENSION



2 WEST ELEVATION
02 AUTOMATED STORAGE, PRODUCTION HALL & PARTICLE BOARD MANUFACTURING LINE LOWES MOUNT ROAD



3 SOUTH ELEVATION
02 PRODUCTION HALL & PARTICLE BOARD MANUFACTURING LINE

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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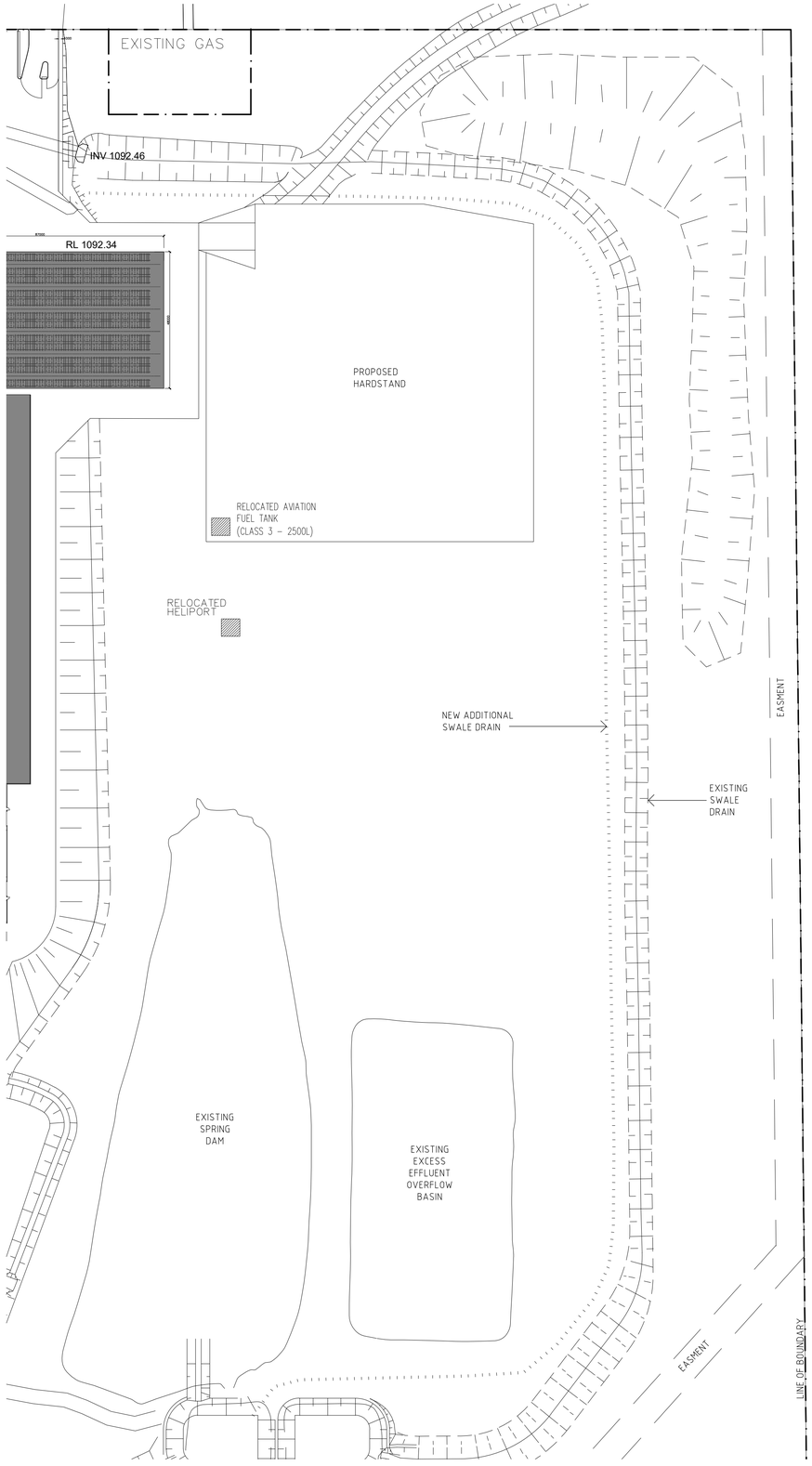
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE ELEVATIONS

Scale	Stage
1:1000 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 09	A



1 DETAIL PLAN

NOTE:

LEGEND:

- PROPOSED NEW BUILDINGS
- NEW SWALE
- NEW PIPE
- VALVE

Issue	Description	Date	Drawn	Audit
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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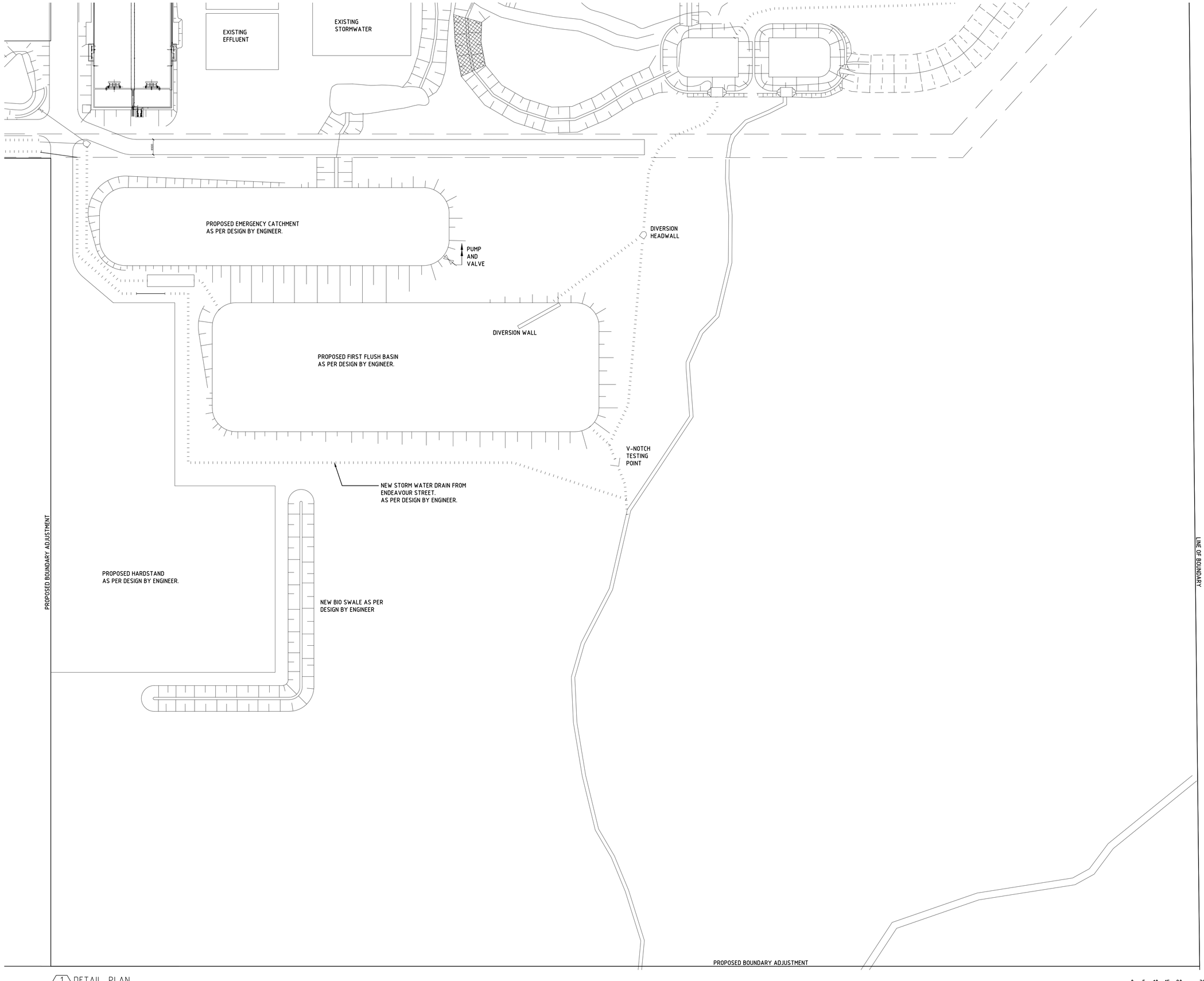
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
NEW ADDITIONAL SWALE

Scale	Stage
APPROX 1:1000 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 101	A



1 DETAIL PLAN

0 5 10 15 20 30 40m

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
STORMWATER MANAGEMENT AND CARPARK

Scale	Stage
APPROX 1:750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 102	A

LEGEND

Existing buildings

HYDRAULICS ROOM

NEW METAL-CLAD CONVEYOR

EXISTING CONVEYOR

EXISTING DEBARKER

EXISTING CHIPPER

EXISTING LOG LIFTER

EXISTING

NEW SILO

EXISTING BARK SHED

NEW CONVEYOR & LOG STORAGE (REFER STAGE 4 DRAWINGS FOR CONTINUATION & DETAIL)

54 NEW CAR SPACES

REJECT TO BREAKER

NEW AWNING ROOF OVER WOODCHIP AREA

DIESEL TANK CLASS C1, 35000L

1
104

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
CONVEYOR, AWNING & CARPARK (SHT 1)

Scale	Stage
APPROX 1:350 (@ A1)	DA

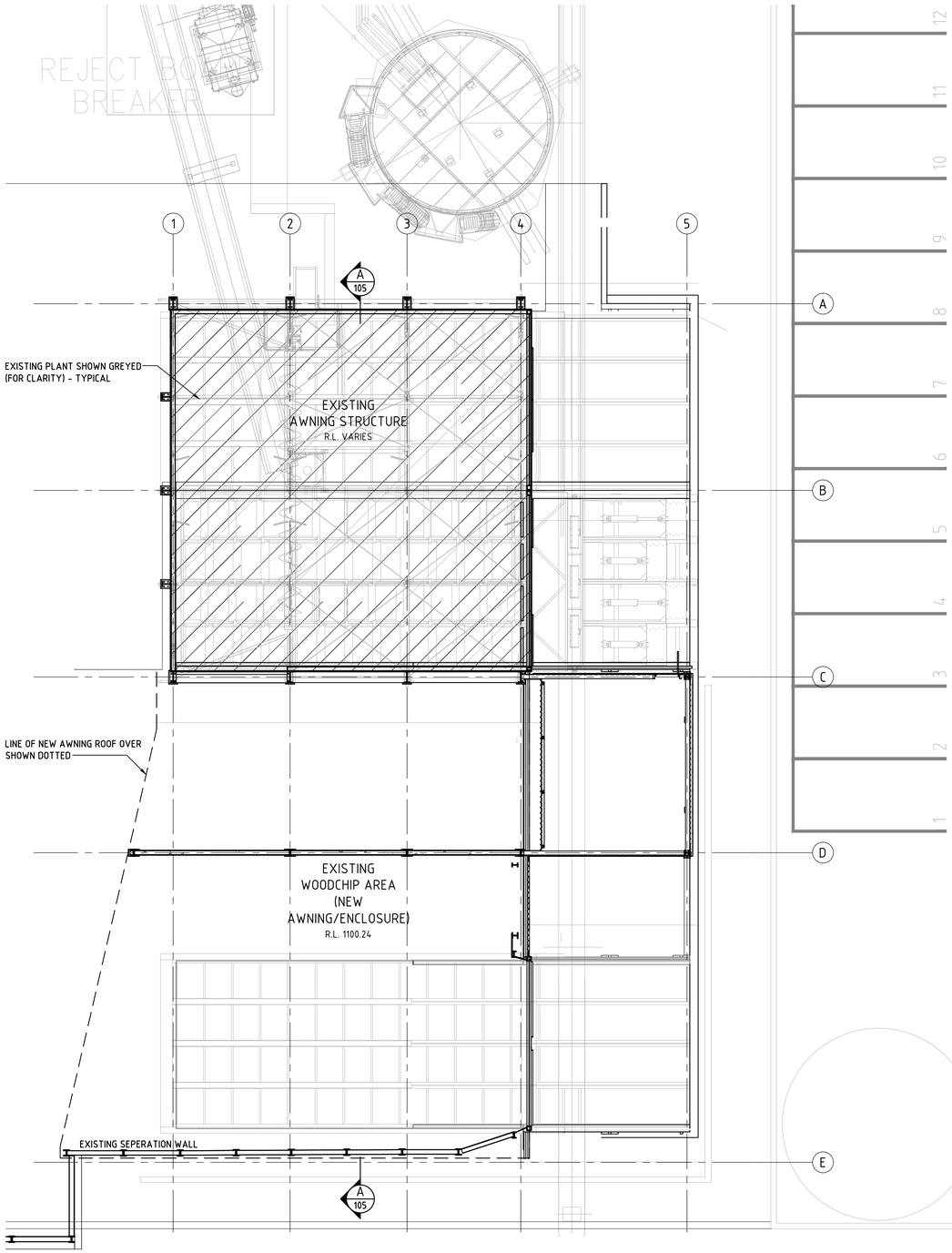
Project Number	Drawing Number	Issue
19	DA 103	A

AREAS	
SPACE	AREA
EXISTING	167
ADDITIONAL	294
TOTAL	461m²

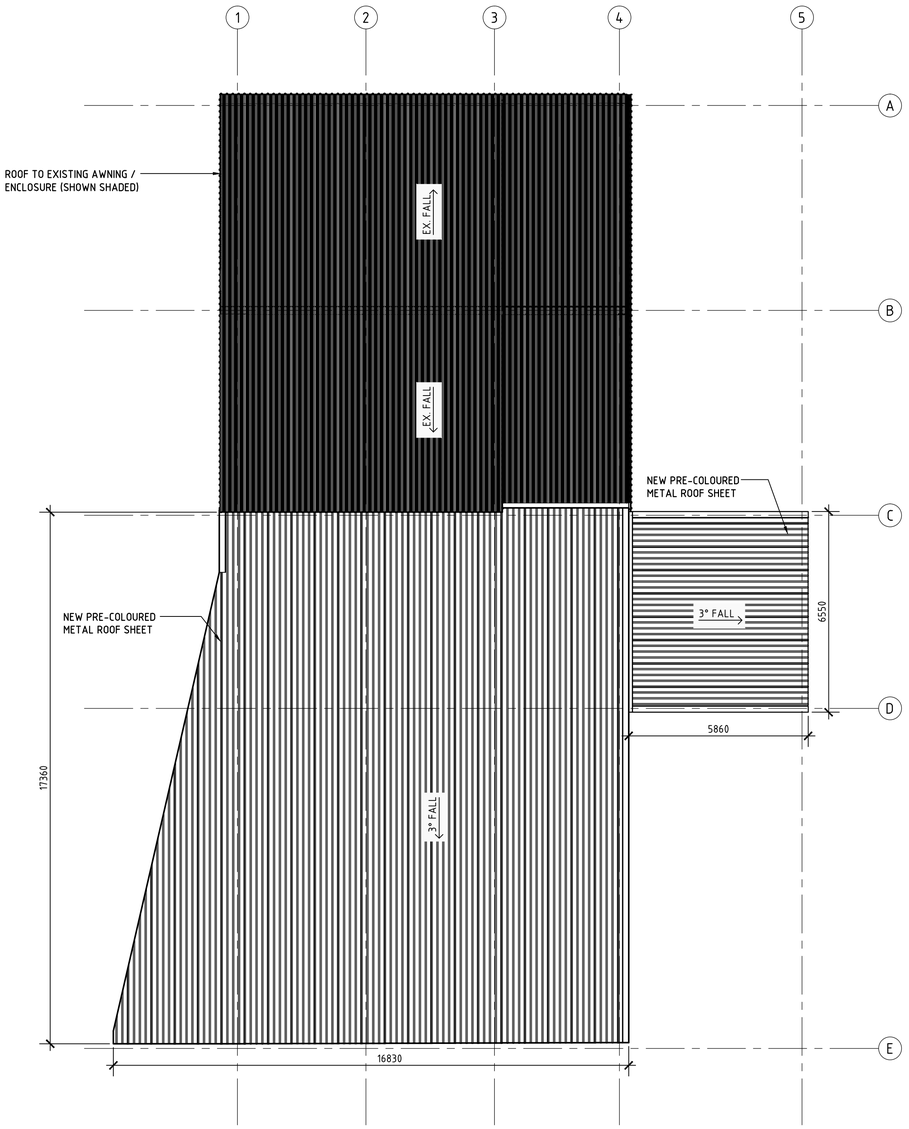
NOTE:

LEGEND:

- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ROOF PLAN)
- PROPOSED NEW BUILDINGS (ROOF PLAN)



1/103 FLOOR PLAN



2 ROOF PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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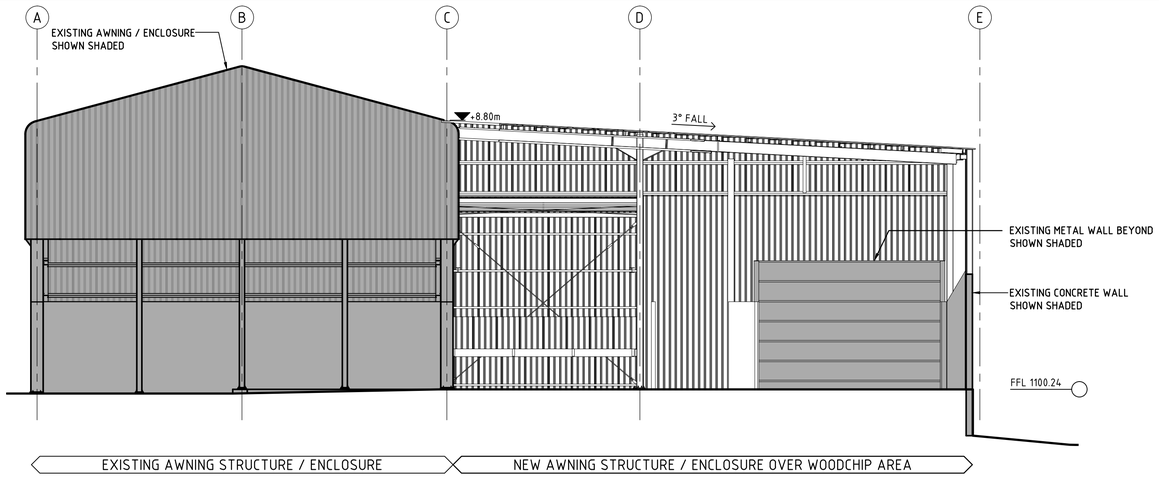
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

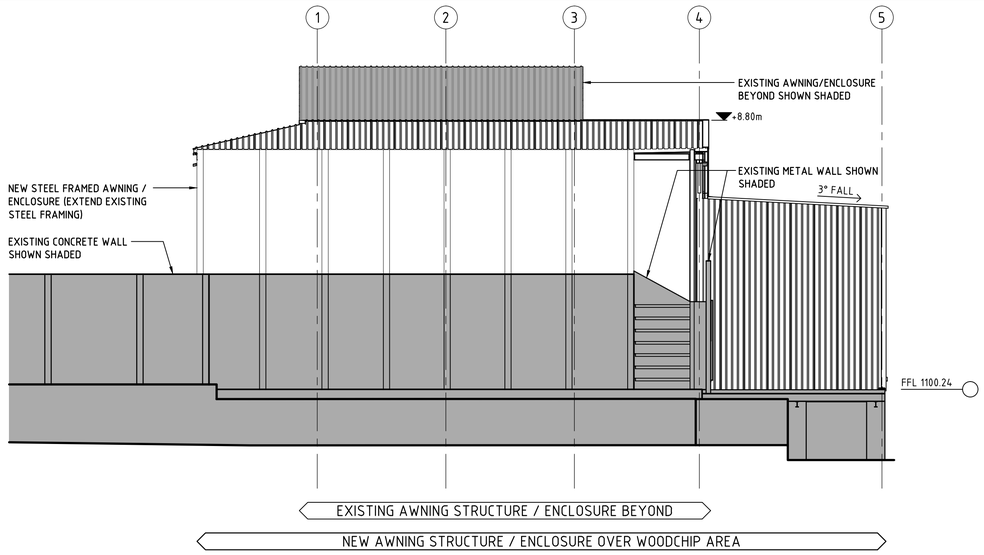
Drawing
AWNING OVER WOODCHIP AREA (SHT 2)

Scale	Stage
1:100 (@ A1)	DA

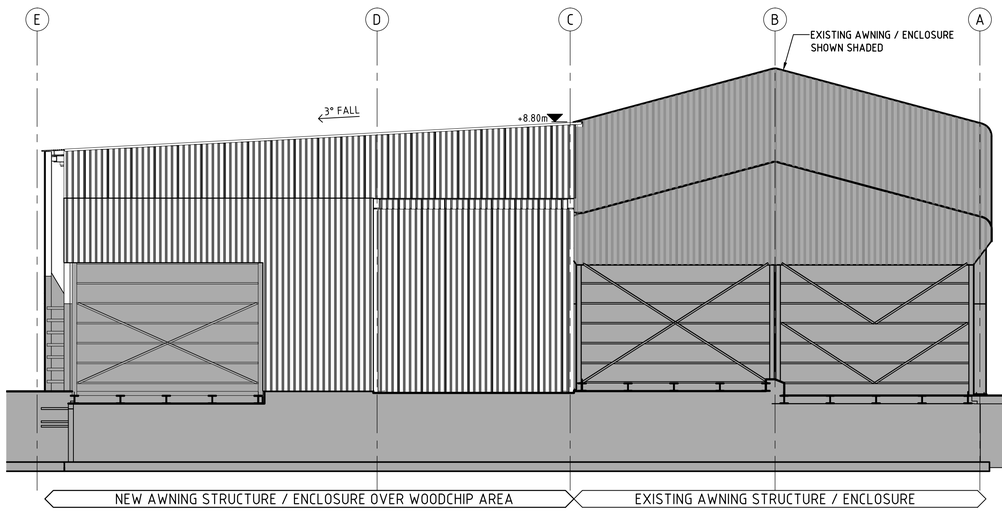
Project Number	Drawing Number	Issue
19	DA 104	A



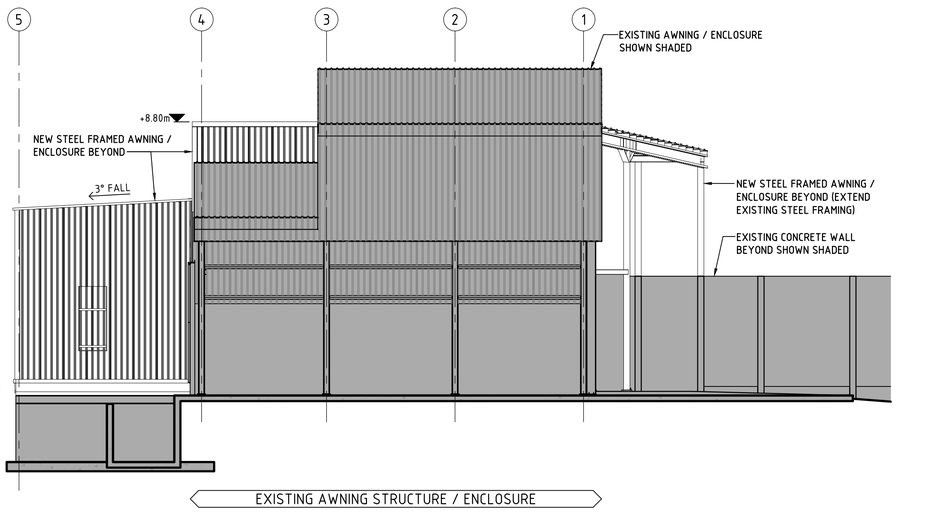
1/104 SOUTH ELEVATION



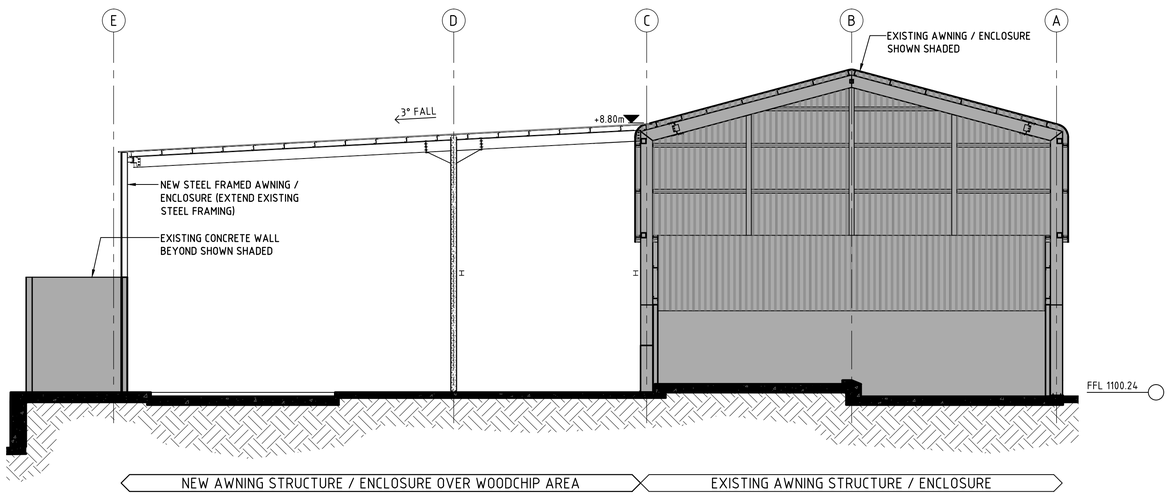
2/104 EAST ELEVATION



3/104 NORTH ELEVATION



4/104 WEST ELEVATION



5/104 SECTION A-A

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
AWNING OVER WOODCHIP AREA (SHT 3)

Scale	Stage
1:100 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 105	A

NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER CONSOLIDATION PLAN FOR DETAIL

DO NOT RELY ON THIS DRAWING FOR ANYTHING OTHER THAN REFERENCES TO DOCUMENTATION SERIES (SEE SITE PLAN)

LEGEND:

EXISTING BUILDINGS

PROPOSED NEW BUILDINGS

1/260 1/230 1/210 1/220 1/240 1/250 1/270 1/280 1/290

GATE 4

LINE OF BOUNDARY

2000 SETBACK

26715

MATERIALS HANDLING AREA

300m³ SILOS

DOSER

BURNER

DRYER

FLAKERS BUILDING

WEST

2X 13000m³ SILOS

DUST SILO

AIR GRADERS

SCREENING

6000 SETBACK

13170

CONVEYOR

CHIPPER

80m³ RESIN TANKS

NEW STACK

BUILDING CONTROL ROOM

+FFL 1099.480

+FFL 1099.48

BLENDERS

CONTROLL PRESS

+FFL 1098.92

CONVEYORS

+FFL 1095.57

MAIN TRANSFORMER YARD

TRANSF. No 1

TRANSF. No 2

EX. EMERGENCY WATER TANK

EXISTING FIRE PUMP

Control Room

SWALE DRAINAGE CHANNEL

NEW GATEHOUSE

2 VISITOR SPACES

3 VISITOR SPACES

153 NEW CAR SPACES

3 DISABLED SPACES

EXISTING HIGH VOLTAGE SUBSTATION

ADMIN BLDG

RL 1098.92

14410

9850

EXISTING WAREHOUSE

RL 1095.57

EXISTING MOULD PLANT

RL 1095.57

EXISTING MAIN PRODUCTION HALL

RL 1099.41

NEW ADDITIONAL SANDER

E200.000

N600.000

2000

DEBARKER

LOG STORAGE/ LOADING

EXISTING LOT 16 & LOT 17

54 NEW CAR SPACES

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
DETAIL PLAN
(STAGE 2)

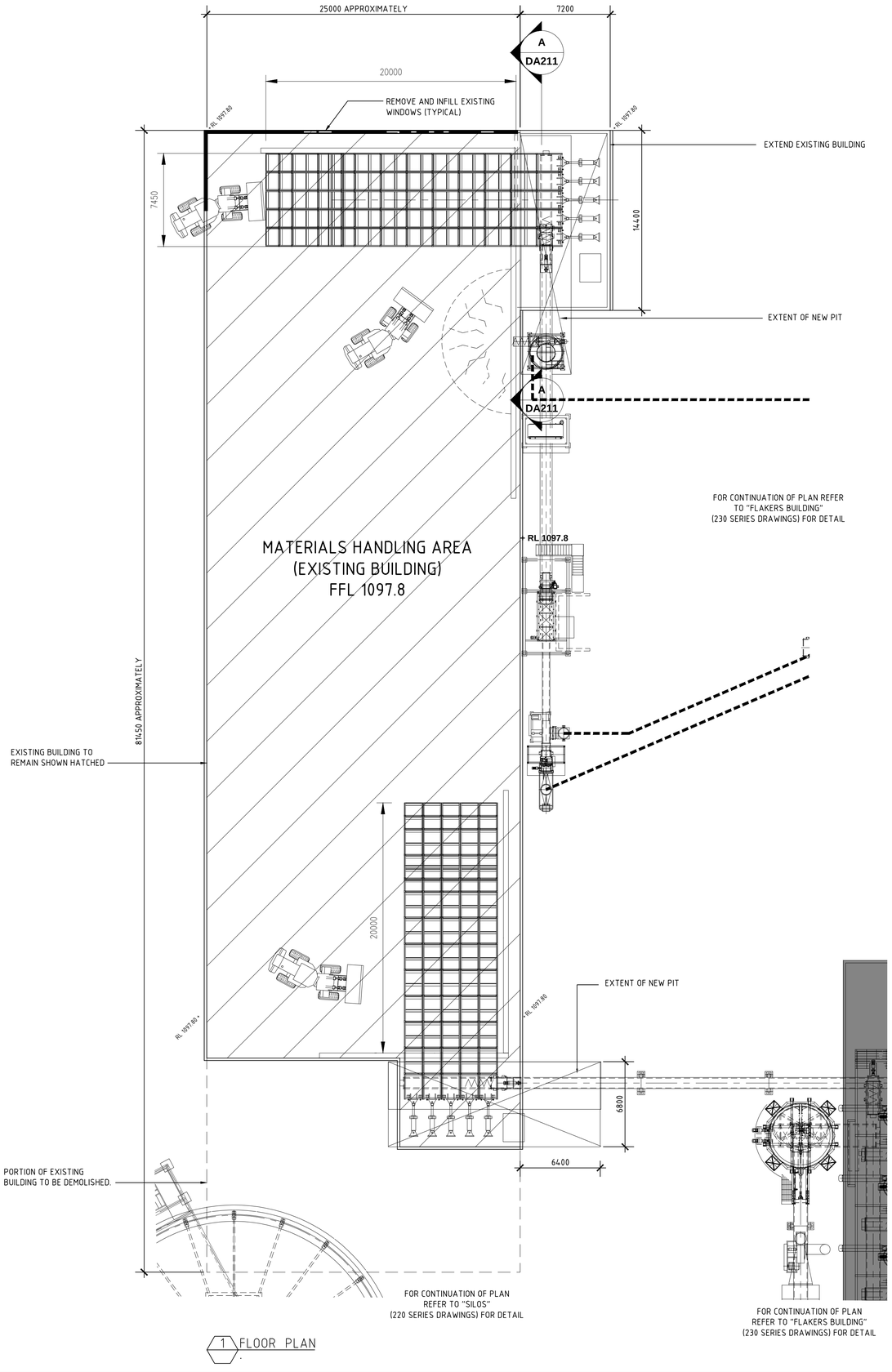
Scale	Stage
APPROX 1:750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 201	A

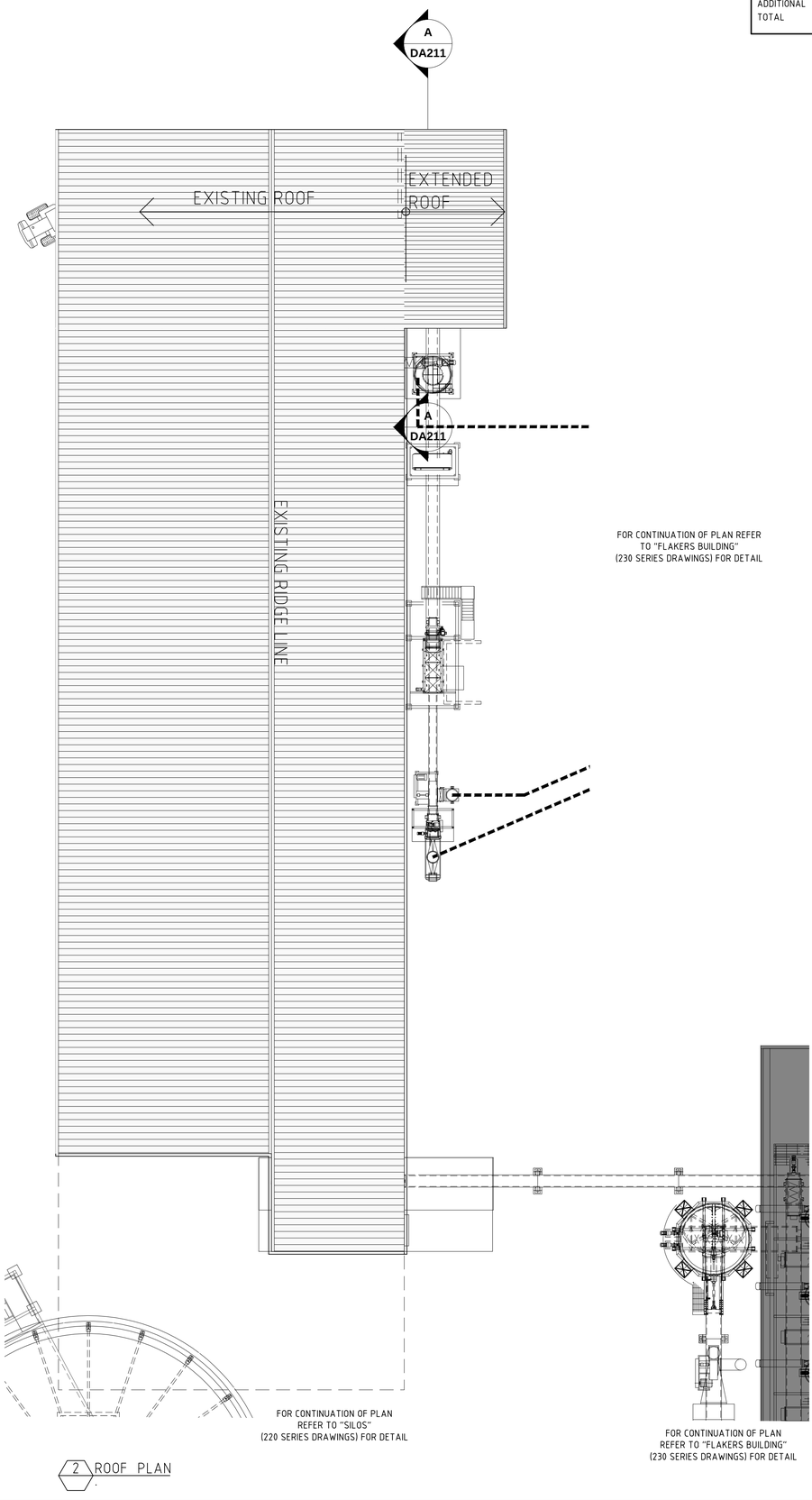
AREAS	
SPACE	AREA
EXISTING (GRND FLR)	2289
DEMOLITION (GRND FLR)	-246
ADDITIONAL	103
TOTAL	2146 m²

LEGEND

Existing buildings



1 FLOOR PLAN



2 ROOF PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
MATERIALS HANDLING (SHT 1)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 210	A

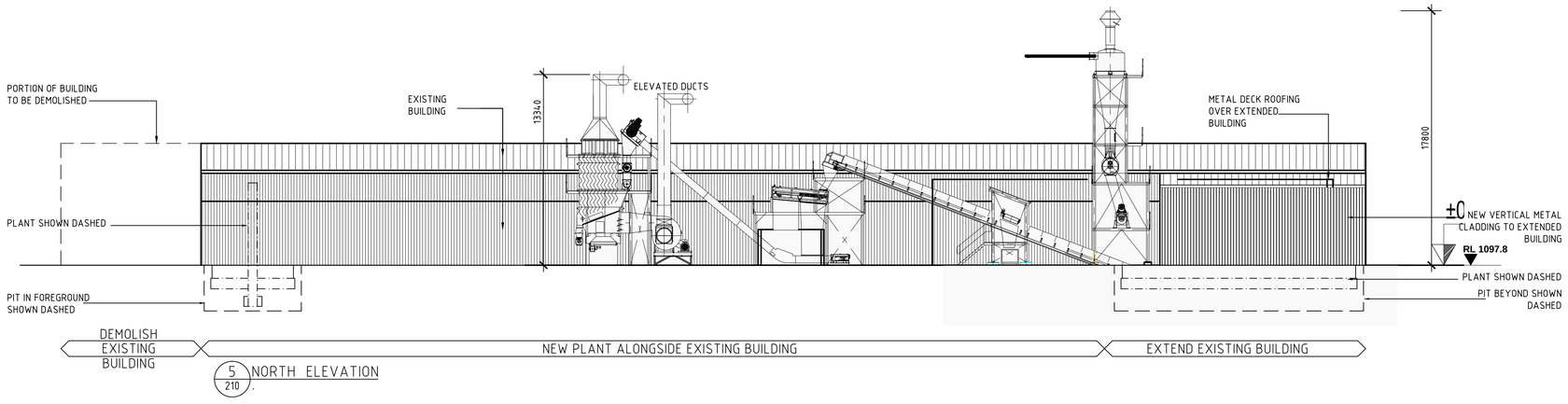
NOTE:

EXISTING GROUND LINES ARE SHOWN AT SITE BOUNDARY UNLESS NOTED OTHERWISE

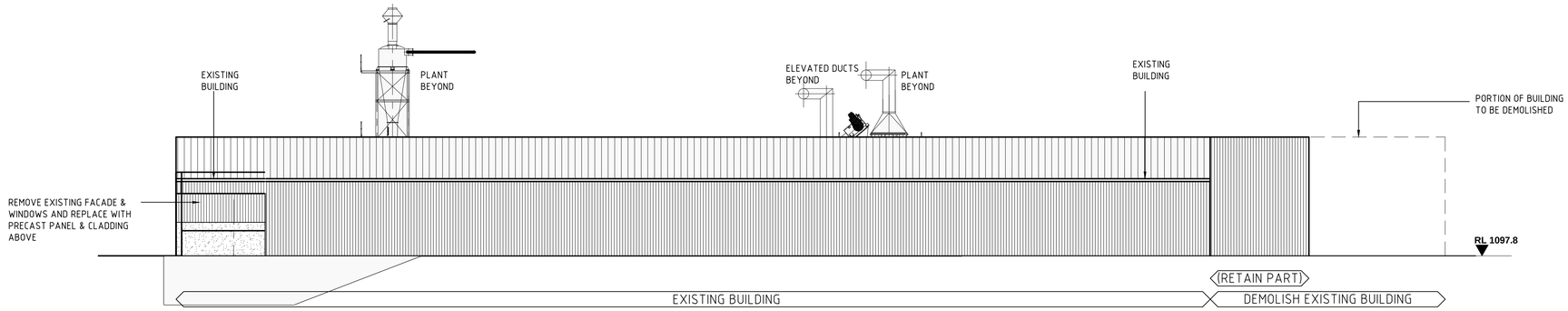
PLANT IN BACKGROUND IS SHOWN DIAGRAMATICALLY ONLY

LEGEND:

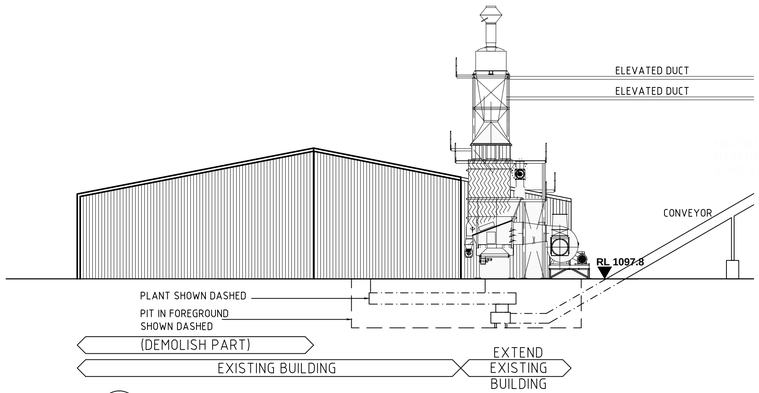
NEW WORKS:
WAREHOUSE & PRODUCTION BUILDINGS



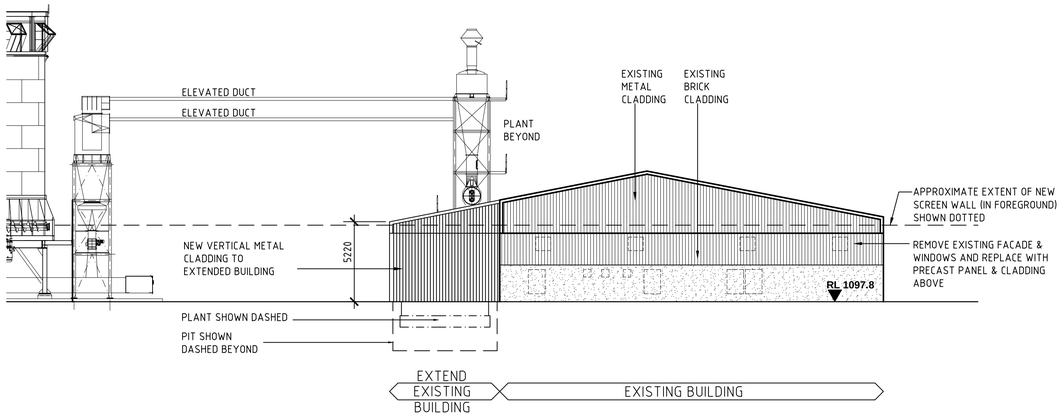
5/210 NORTH ELEVATION



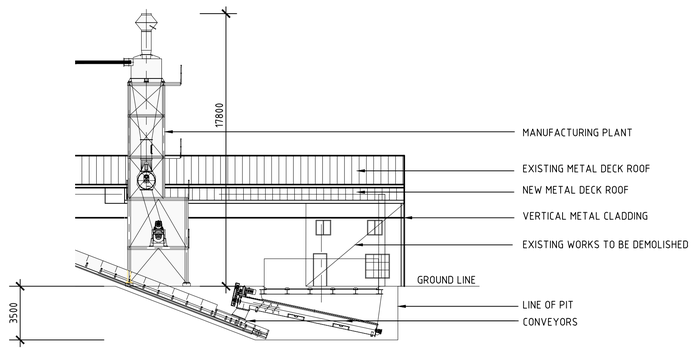
4/210 SOUTH ELEVATION



3/210 EAST ELEVATION



2/210 WEST ELEVATION



1/210 SECTION A-A

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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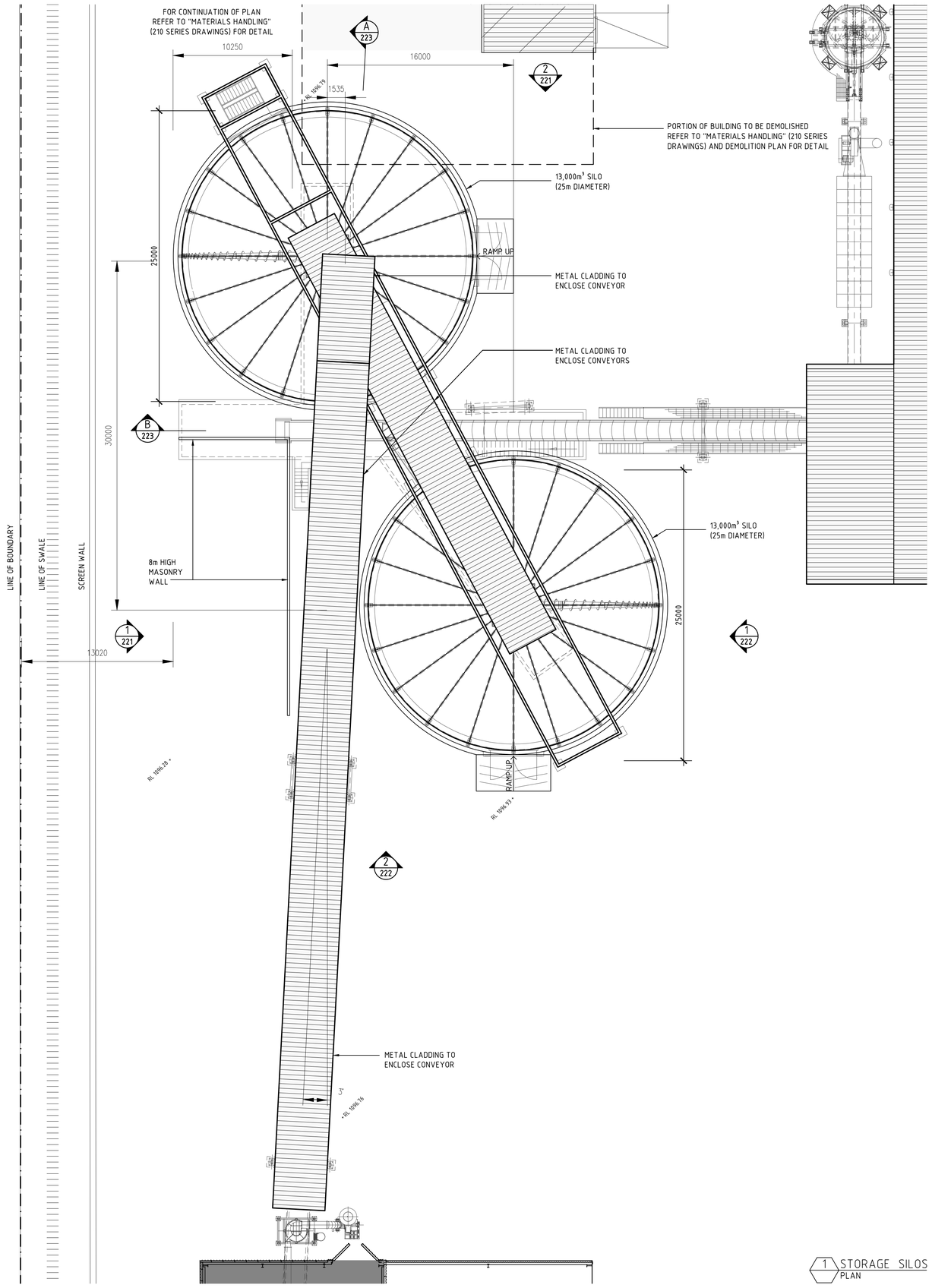
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
MATERIALS HANDLING (SHT 2)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 211	A



LEGEND

Existing buildings

1 STORAGE SILOS PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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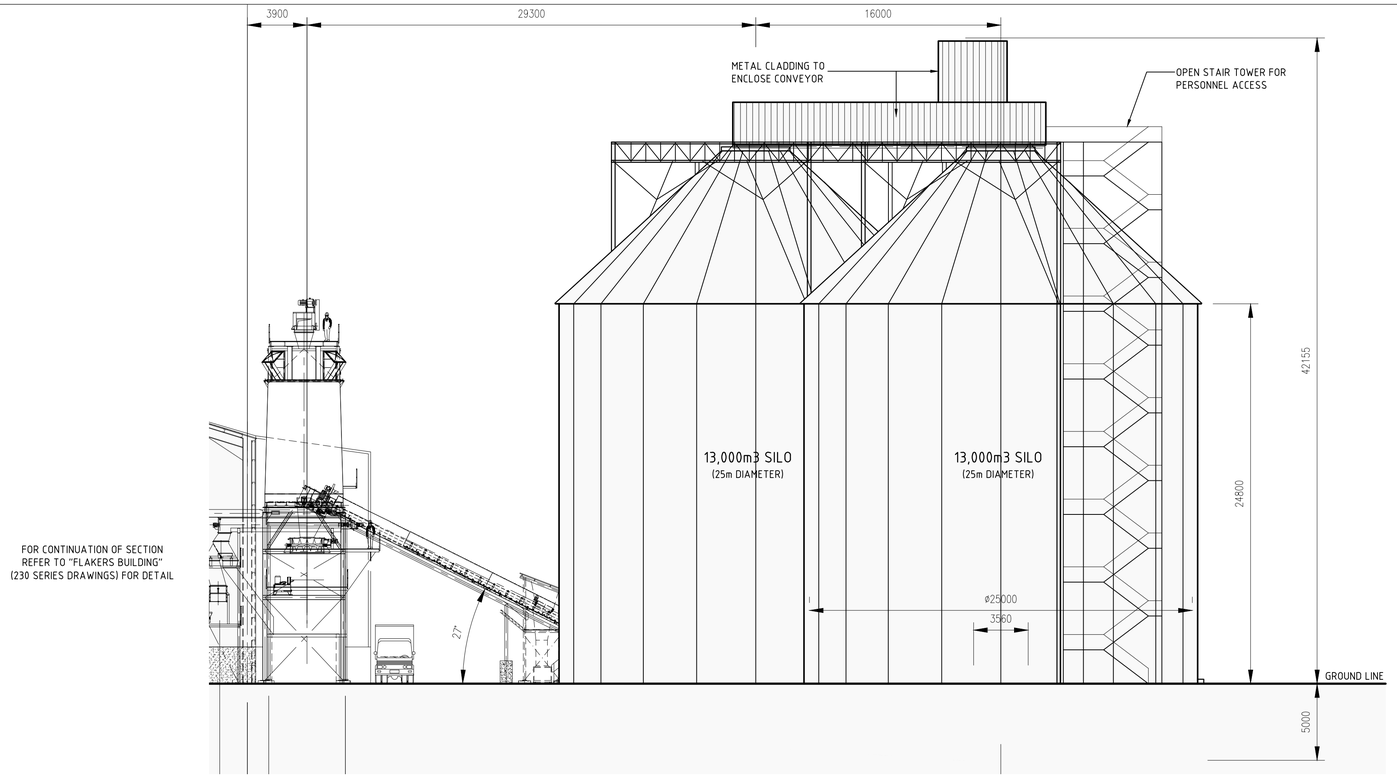
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SILOS (SHT 1)

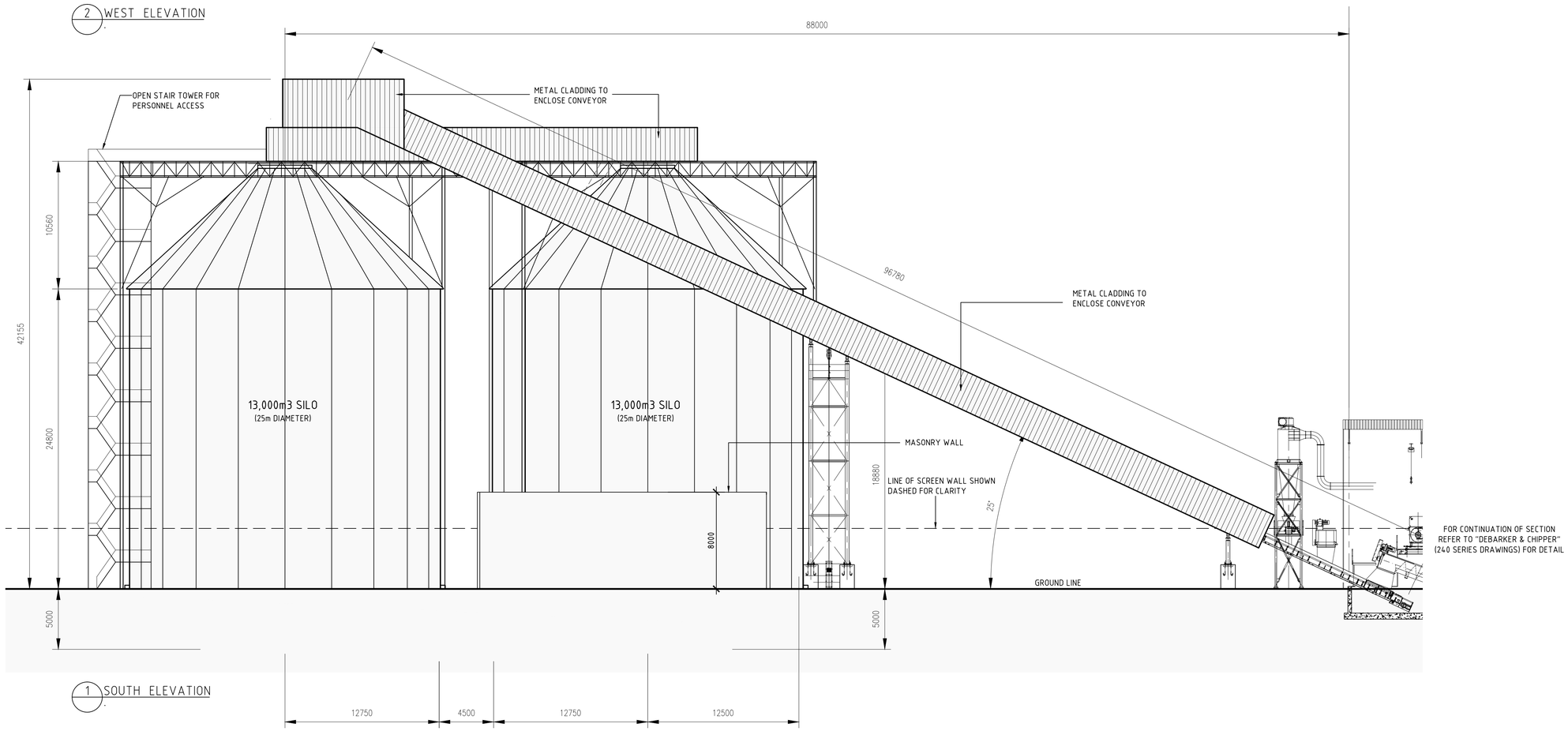
Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 220	A



FOR CONTINUATION OF SECTION
REFER TO "FLAKERS BUILDING"
(230 SERIES DRAWINGS) FOR DETAIL

2 WEST ELEVATION



1 SOUTH ELEVATION

FOR CONTINUATION OF SECTION
REFER TO "DEBARKER & CHIPPER"
(240 SERIES DRAWINGS) FOR DETAIL

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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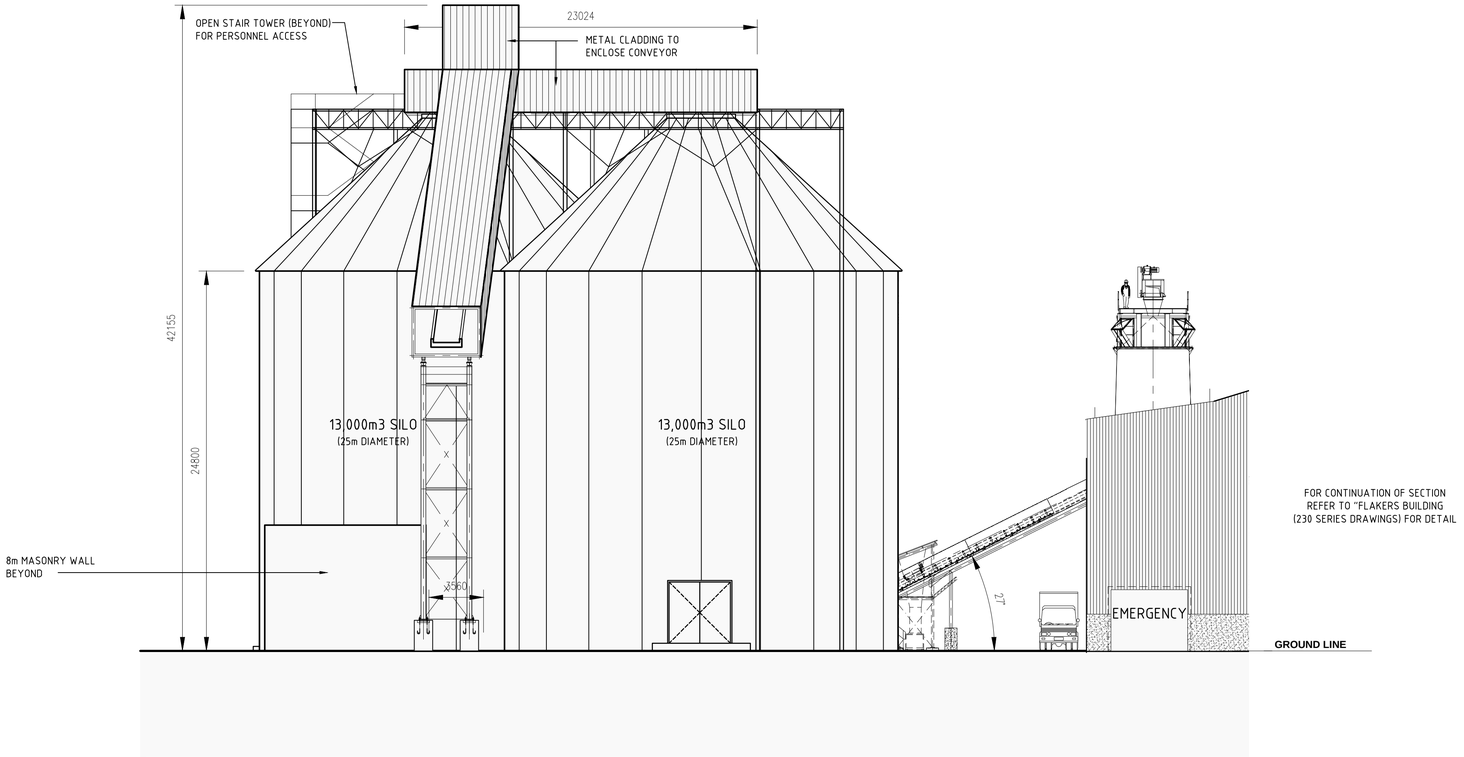
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

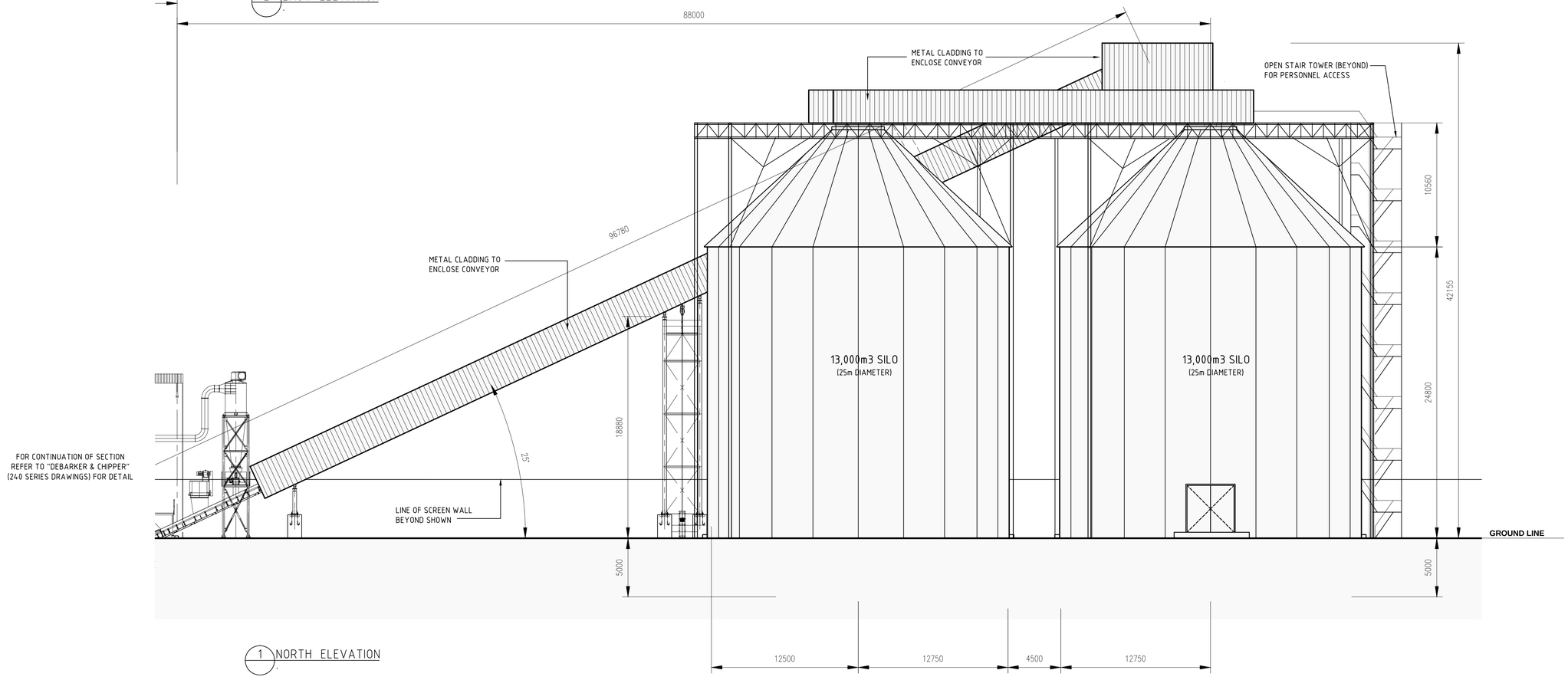
Drawing
SILOS (SHT 2)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 221	A



2 EAST ELEVATION



1 NORTH ELEVATION

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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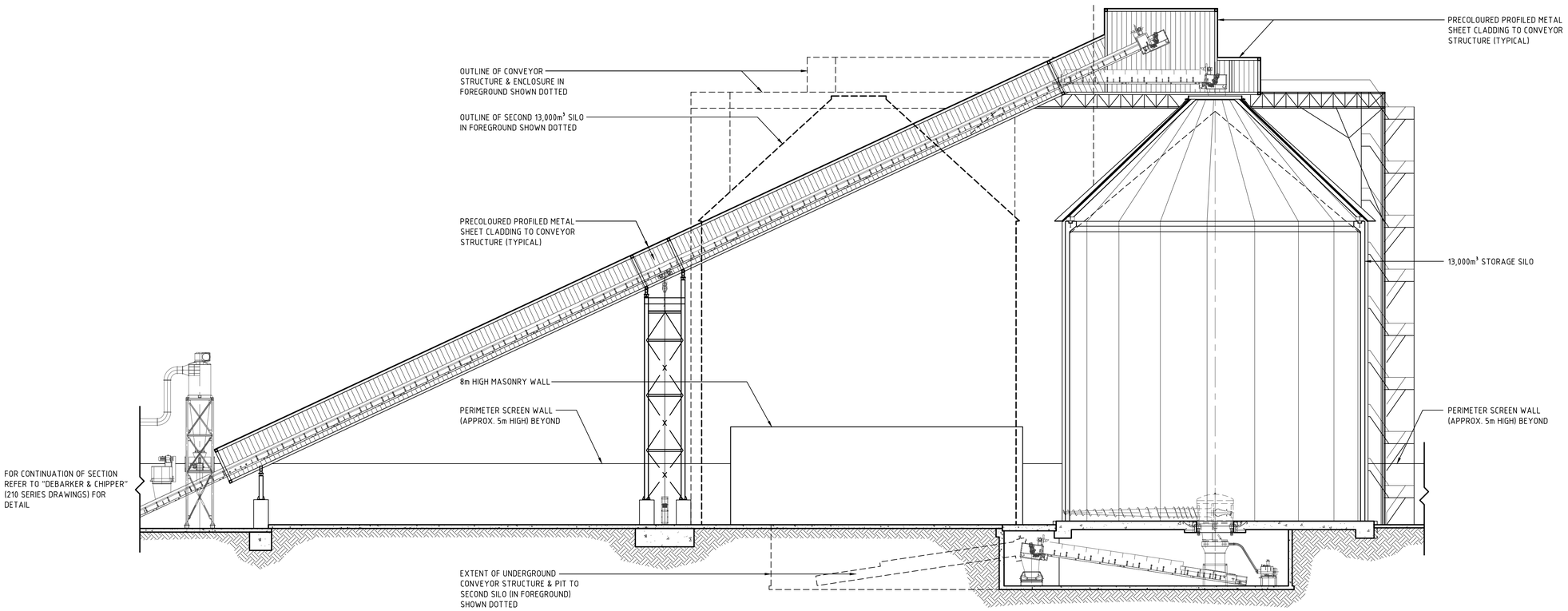
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

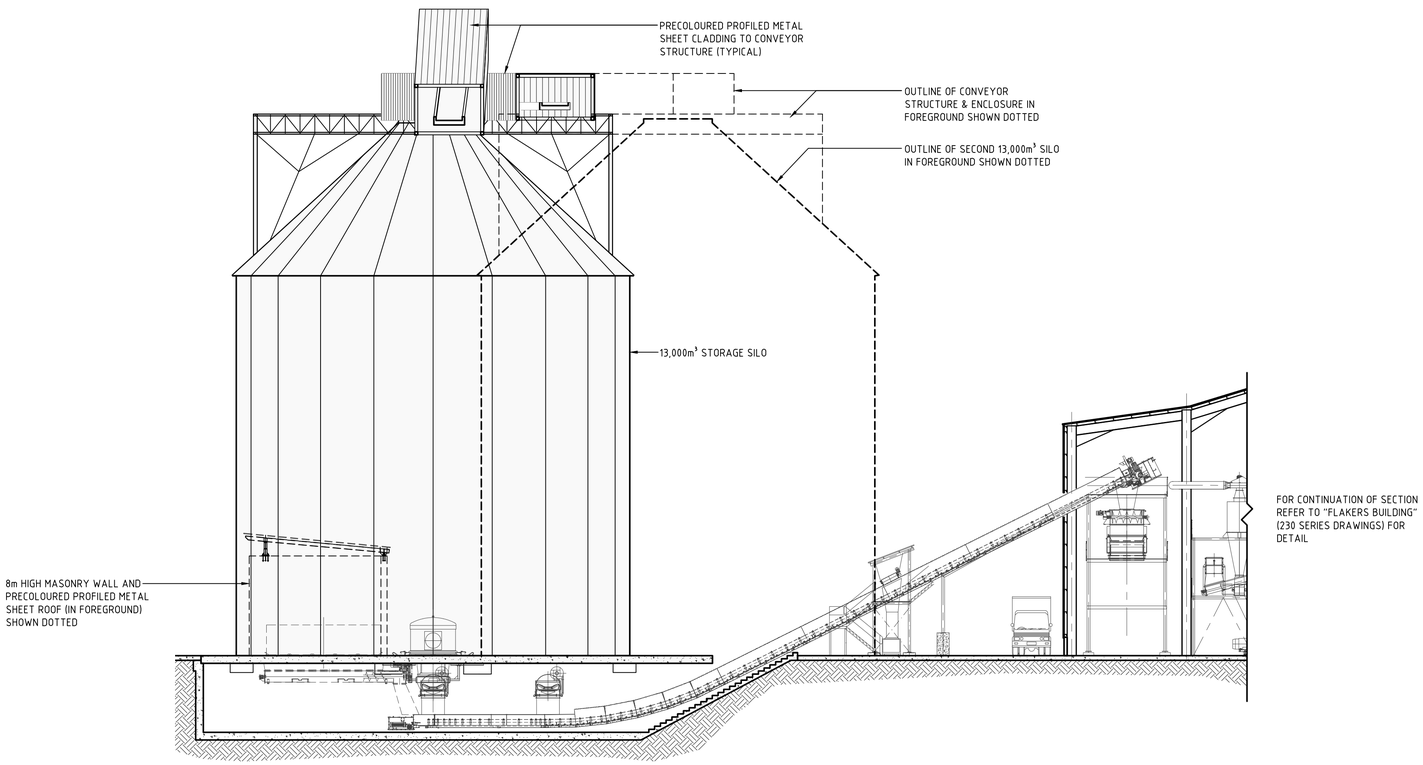
Drawing
SILOS (SHT 3)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 222	A



1 SECTION A-A



2 SECTION B-B

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SILOS (SHT 4)

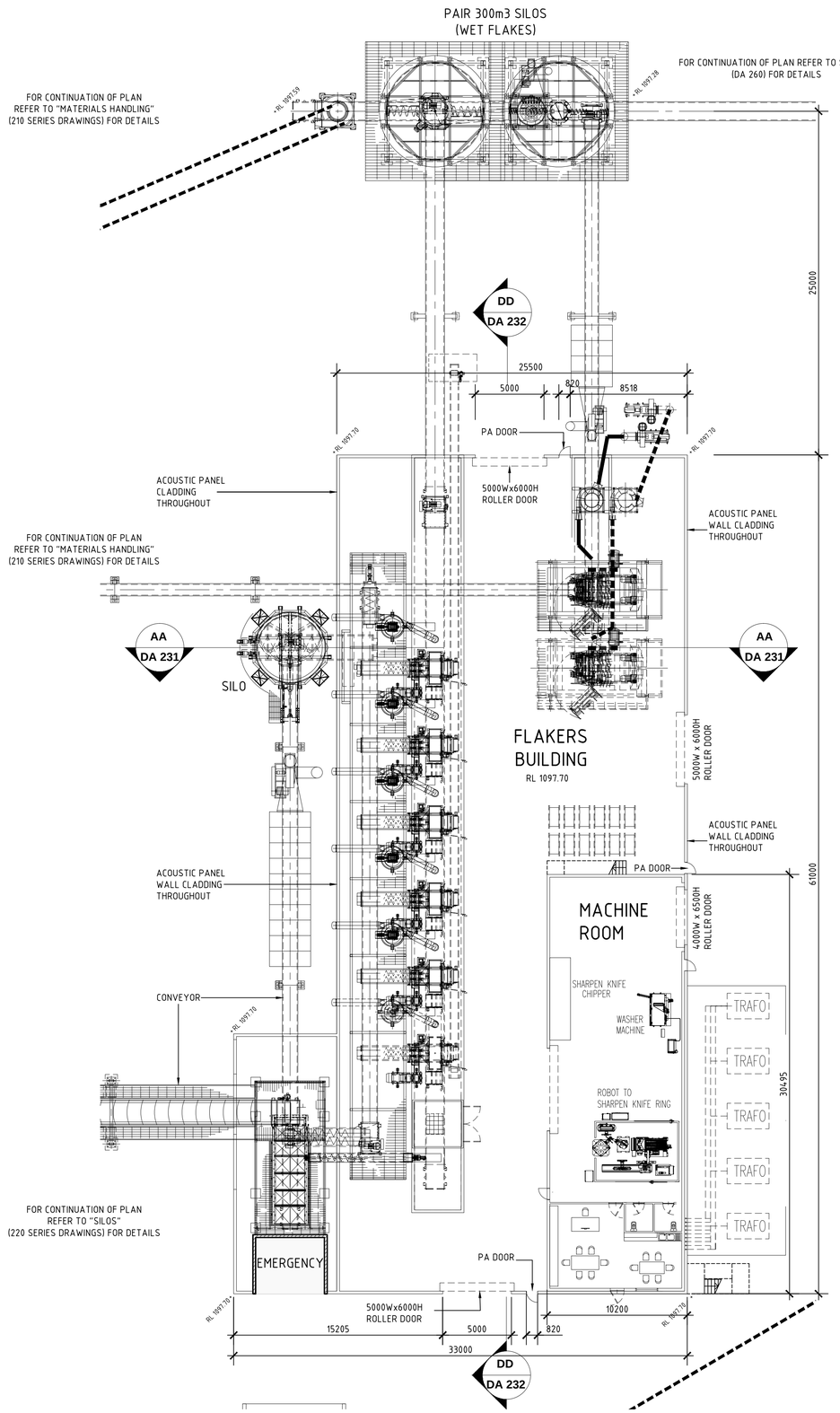
Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 223	A

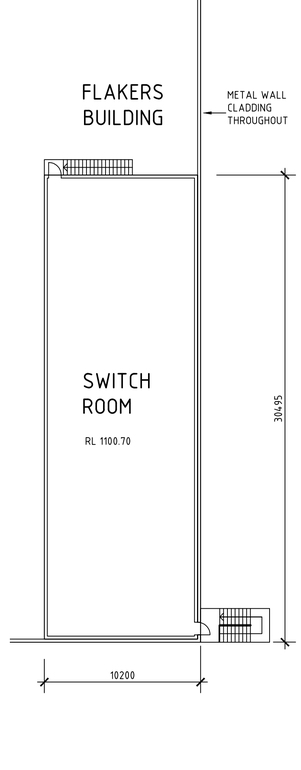
AREAS	
SPACE	AREA
GROUND FLOOR	1697
FIRST FLOOR	311
TOTAL	2008 m²

LEGEND

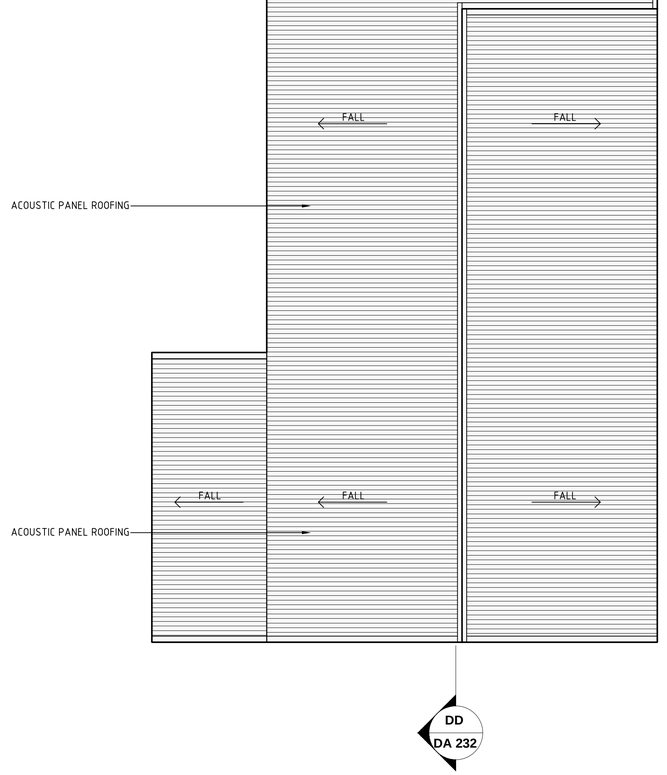
Existing buildings



1 GROUND FLOOR PLAN



3 FIRST FLOOR PLAN



2 ROOF PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

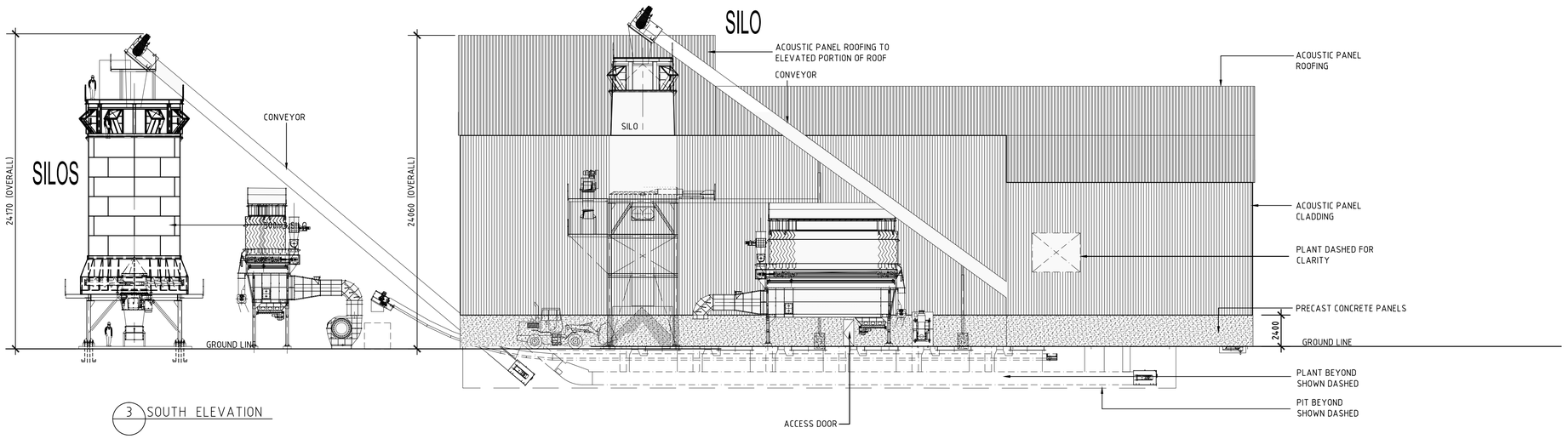
Drawing
FLAKERS BUILDING (SHT 1)

Scale	Stage
APPROX 1:200 (@ A1)	DA

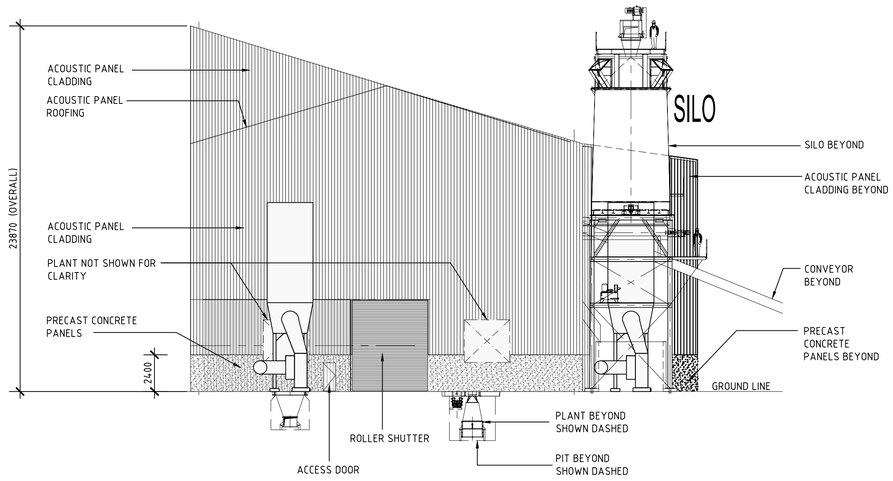
Project Number	Drawing Number	Issue
19	DA 230	A

LEGEND

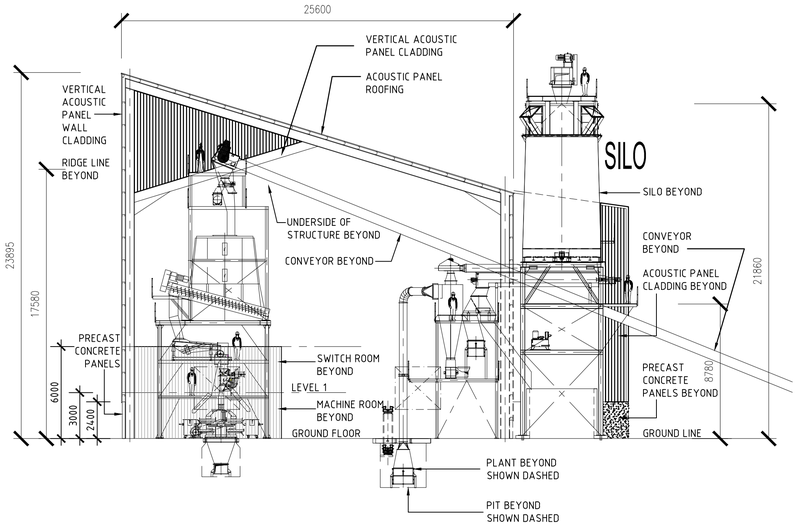
Existing buildings



3 SOUTH ELEVATION



1 WEST ELEVATION



2 SECTION A-A
DA230

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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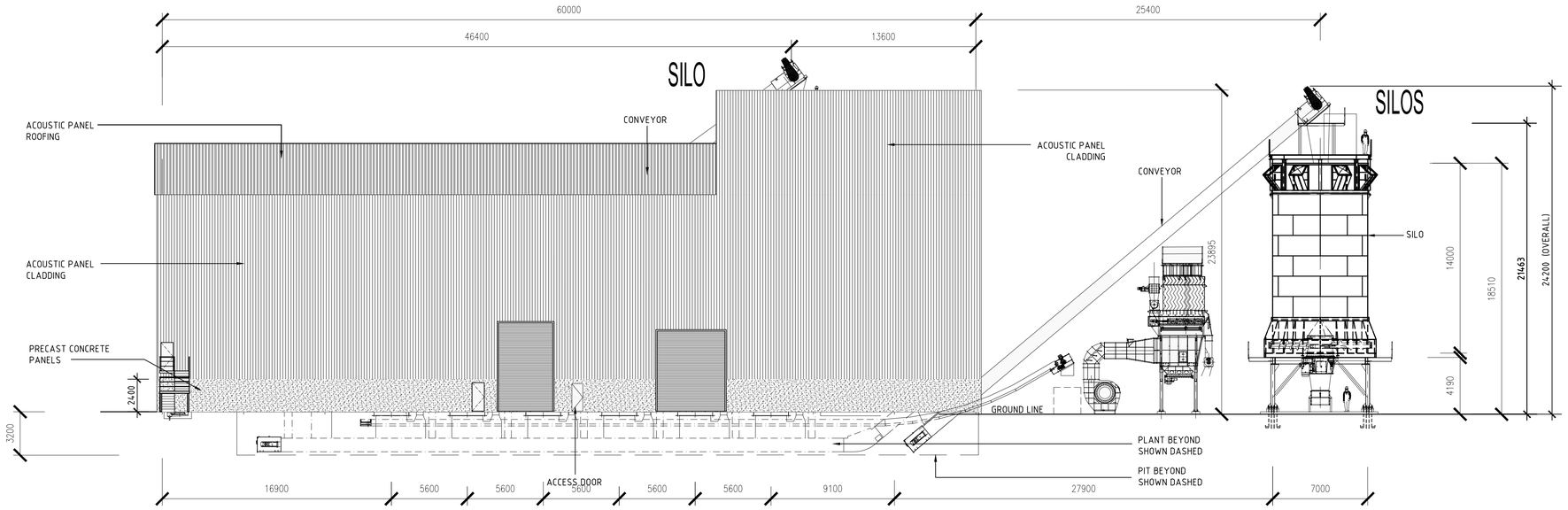
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

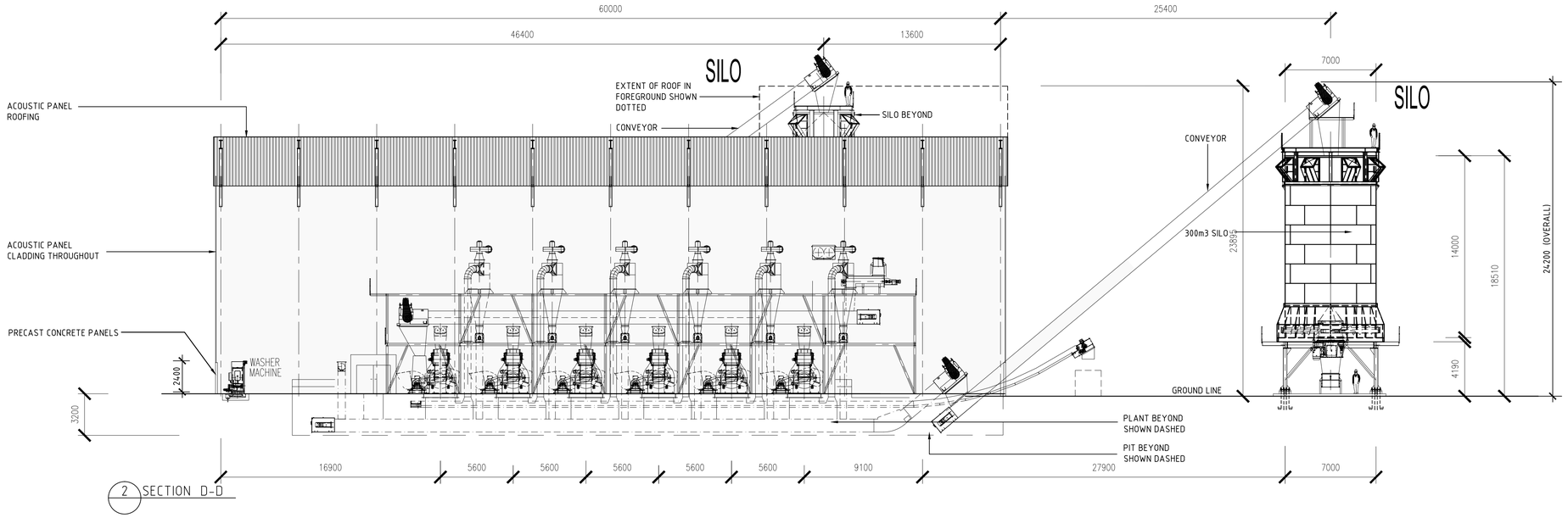
Drawing
FLAKERS BUILDING (SHT 2)

Scale	Stage
APPROX 1:200 (@ A1)	DA

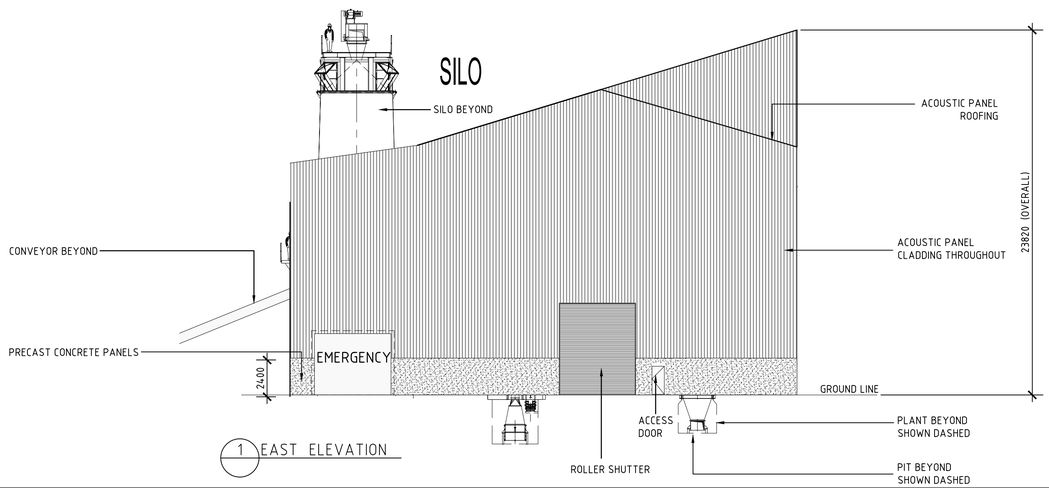
Project Number	Drawing Number	Issue
19	DA 231	A



3 NORTH ELEVATION



2 SECTION D-D



1 EAST ELEVATION

LEGEND

Existing buildings

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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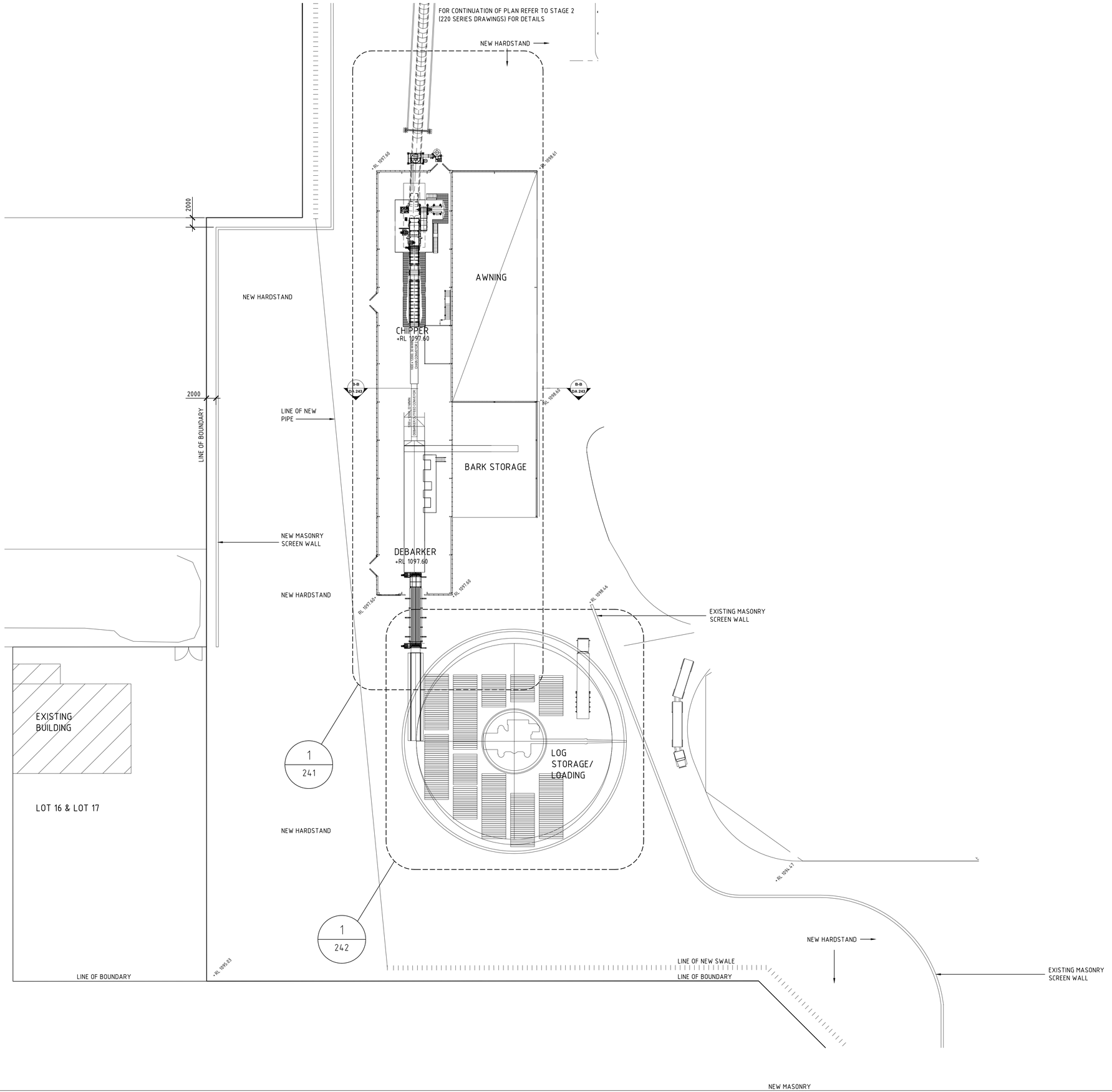
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
FLAKERS BUILDING (SHT 3)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 232	A



LEGEND

Existing buildings

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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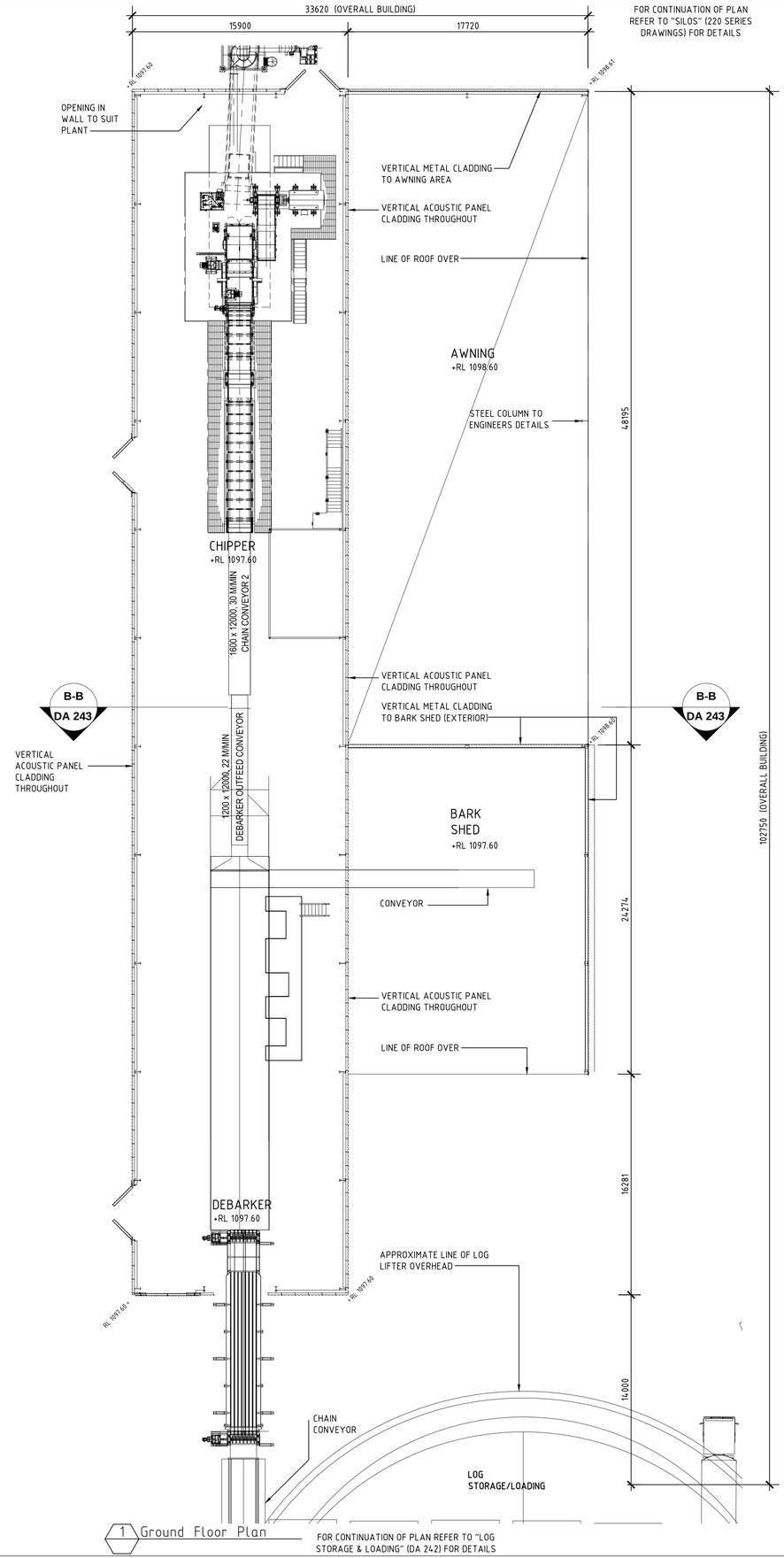
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

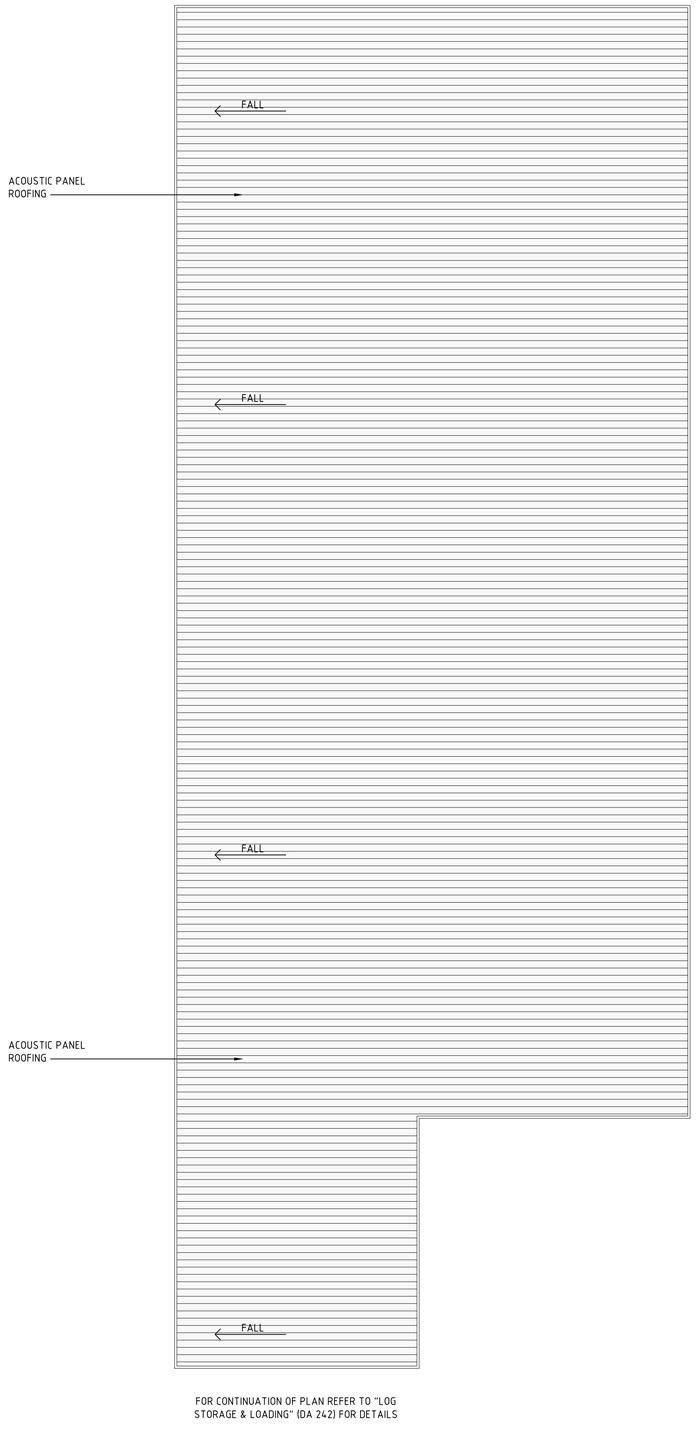
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
LOG STORE/LOAD, DEBARKER & CHIPPER (SHT 1)

Scale	Stage
APPROX 1:400 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 240	A





AREAS	
SPACE	AREA
ENCLOSED	1844
COVERED	856
TOTAL	2700 m²

LEGEND

Existing buildings

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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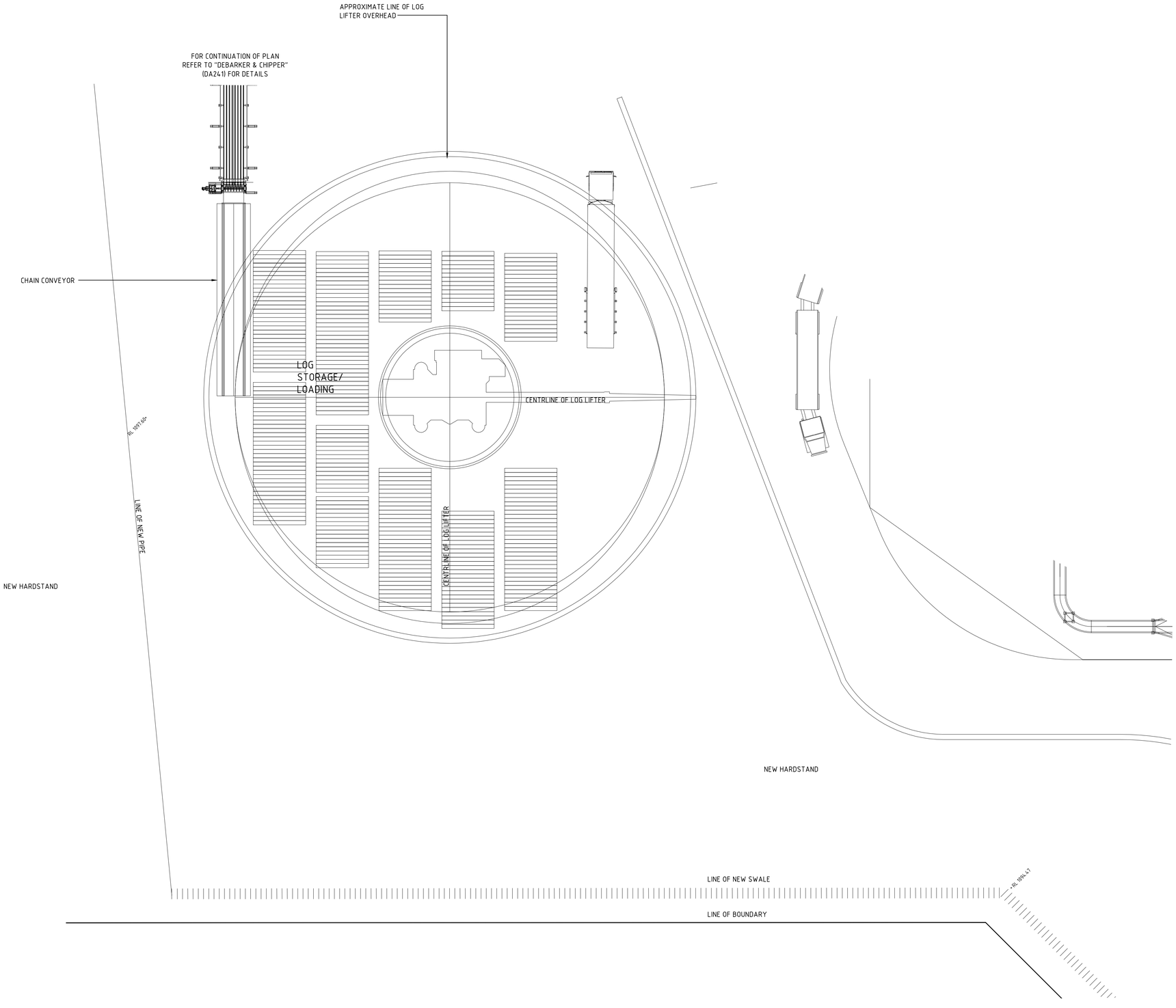
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
LOG STORE/LOAD, DEBARKER & CHIPPER (SHT 2)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 241	A



1 Ground Floor Plan

LEGEND

Existing buildings

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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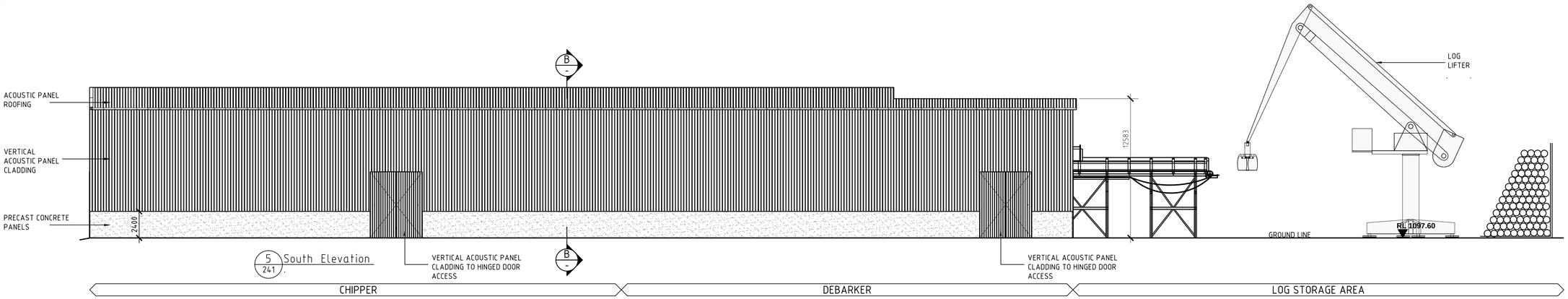
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

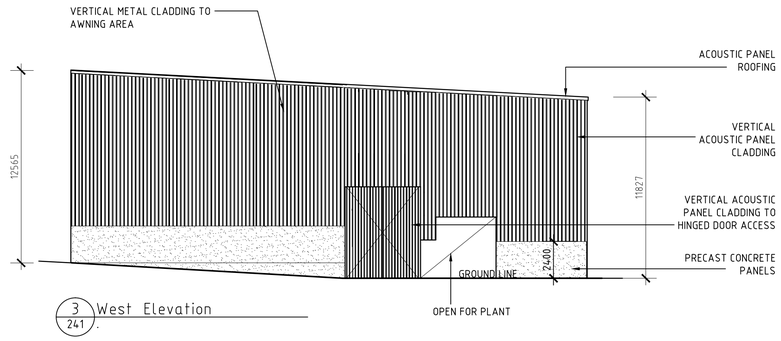
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

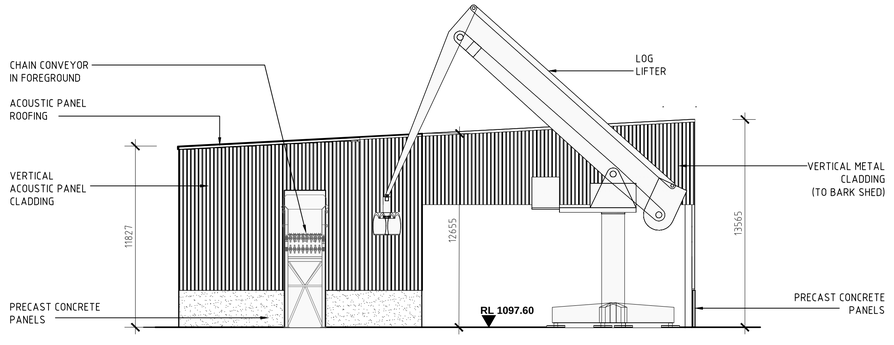
Drawing
LOG STORE/LOAD, DEBARKER & CHIPPER (SHT 3)

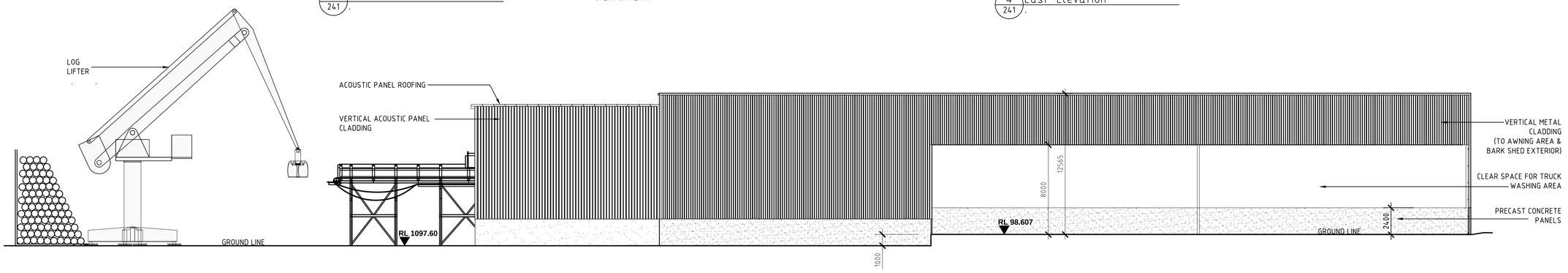
Scale	Stage
APPROX 1:200 (@ A1)	DA

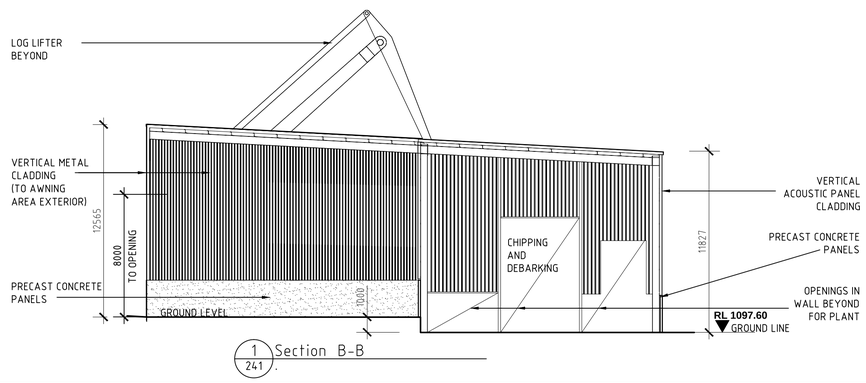
Project Number	Drawing Number	Issue
19	DA 242	A











NOTE:

EXISTING GROUND LINES ARE SHOWN AT SITE BOUNDARY UNLESS NOTED OTHERWISE

PLANT IN BACKGROUND IS SHOWN DIAGRAMATICALLY ONLY

LEGEND:

NEW WORKS:
WAREHOUSE & PRODUCTION BUILDINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
LOG STORE/LOAD, DEBARKER & CHIPPER (SHT 4)

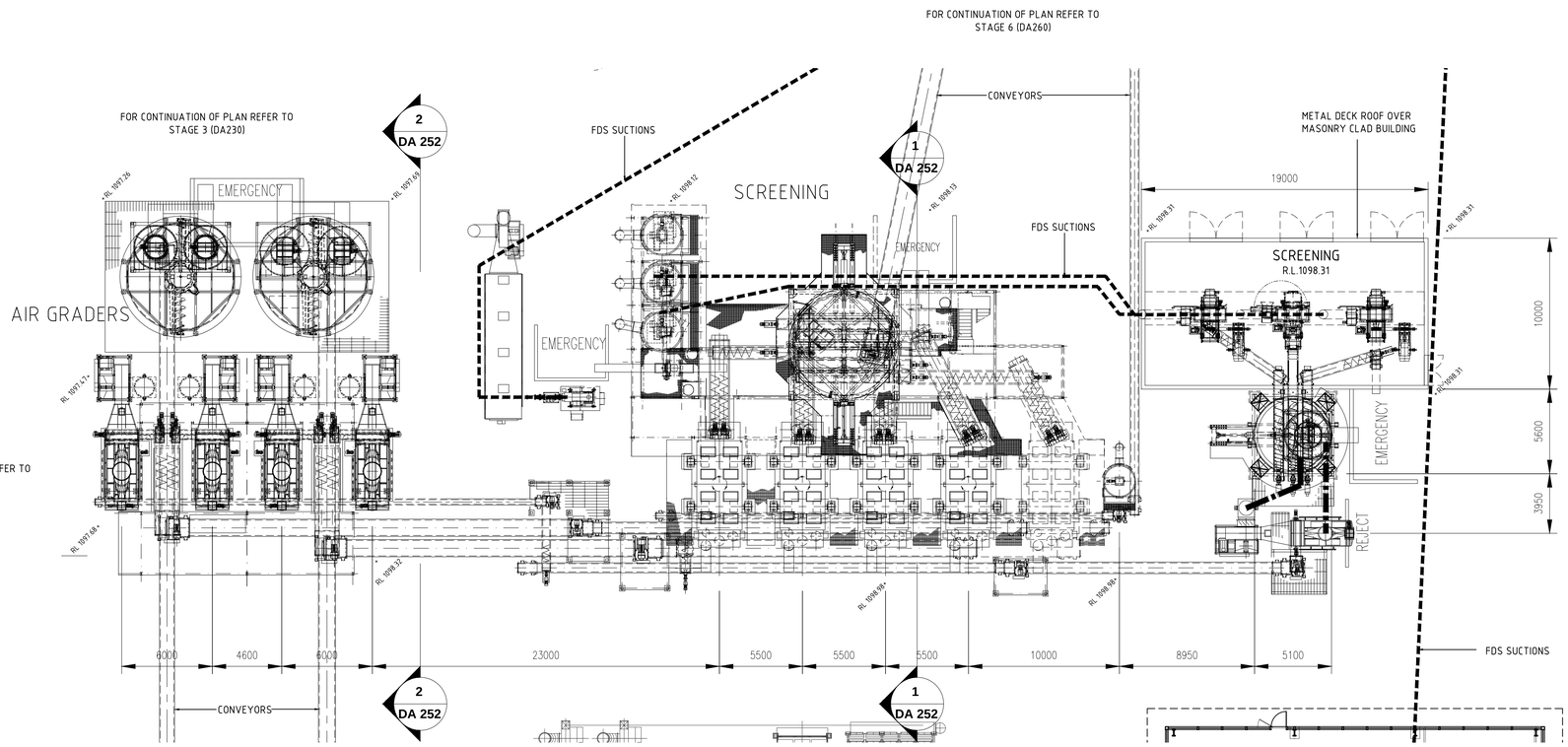
Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 243	A

AREAS	
SPACE	AREA
SCREENING	190 m^2

LEGEND

Existing buildings



1 Ground Floor Plan

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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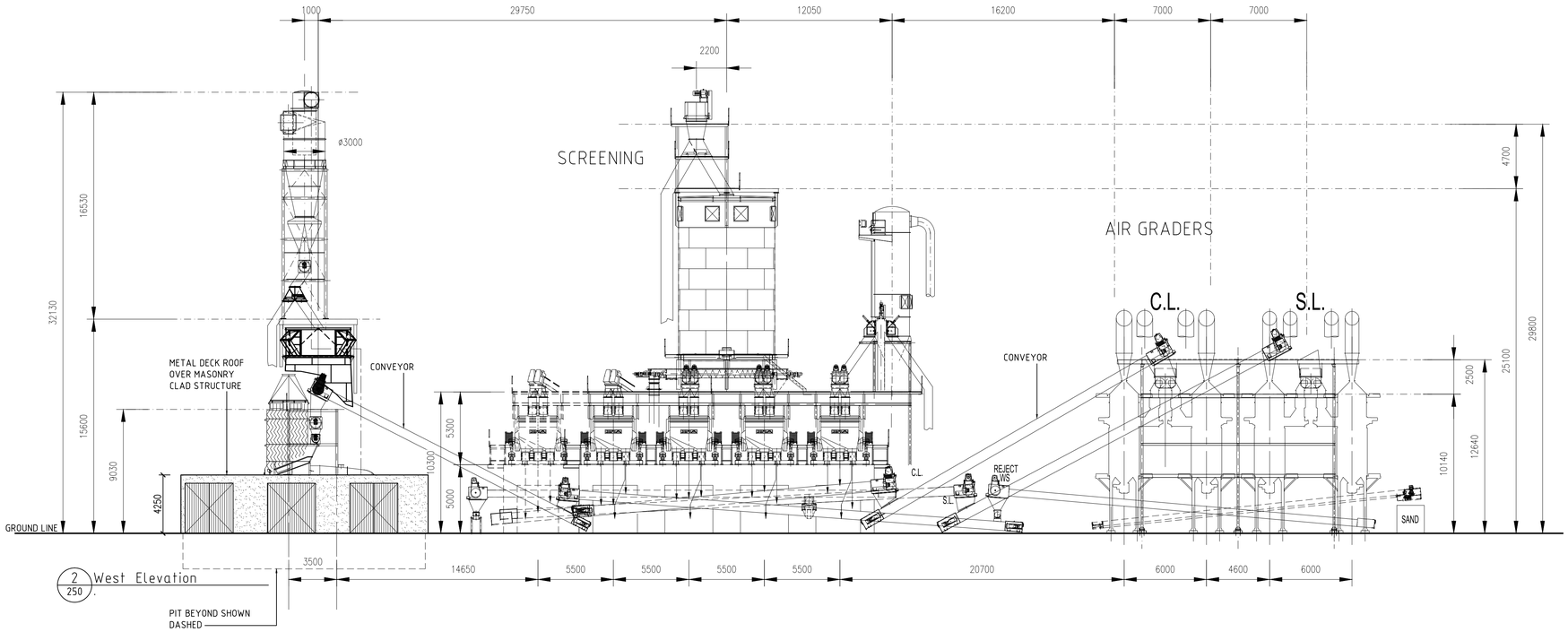
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
AIR GRADERS & SCREENING (SHT 1)

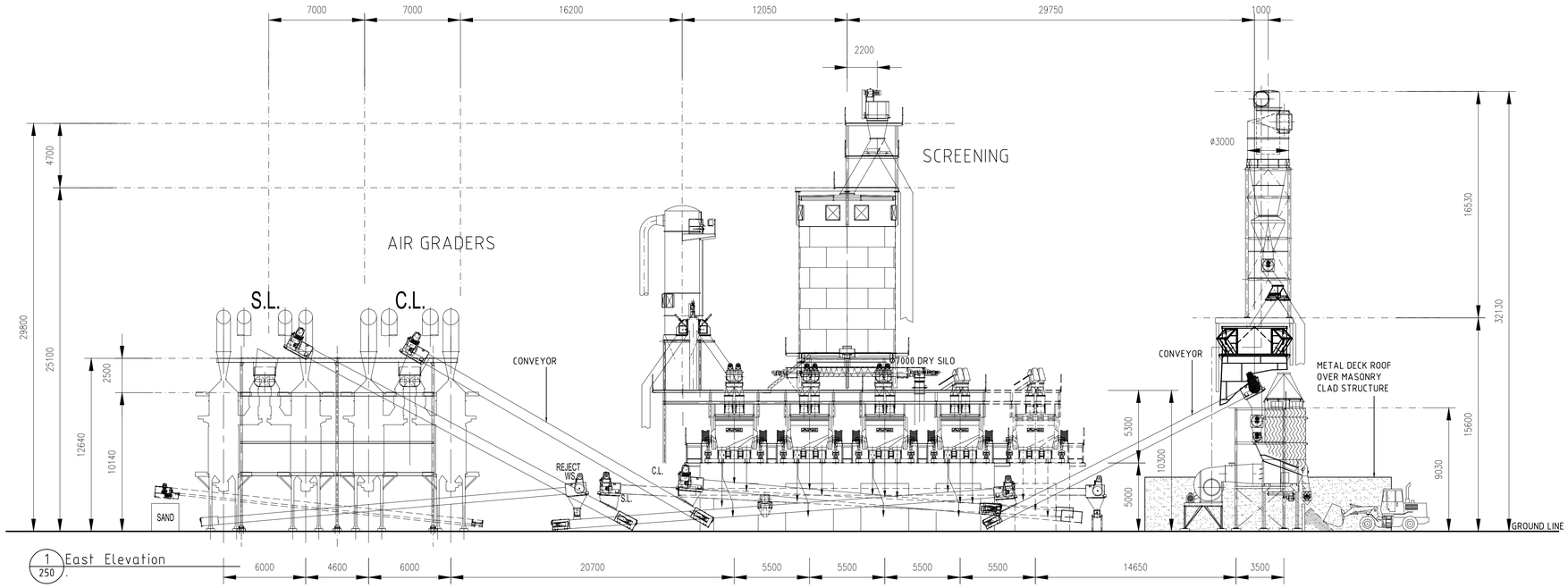
Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 250	A



2 / 250 West Elevation

PIT BEYOND SHOWN DASHED



1 / 250 East Elevation

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
AIR GRADERS & SCREENING (SHT 2)

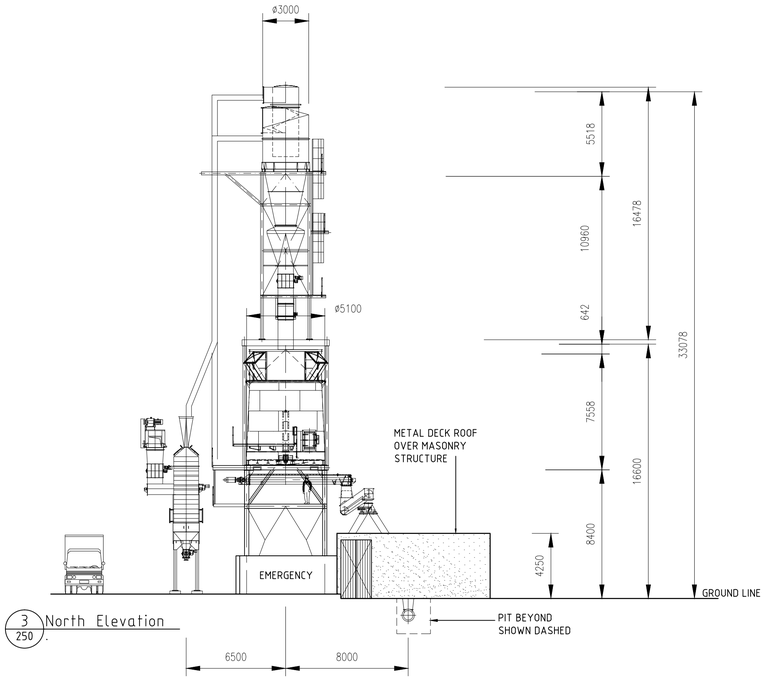
Scale
APPROX 1:200 (@ A1)

Stage
DA

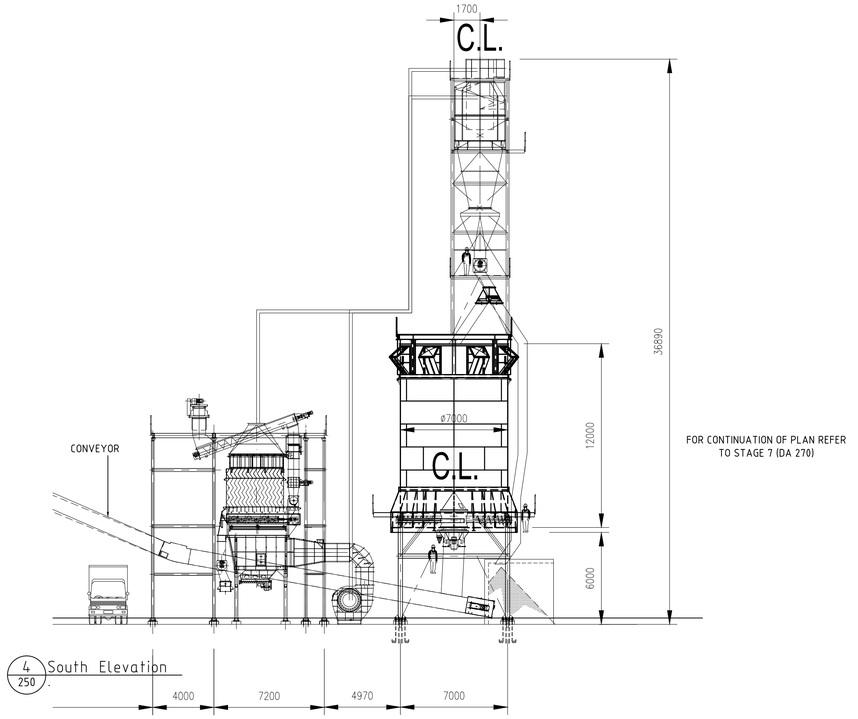
Project Number
19

Drawing Number
DA 251

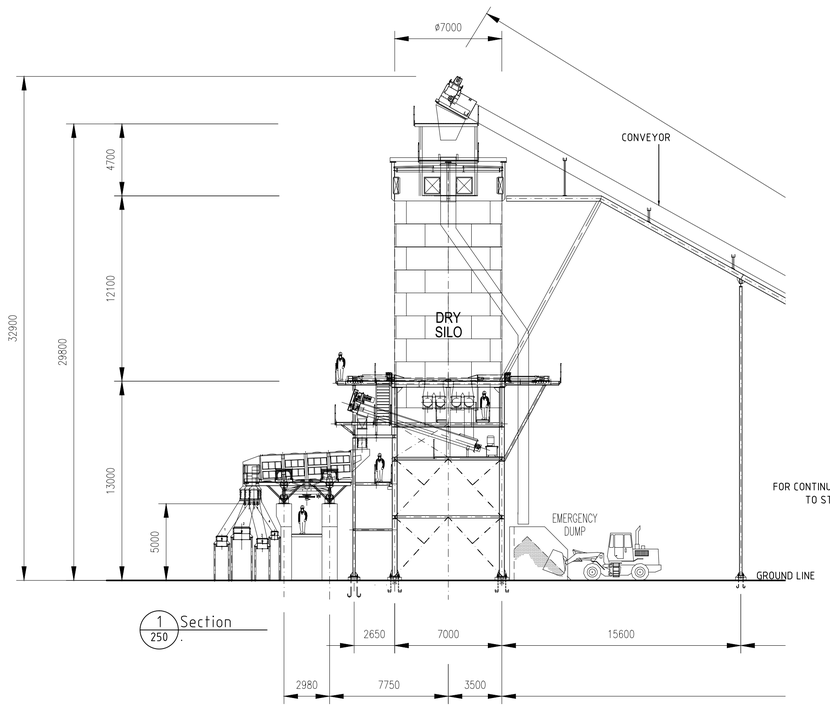
Issue
A



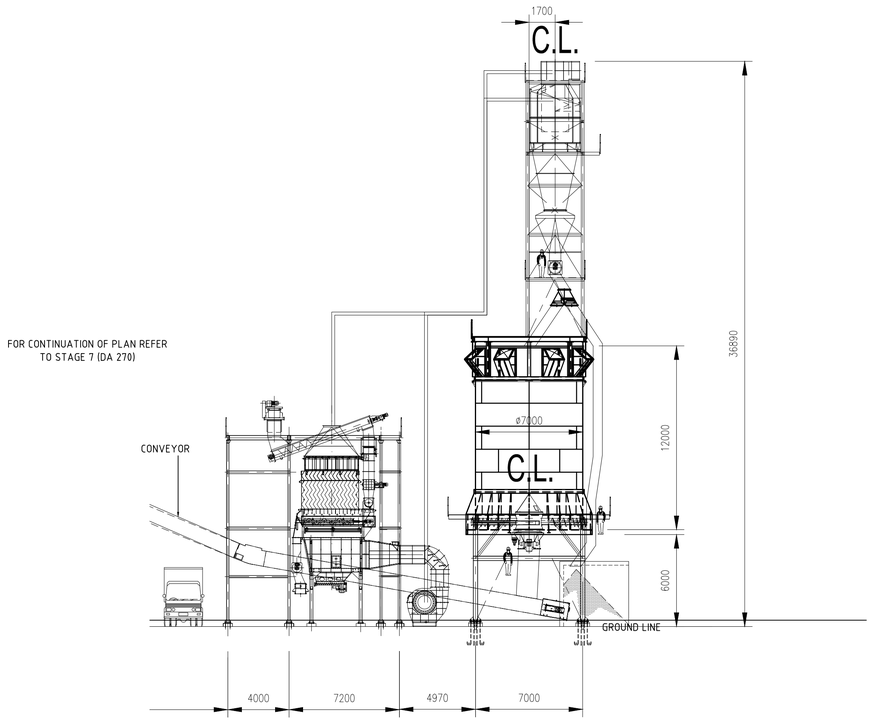
3/250 North Elevation



4/250 South Elevation



1/250 Section



2/250 Section

NOTE:

EXISTING GROUND LINES ARE SHOWN AT SITE BOUNDARY UNLESS NOTED OTHERWISE

PLANT IN BACKGROUND IS SHOWN DIAGRAMATICALLY ONLY

LEGEND:

NEW WORKS:
WAREHOUSE & PRODUCTION BUILDINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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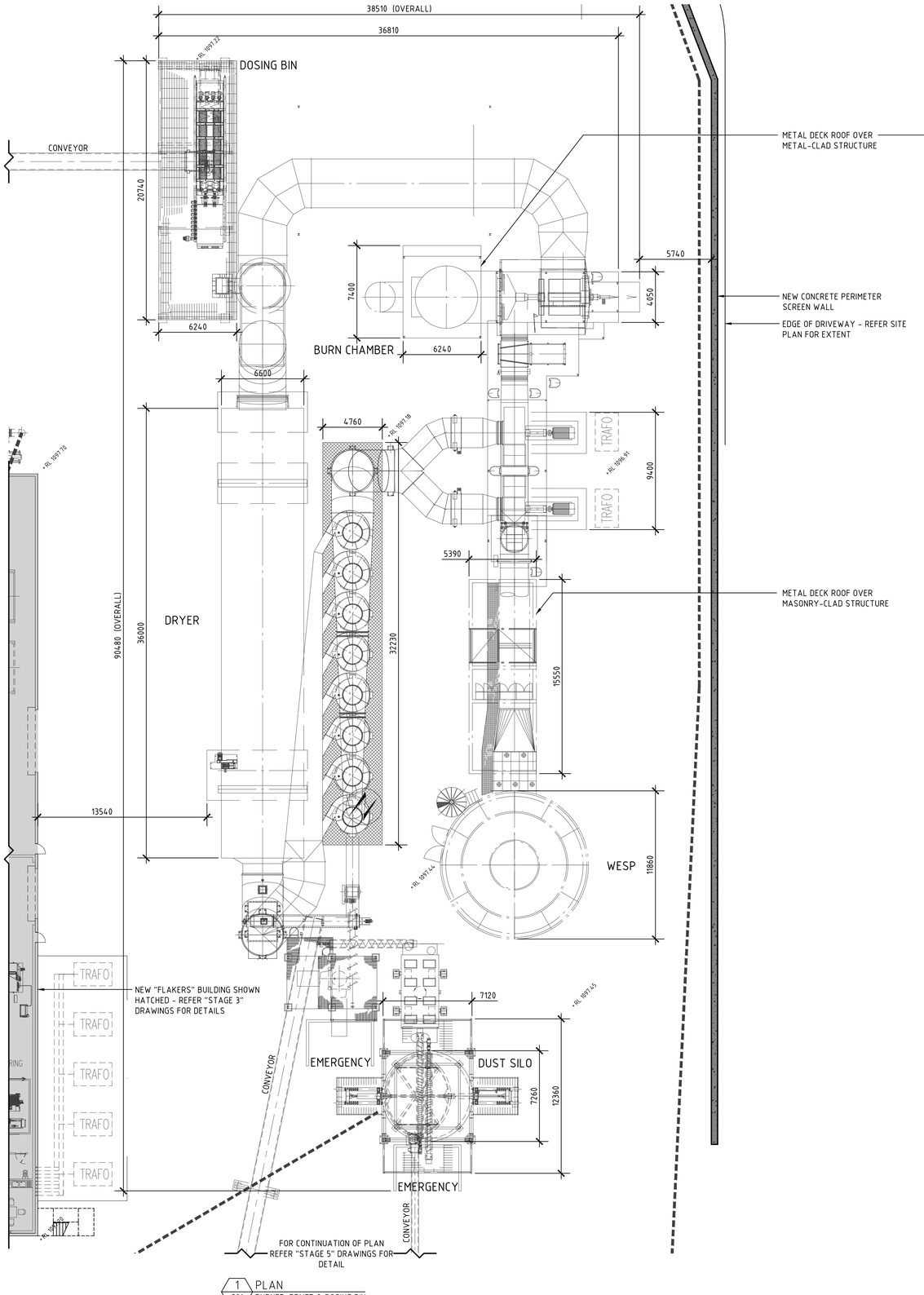
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

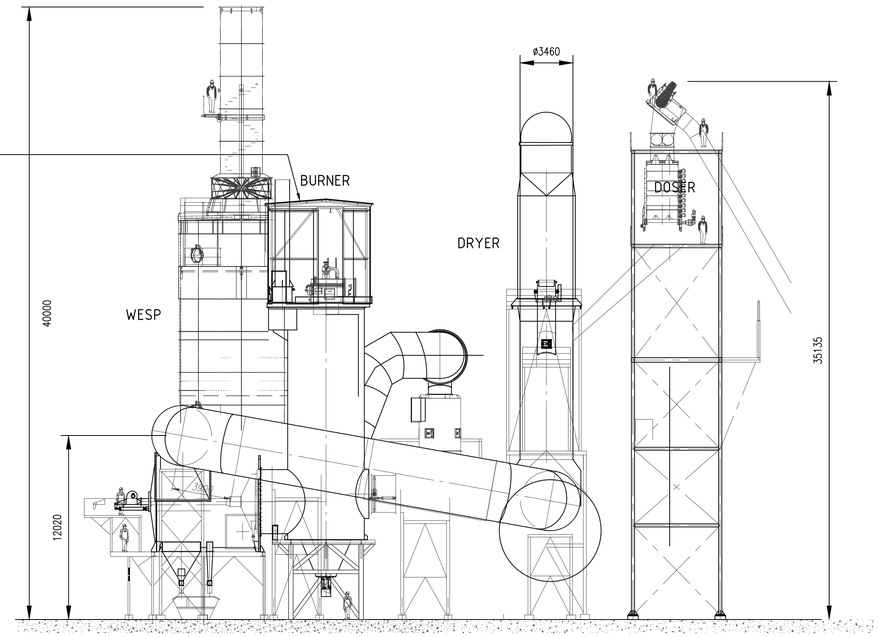
Drawing
AIR GRADERS & SCREENING (SHT 3)

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 252	A



1/201 PLAN
BURNER, DRYER & DOSING BIN



2 WEST ELEVATION

NOTE:

LEGEND:

NEW BUILDINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

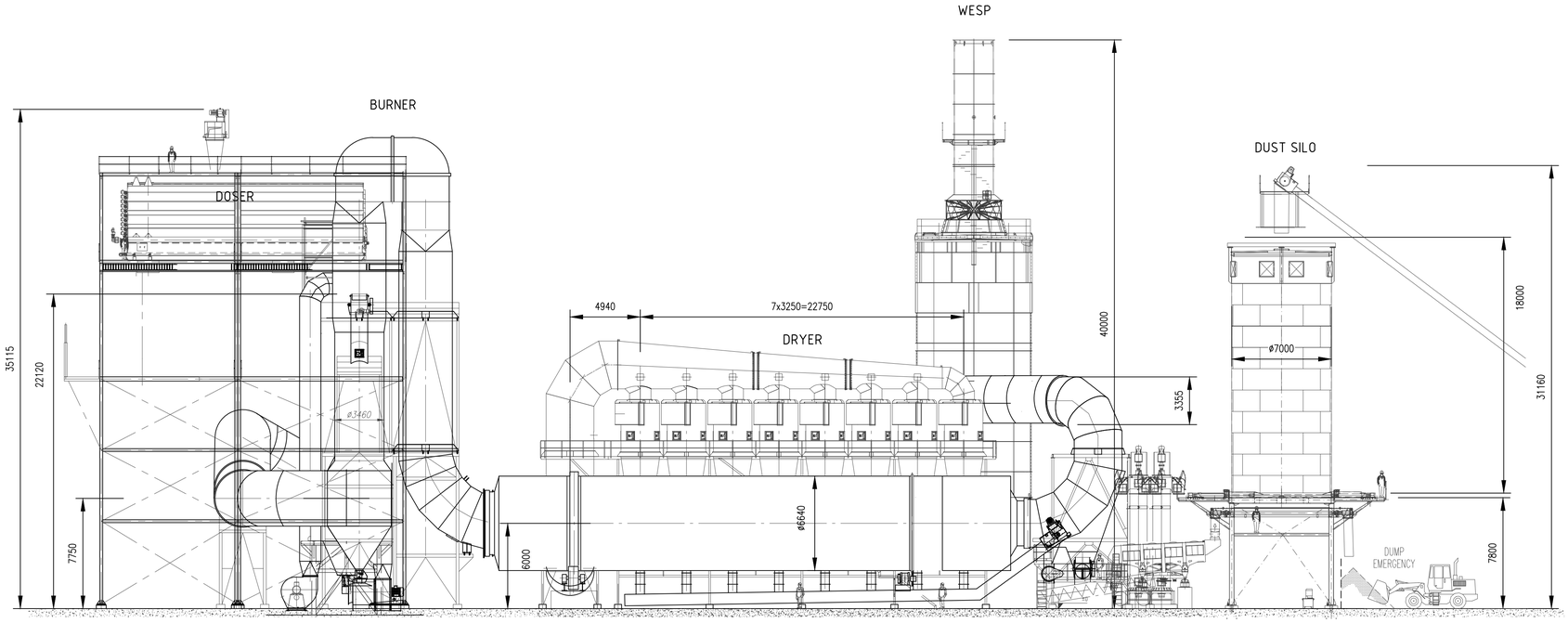
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
BURNER & DRYER (SHT 1)

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 260	A

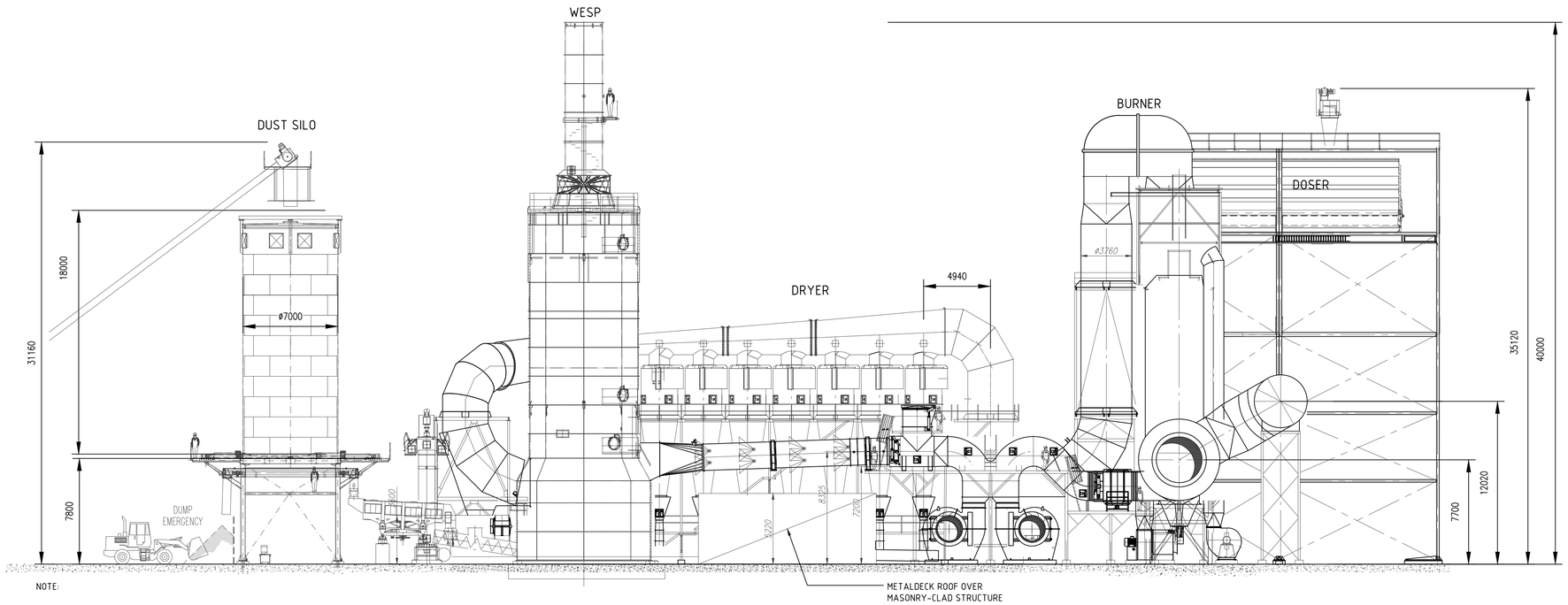
NOTE:



1 SOUTH ELEVATION

NOTE:

FOR CONTINUATION OF ELEVATION
REFER "STAGE 5" DRAWINGS FOR
DETAIL



NOTE:

FOR CONTINUATION OF ELEVATION
REFER "STAGE 5" DRAWINGS FOR
DETAIL

2 NORTH ELEVATION

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
BURNER & DRYER (SHT 2)

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 261	A

NOTE:

LEGEND:

- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ROOF PLAN)
- PROPOSED NEW BUILDINGS (ROOF PLAN)

FACE OF EXISTING BLDG

231745 (OVERALL)

17550 | 156005 | 25120 | 58190 | 7800

EX. PILOT PLANT

NEW ADMIN

EXISTING WAREHOUSE
RL 1095.57

EXISTING MOULD PLANT
RL 1095.57

EXISTING BUILDING
RL 1098.92

NEW PRESS BUILDING
(RL 1098.92)

NEW PRESS BLDG
RL 1099.48

NEW CRANE BUILDING
RL 1098.92

STORAGE

EXISTING CRANE BLDG
RL 1095.57

NEW STACK –
1.6m DIA. x 40m HIGH

CONTROL ROOM

EMERGENCY

GLUING | FORMING | CONTIROLL PRESS | TRIMMING | COOLING | STACKING

584.0 | 15565 | 6190 | 26740 | 42305 (OVERALL)

RL 1098.92 | RL 1098.92 | RL 1098.92 | RL 1098.92

RL 1099.13 | RL 1099.41 | RL 1099.41 | RL 1099.36

EXISTING MAIN PRODUCTION HALL
RL 1099.41

EXISTING SAWING PLANT
RL 1095.41

NEW ADDITIONAL SANDER
(REFER DA-290 FOR DETAILS)

HYDRAULICS ROOM

ACCESS STAIR

ROLLER PAINTER

1 / 281 | 1 / 271 | 2 / 271 | 1 / 272 | 2 / 272 | 3 / 272 | A / 274 | B / 276

1 REFERENCE PLAN

AREAS

SPACE	AREA
GROUND FLOOR	9144
FIRST FLOOR	274
TOTAL	9418 m²

EXISTING BUILDING
(SHOWN SHADED) - TYPICAL

NEW PRE-COLOURED METAL
BULLNOSE PROFILE - TYPICAL
(SIMILAR TO EXISTING)

EX. BOX GUTTER | EX. FALL | FALL

NEW BOX GUTTER | EX. BOX GUTTER

5° FALL | 10° FALL | 15° FALL

N.B.G. | NEW BOX GUTTER (N.B.G.) | EX. BOX GUTTER

EXISTING ROOF

2 ROOF PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
PRESS BUILDING (SHT 1)

Scale	Stage
1:500 (@ A1)	DA

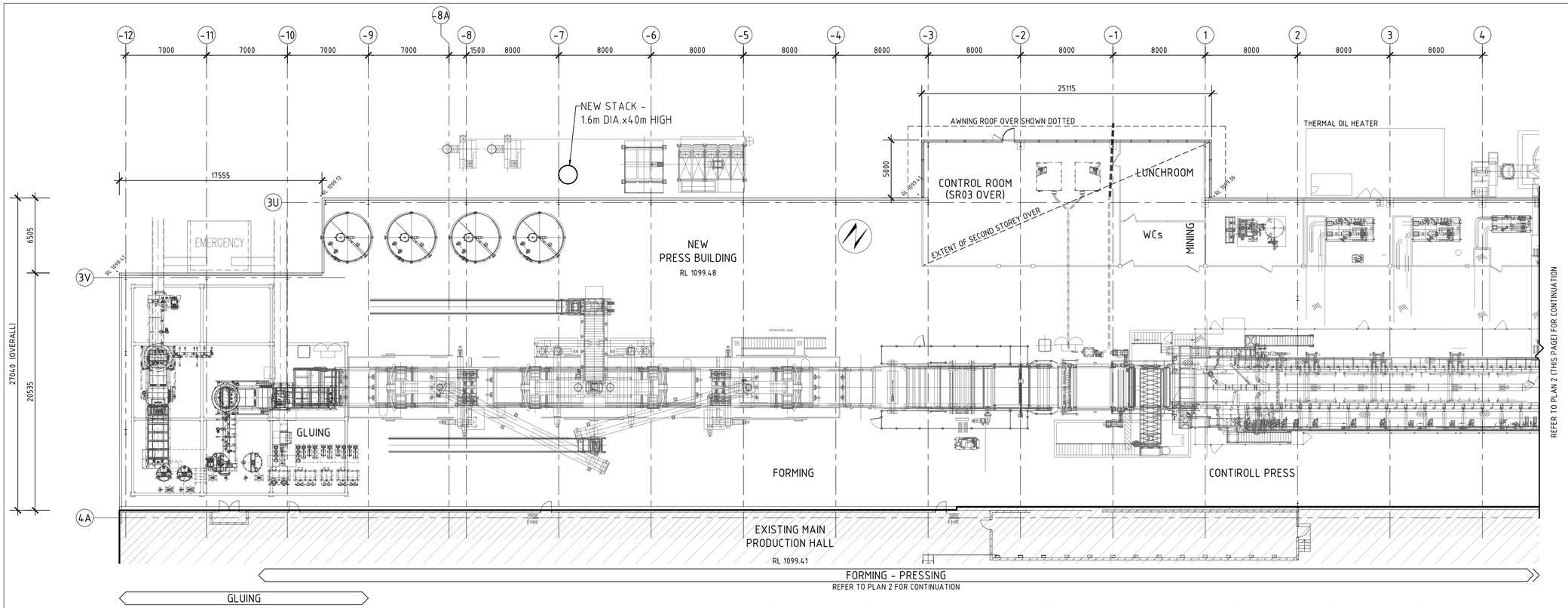
Project Number	Drawing Number	Issue
19	DA 270	A

NOTE:

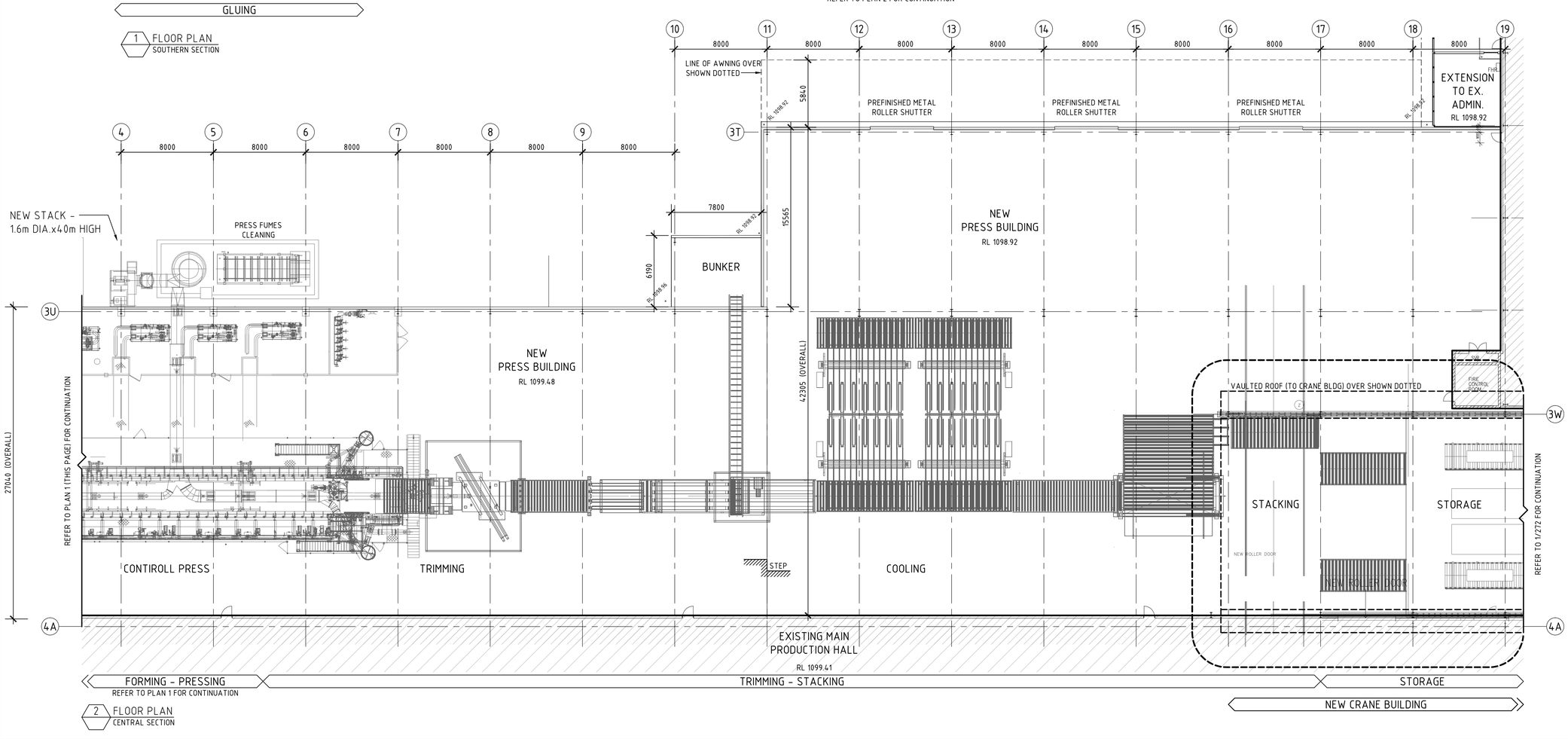
PART PLANS SHOWN ON THIS DRAWING - REFER TO REFERENCE PLAN FOR DIMENSIONS OF PRESS BUILDING IN ITS ENTIRETY

LEGEND:

EXISTING BUILDINGS



1 FLOOR PLAN SOUTHERN SECTION



2 FLOOR PLAN CENTRAL SECTION

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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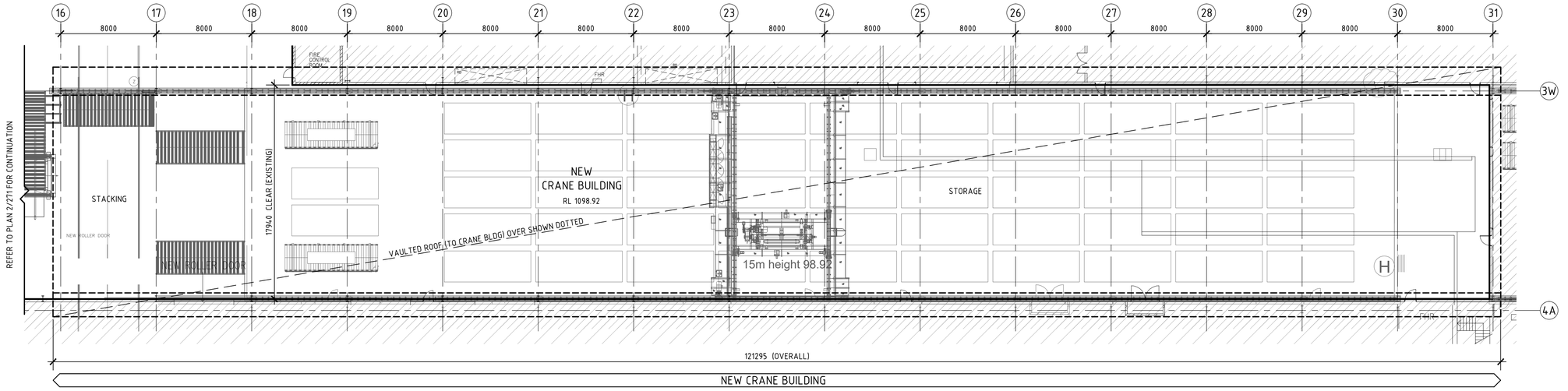
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

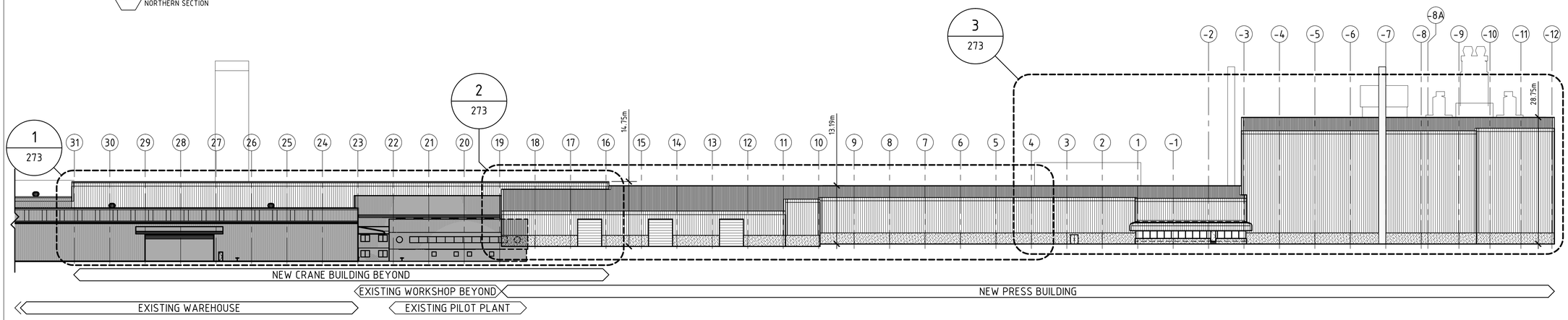
Drawing
PRESS BUILDING (SHT 2)

Scale	Stage
1:200 (@ A1)	DA

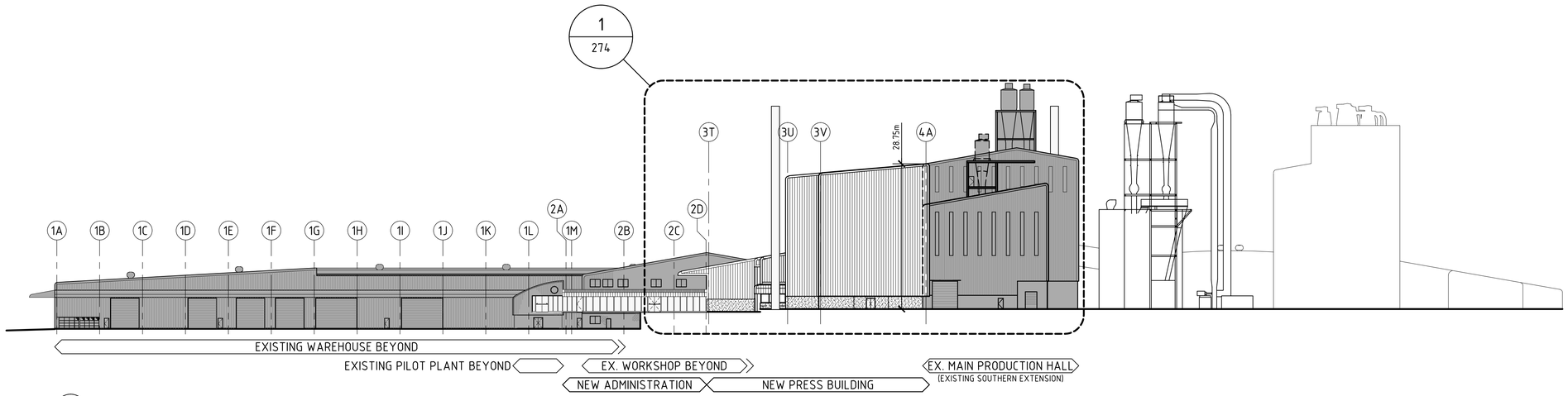
Project Number	Drawing Number	Issue
19	DA 271	A



1 FLOOR PLAN
NORTHERN SECTION



2 WEST ELEVATION
FROM LOWES MOUNT ROAD (REFERENCE ELEVATION) 1:500



3 SOUTH ELEVATION
(REFERENCE ELEVATION) 1:500

NOTE:

PART PLAN SHOWN ON THIS DRAWING - REFER TO REFERENCE PLAN FOR DIMENSIONS OF PRESS BUILDING IN ITS ENTIRETY

LEGEND:

- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ELEVATIONS)
- PROPOSED NEW BUILDINGS (ELEVATIONS)

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H	

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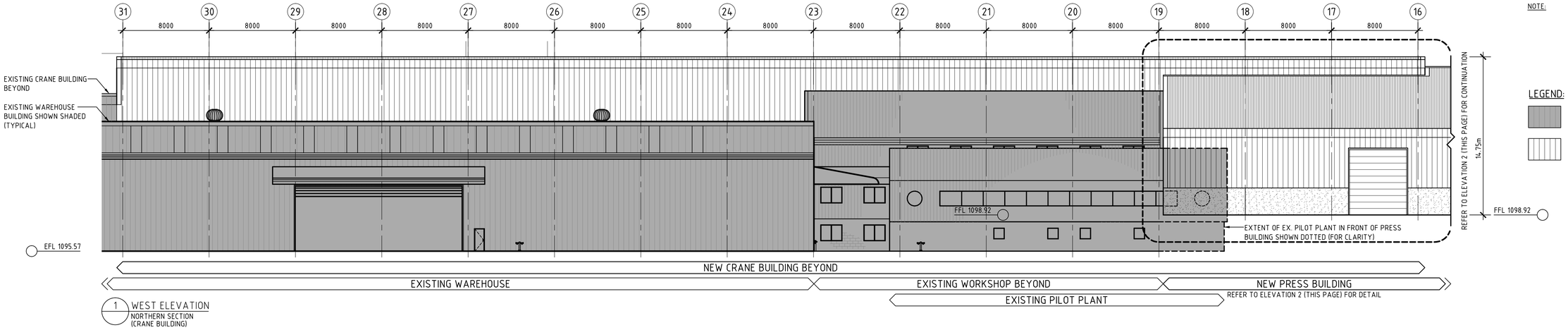
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

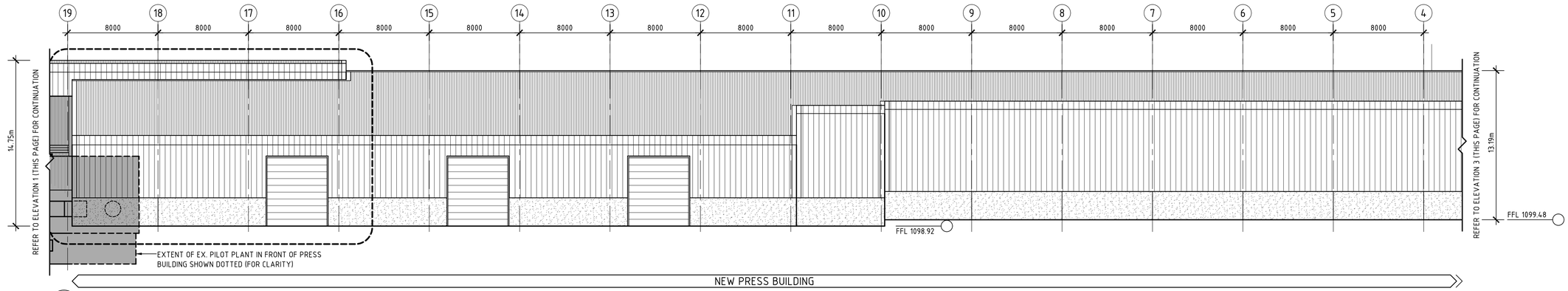
Drawing
PRESS BUILDING (SHT 3)

Scale	Stage
1:200 (@ A1) U.N.O.	DA

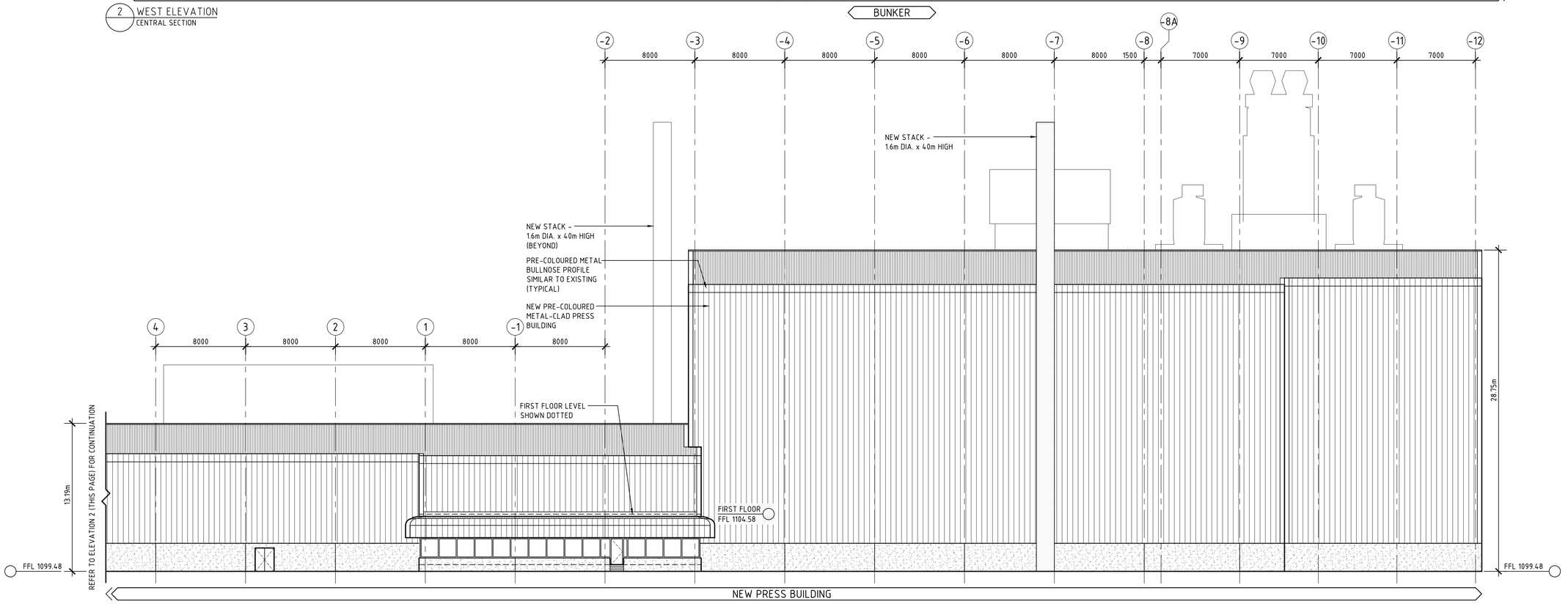
Project Number	Drawing Number	Issue
19	DA 272	A



1 WEST ELEVATION
NORTHERN SECTION
(CRANE BUILDING)



2 WEST ELEVATION
CENTRAL SECTION



3 WEST ELEVATION
SOUTHERN SECTION

NOTE:

LEGEND:
- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H	

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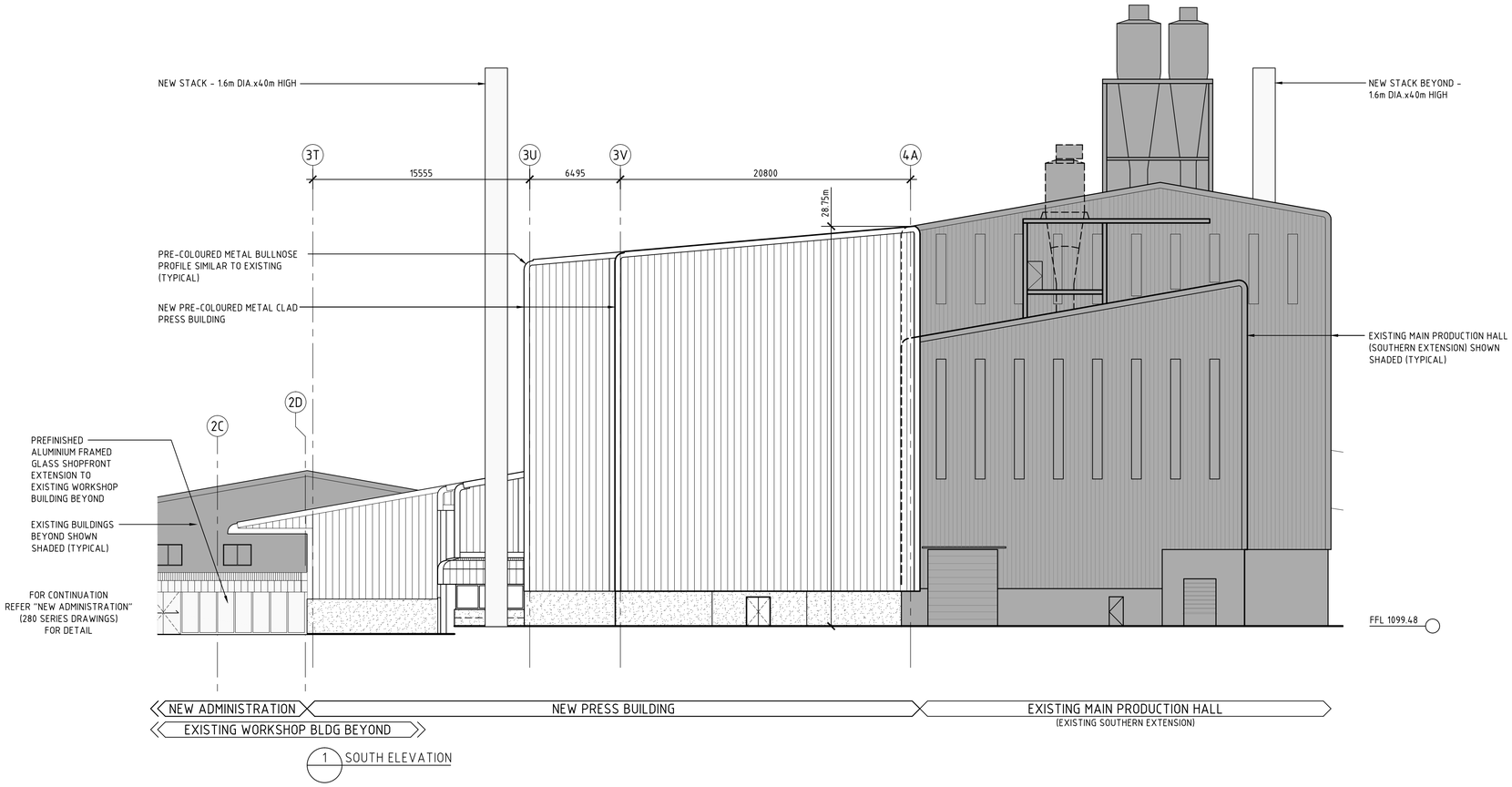
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

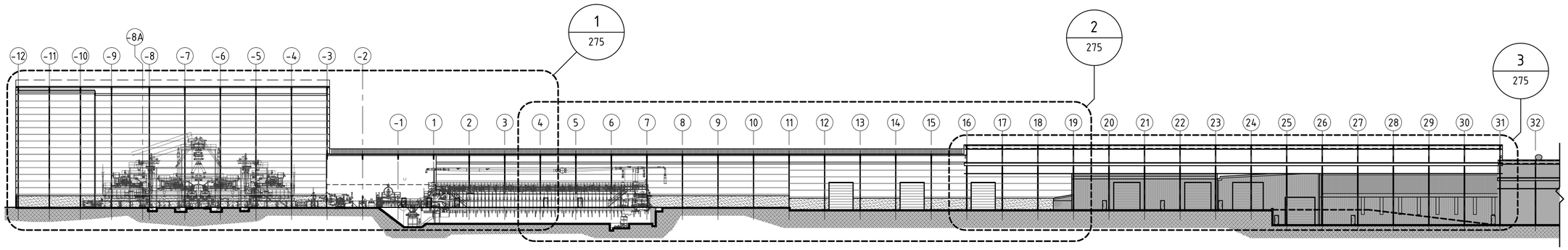
Drawing
PRESS BUILDING (SHT 4)

Scale	Stage
1:200 (@ A1) U.N.O.	DA

Project Number	Drawing Number	Issue
19	DA 273	A



1 / SOUTH ELEVATION



2 / 270 LONG SECTION A-A
LOOKING WEST 1:500
(TOWARDS LOWES MOUNT ROAD)

NOTE:

LEGEND:

EXISTING BUILDINGS

PROPOSED NEW BUILDINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
PRESS BUILDING (SHT 5)

Scale
1:200 (@ A1) U.N.O.

Stage
DA

Project Number
19

Drawing Number
DA 274

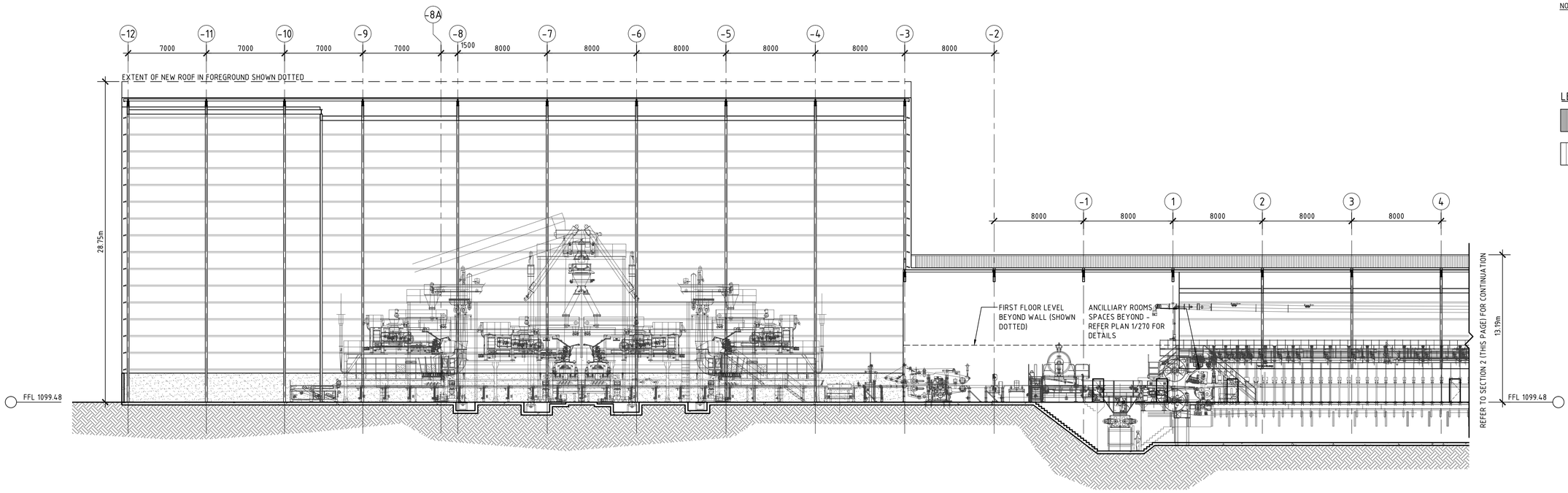
Issue
A

NOTE:

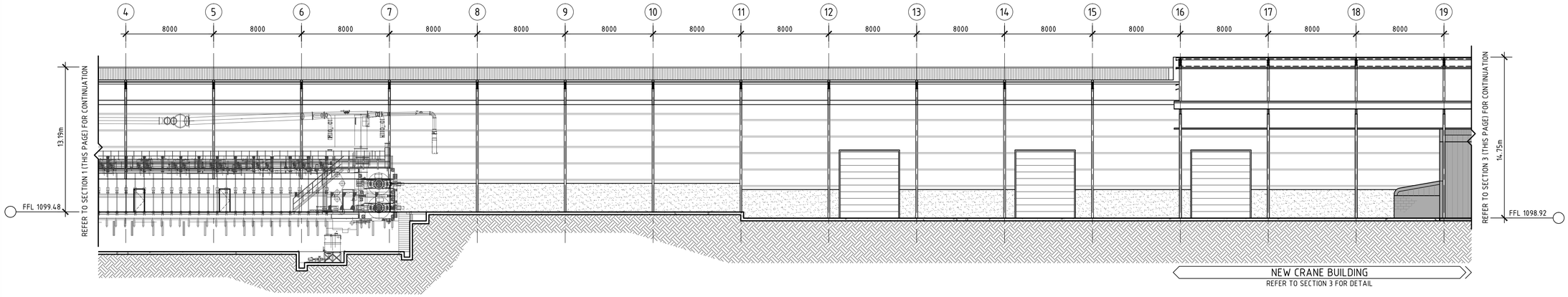
LEGEND:

EXISTING BUILDINGS

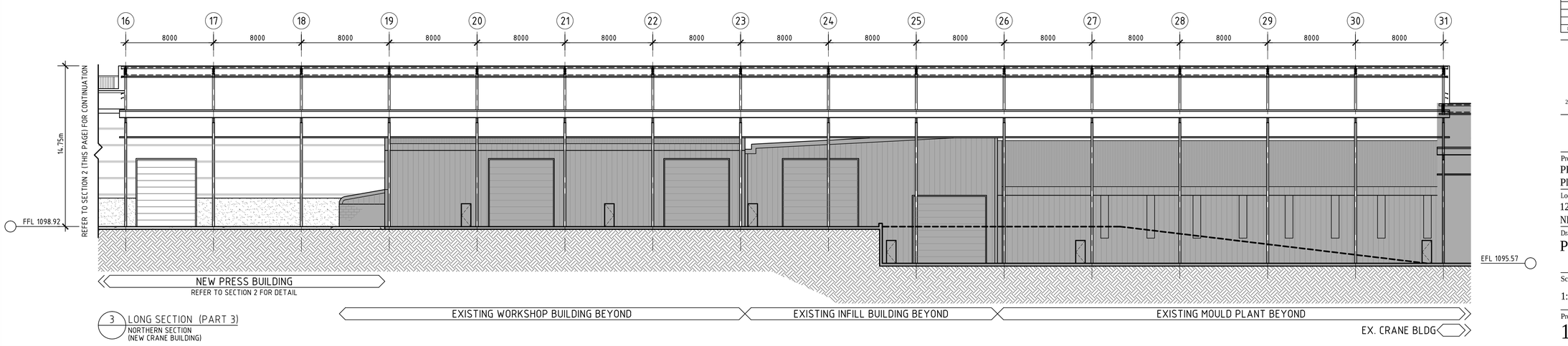
PROPOSED NEW BUILDINGS



1 LONG SECTION (PART 1)
SOUTHERN SECTION



2 LONG SECTION (PART 2)
CENTRAL SECTION



3 LONG SECTION (PART 3)
NORTHERN SECTION
(NEW CRANE BUILDING)

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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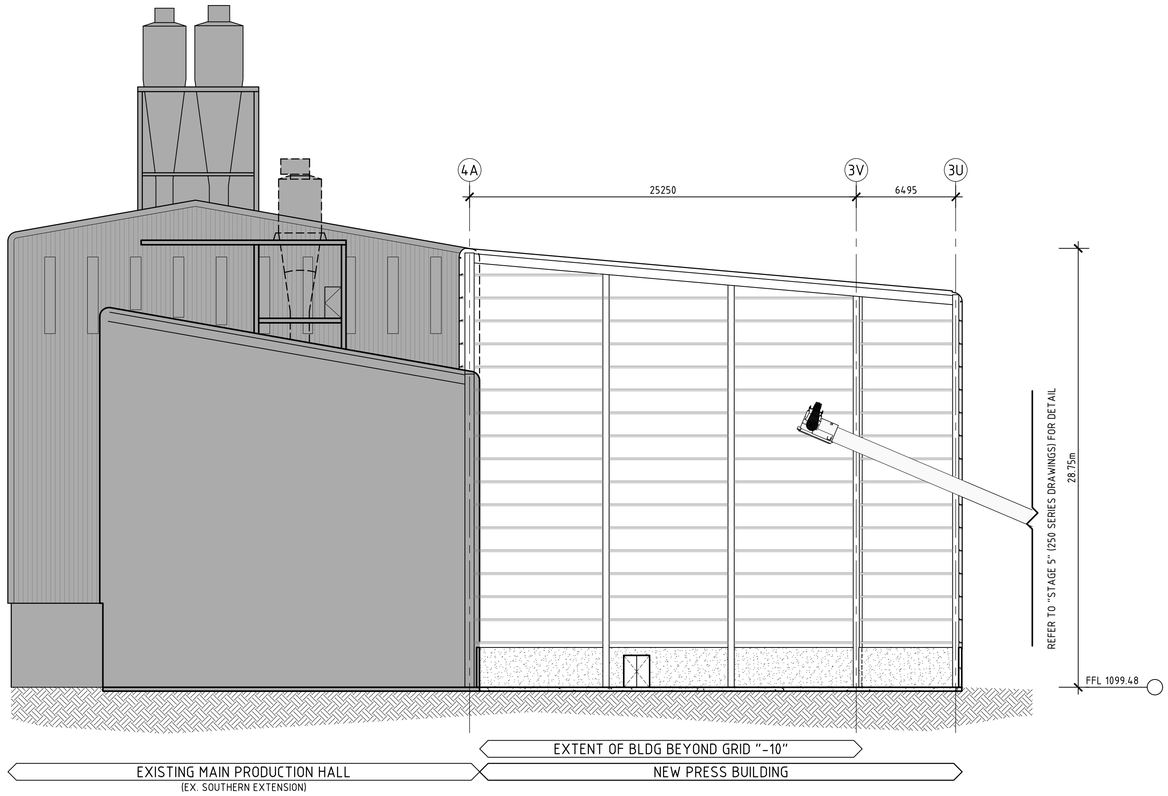
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
PRESS BUILDING (SHT 6)

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 275	A



1/270 SECTION B-B

NOTE:

LEGEND:

EXISTING BUILDINGS

PROPOSED NEW BUILDINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
PRESS BUILDING (SHT 7)

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 276	A

LEGEND:

EXISTING BUILDINGS

DRIVEWAY ENTRY

EXISTING TRANSFORMER YARD

EXISTING SWALE DRAINAGE CHANNEL

EXISTING FIRE PUMP

CONTROL RM

RL 1096.46

RL 1095.57

282

NEW SCREEN WALL

NEW SLIDING GATE

10000

NEW GATEHOUSE

NEW OFFICE BLOCK

MEET 1

LWC

MEET 2

2 VISITORS' CAR SPACES

3 VISITORS' CAR SPACES

NEW SLIDING GATE 10000

NEW HARDSTAND THROUGHOUT

1 2 3 4 5 6 7 8 9 10 11

1 (V) 2 (V) 3 (V) 4 (V) 5 (V)

23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44

281

FOR CONTINUATION OF PLAN REFER TO STAGE 8 (280 SERIES DRAWINGS)

12 13 14 15 16 17 18 19 20 21 22

RL 1097.33

RL 1097.25

153 CAR SPACES

45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66

NEW RETAINING WALL

RL 1097.86

RL 1095.57

RL 1097.72

3 DISABLED CAR SPACES

1 (D) 2 (D) 3 (D)

RL 1098.92

PILOT PLANT

85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107

EXISTING SUBSTATION

73 74 75 76 77 78

RL 1098.17

RL 1098.67

67 68 69 70 71 72

79 80 81 82 83 84

108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130

131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153

NEW ADMIN BUILDING

EX. ADMIN BUILDING

RL 1098.20

MALE

WT

FEMALE

STAGE 1 STAIR

2456

FIRE

NEW HARDSTAND THROUGHOUT

270

FOR CONTINUATION OF PLAN REFER TO STAGE 7 (270 SERIES DRAWINGS)

PRESS FUMES CLEANING

RL 1098.92

RL 1098.96

NEW PRESS BUILDING

Room

RL 1097.36

THERMAL OIL HEATER

Entleerpume fill and drain pump

Heaters 1 circuit 1

Heaters 3 circuit 3

Heaters 5 circuit 5

Minifog

Cs

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

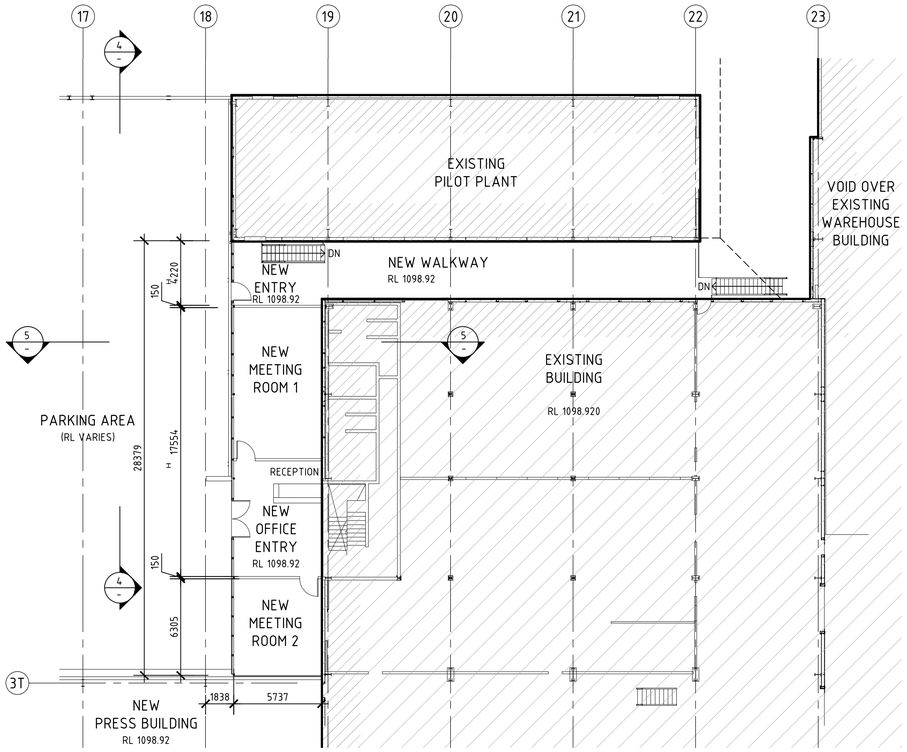
Drawing
RETAINING WALL, HARDSTAND, GATE HOUSE AND NEW ADMIN

Scale	Stage
APPROX 1:250 (@ A1)	DA

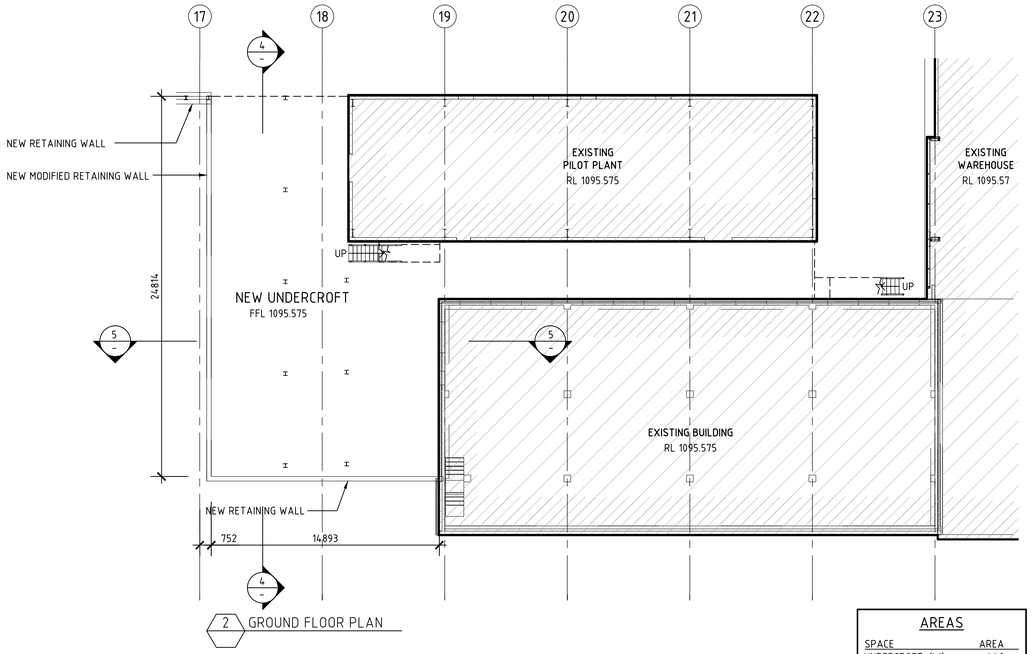
Project Number	Drawing Number	Issue
19	DA 280	A

1 DETAIL PLAN
290 SERIES DRAWINGS

NOTE:



1 / 201 LEVEL 1 FLOOR PLAN



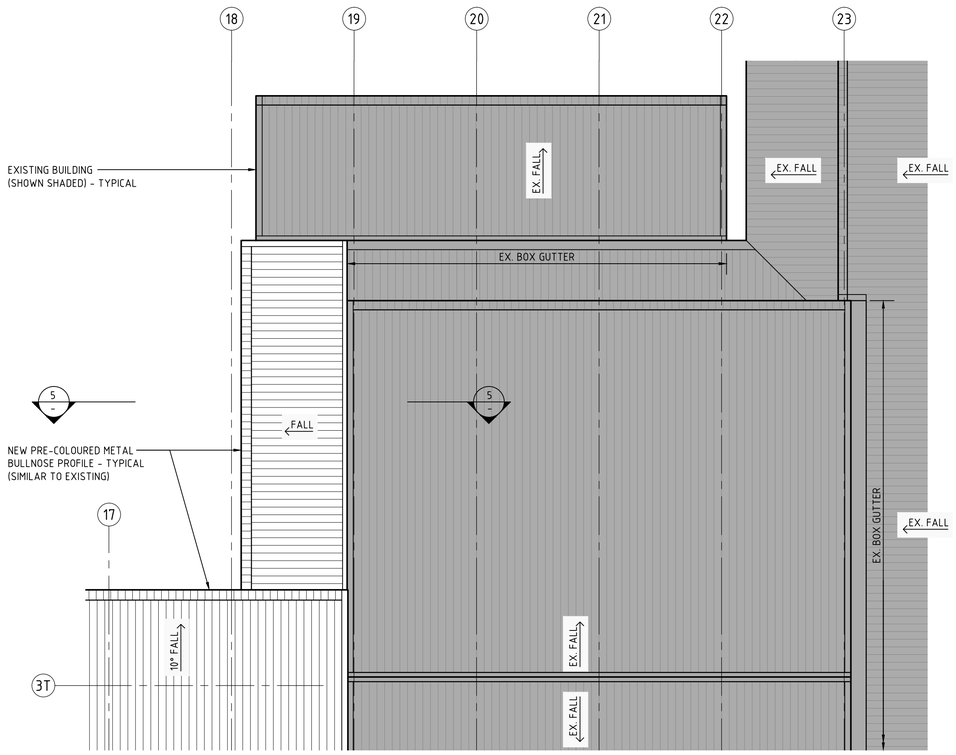
2 GROUND FLOOR PLAN

LEGEND:

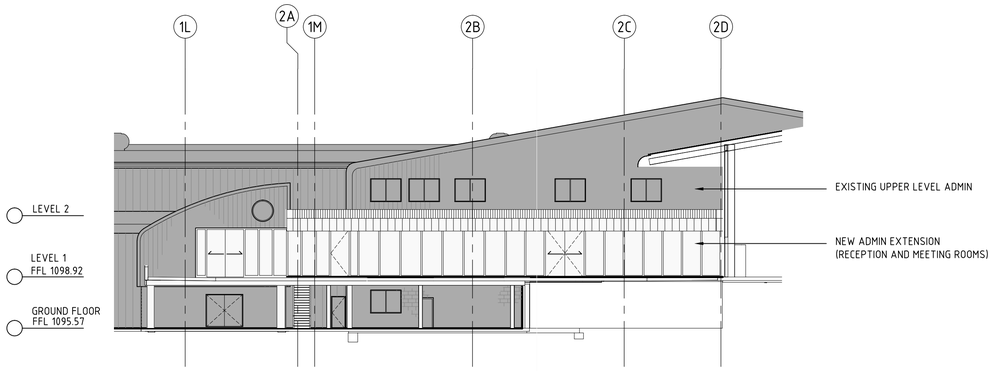
- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ROOF PLAN)
- PROPOSED NEW BUILDINGS (ROOF PLAN)

AREAS

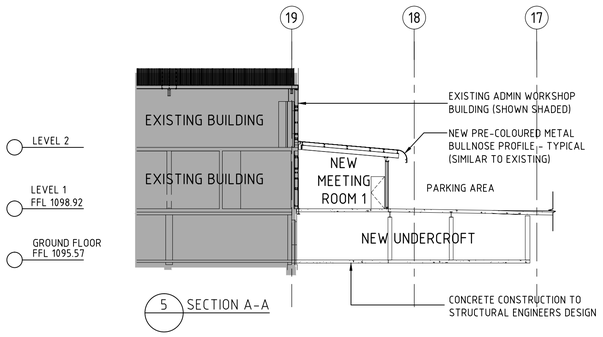
SPACE	AREA
UNDERCROFT (L1)	440
ENCLOSED (L2)	143
COVERED (L2)	144
TOTAL	727 m²



3 ROOF PLAN



4 SOUTH ELEVATION



5 SECTION A-A

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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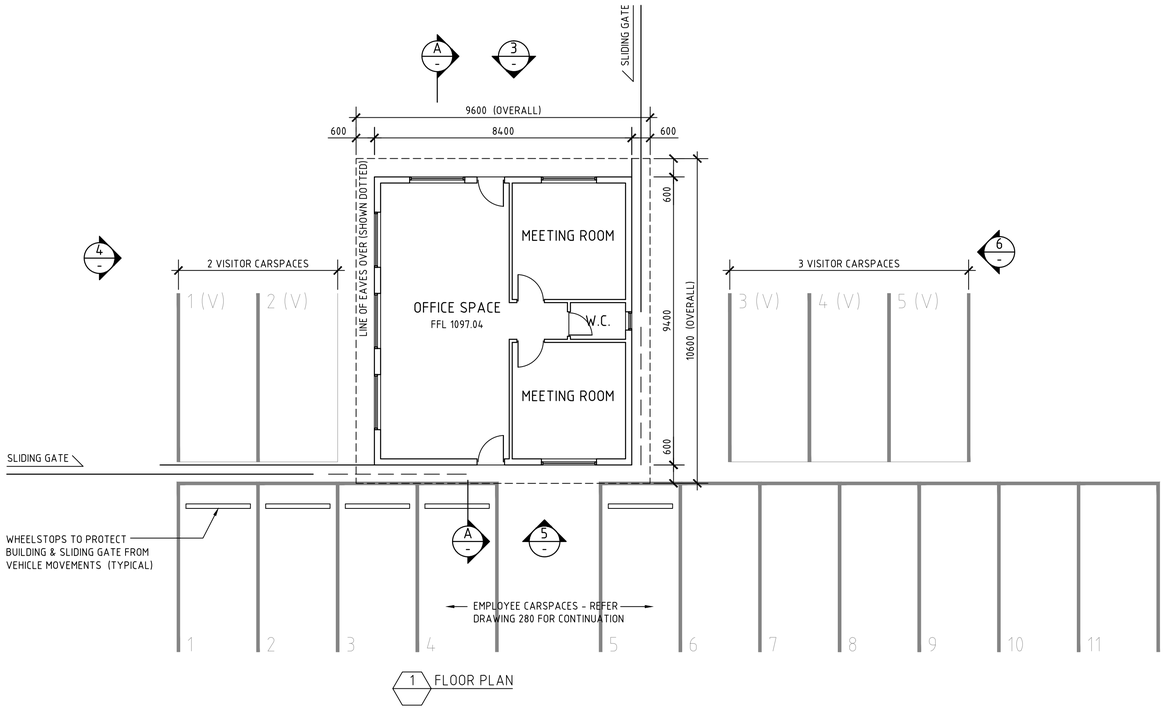
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
NEW ADMIN

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 281	A



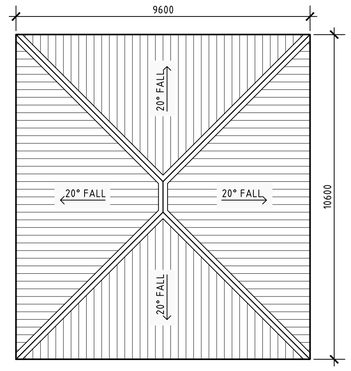
1 FLOOR PLAN

AREAS	
SPACE	AREA
TOTAL	78 m²

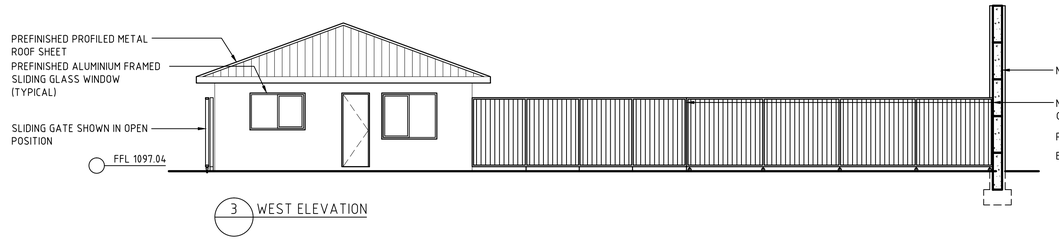
NOTE:

LEGEND:

- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ROOF PLAN)
- PROPOSED NEW BUILDINGS (ROOF PLAN)

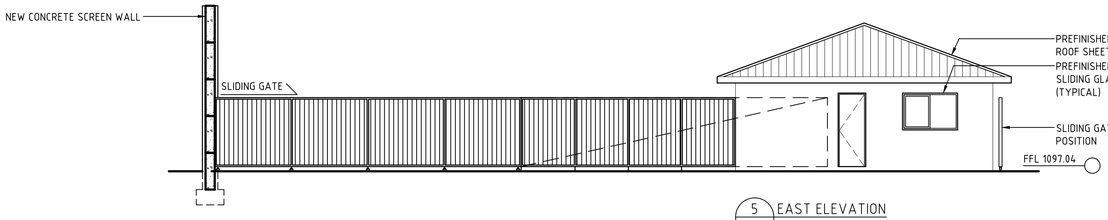


2 ROOF PLAN

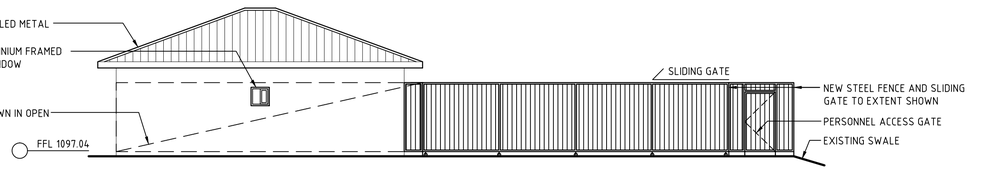


3 WEST ELEVATION

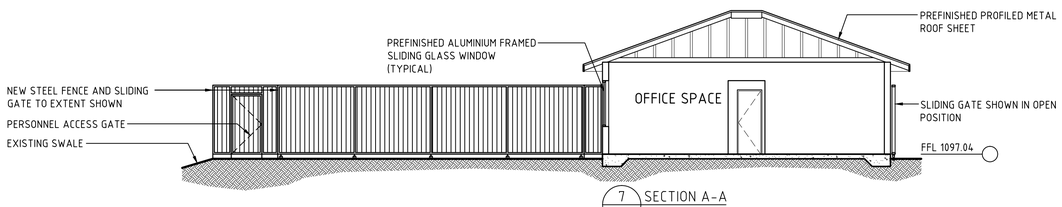
4 SOUTH ELEVATION



5 EAST ELEVATION



6 NORTH ELEVATION



7 SECTION A-A

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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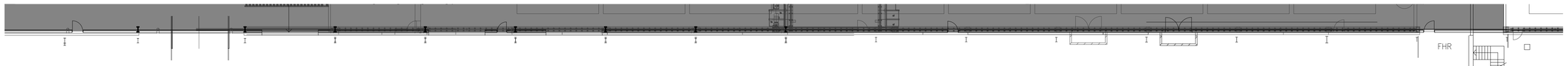
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

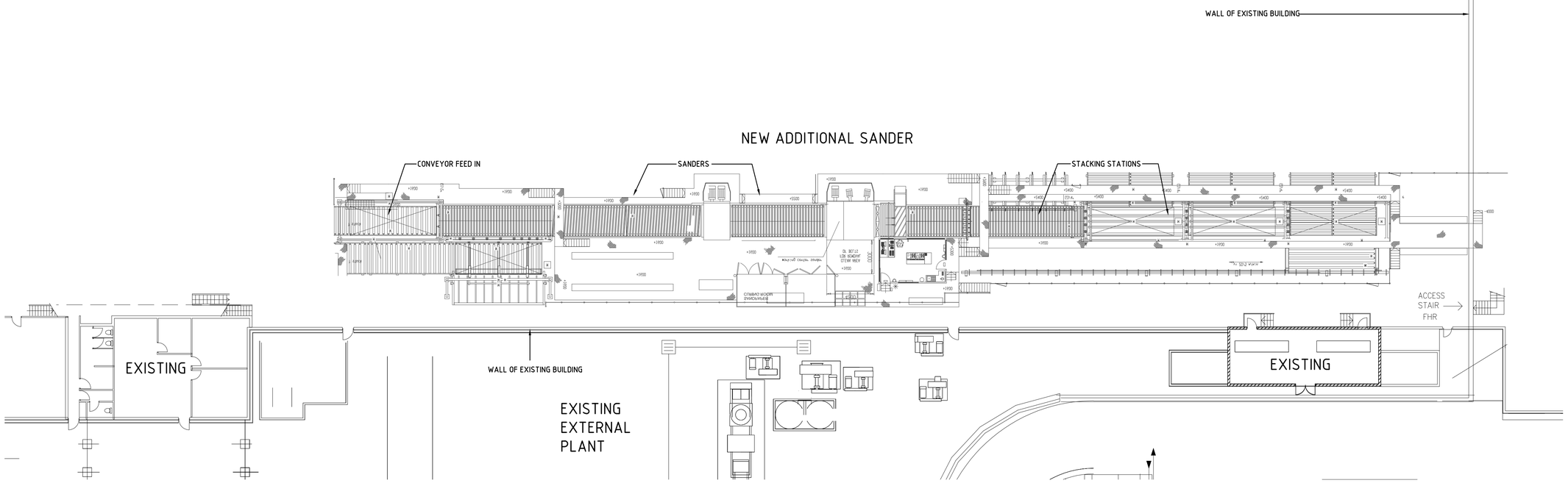
Drawing
NEW GATEHOUSE

Scale	Stage
1:100 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 282	A



EXISTING MAIN PRODUCTION HALL



1 DETAIL PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT AND ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
NEW ADDITIONAL SANDER

Scale	Stage
APPROX 1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 290	A

NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER CONSOLIDATION PLAN FOR DETAIL

DO NOT RELY ON THIS DRAWING FOR ANYTHING OTHER THAN REFERENCES TO DOCUMENTATION SERIES (SEE SITE PLAN)

LEGEND:

EXISTING BUILDINGS

PROPOSED NEW BUILDINGS

EXISTING GAS
LOT 1
DP 785979

Inv 1092.34

Inv 1092.29

14165

14215

9850

9850

AUTOMATED STORAGE

87000

40000

RL 1095.57

NEW PANEL SAWS

PROPOSED HARDSTAND 14000m²

1
330

1
310

RELOCATED AVIATION FUEL TANK (CLASS 3 - 2500L)

NEW STORAGE SYSTEM EXISTING BUILDING

NEW EXTENSION TO EXISTING PRODUCTION BUILDINGS

ADDITIONAL LAMINATING LINE

EXISTING SAWING PLANT
RL 1095.41

RELOCATED HELIPORT

LINE OF PROPOSED ADDITIONAL SWALE DRAIN

EXISTING LAMINATING LINE

NEW STORAGE SYSTEM EXISTING BUILDING

EXISTING JELDWIN BUILDING

NEW RACKING

2 NEW PAPER IMPREGNATING LINES

1
320

EXISTING BUILDING

24 NEW CAR SPACES

1
340

EXISTING RO WATER

EASMENT

1
300
DETAIL PLAN
300 SERIES DRAWINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

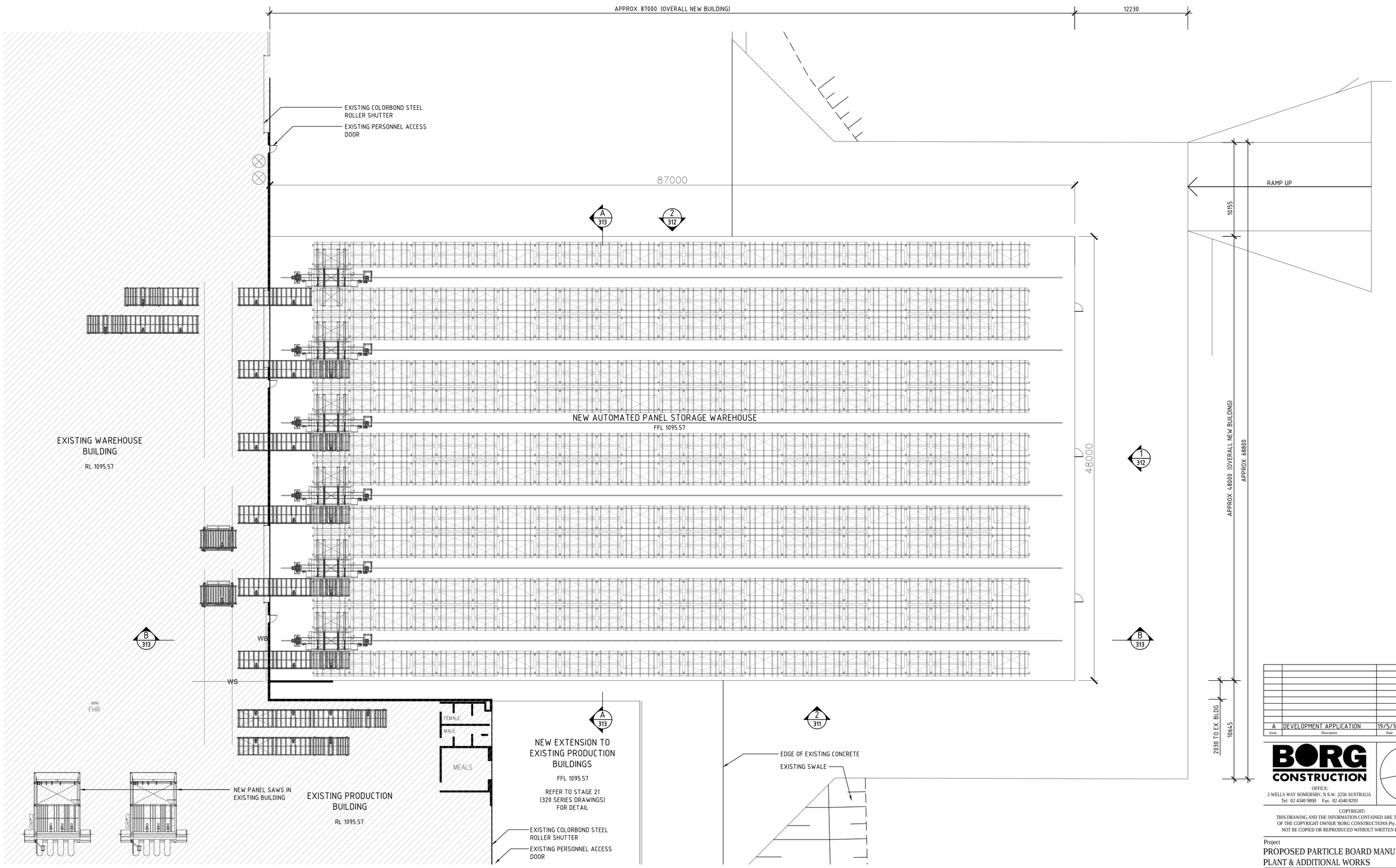
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
DETAIL PLAN: STAGE 3

Scale	Stage
1:750 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 301	A

NOTE:



1 301 FLOOR PLAN

AREAS

SPACE	AREA
TOTAL	4175 m²

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

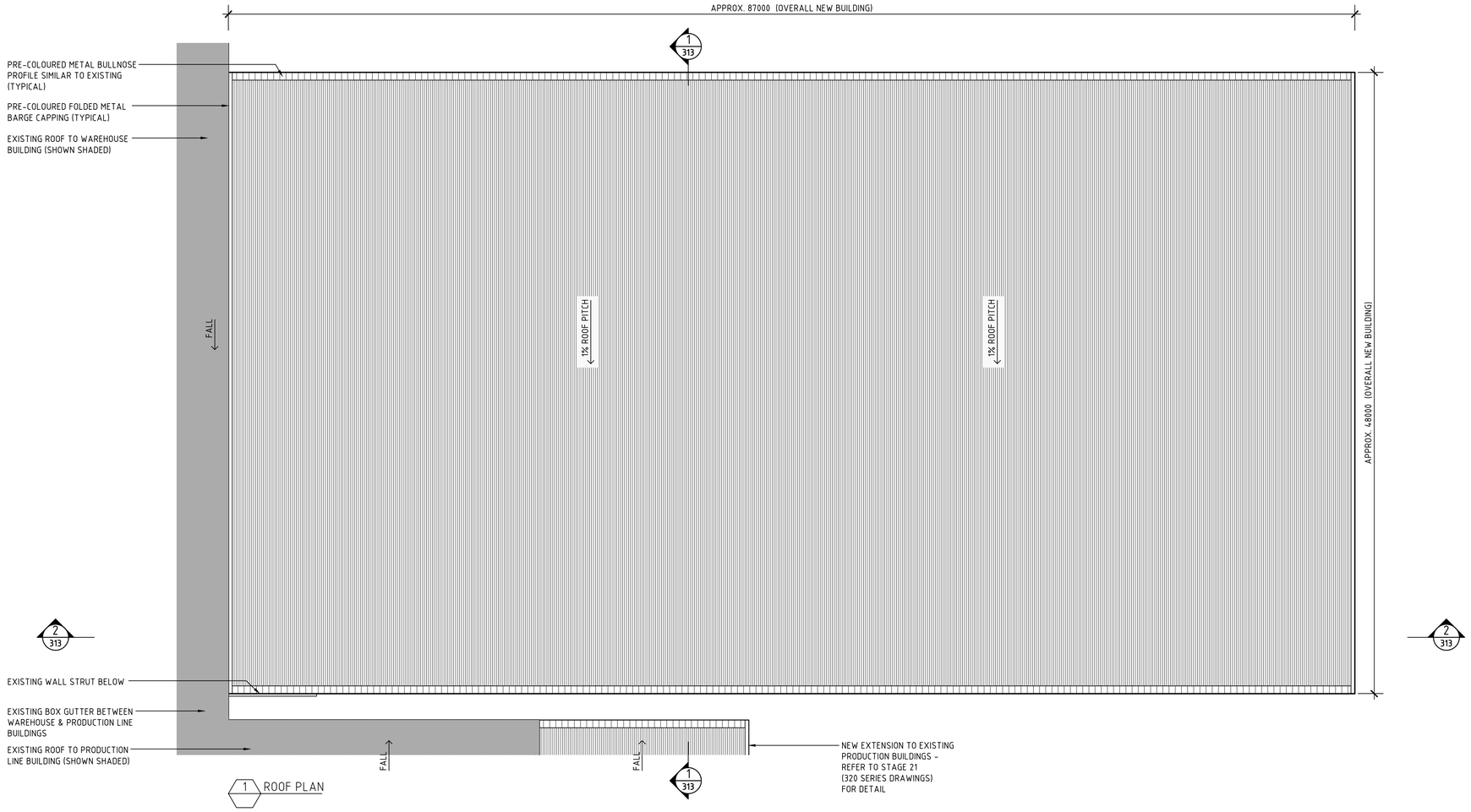
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
AUTOMATED STORAGE (SHT 1)

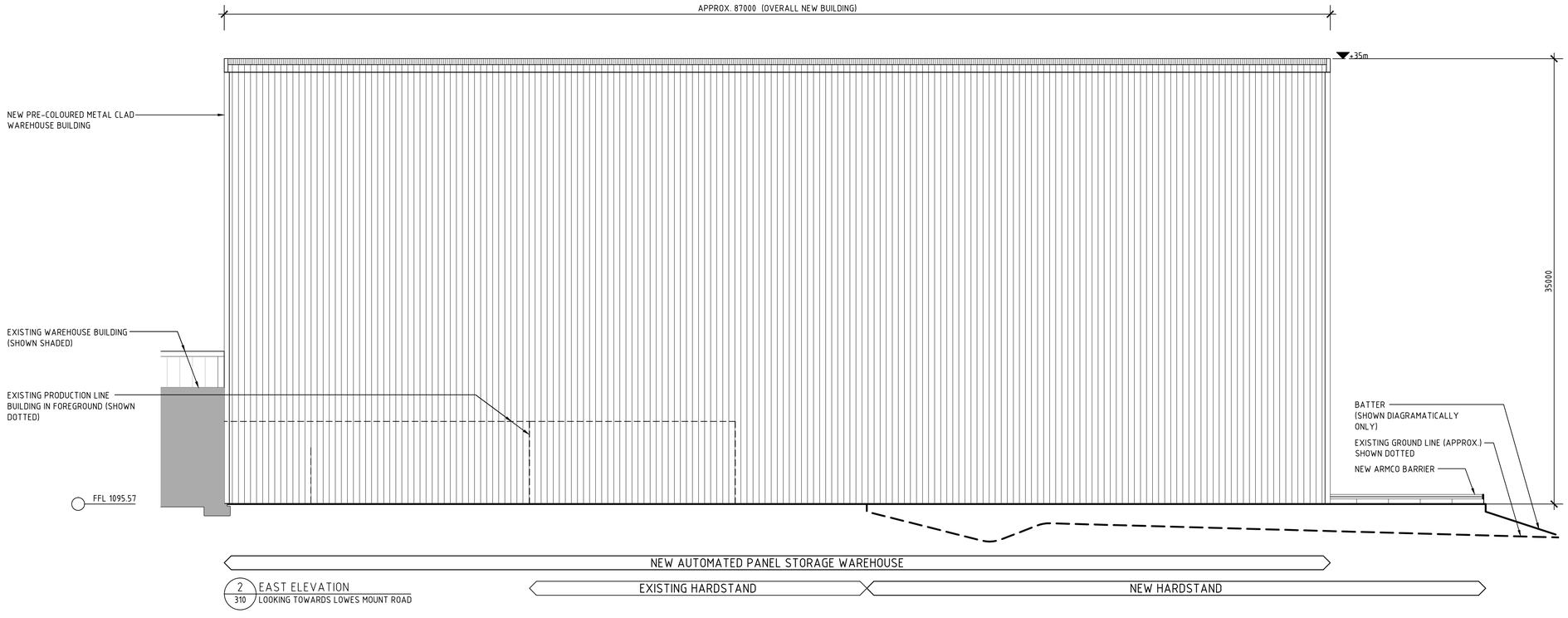
Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 310	A

NOTE:



1 ROOF PLAN



2 310 EAST ELEVATION
LOOKING TOWARDS LOWES MOUNT ROAD

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

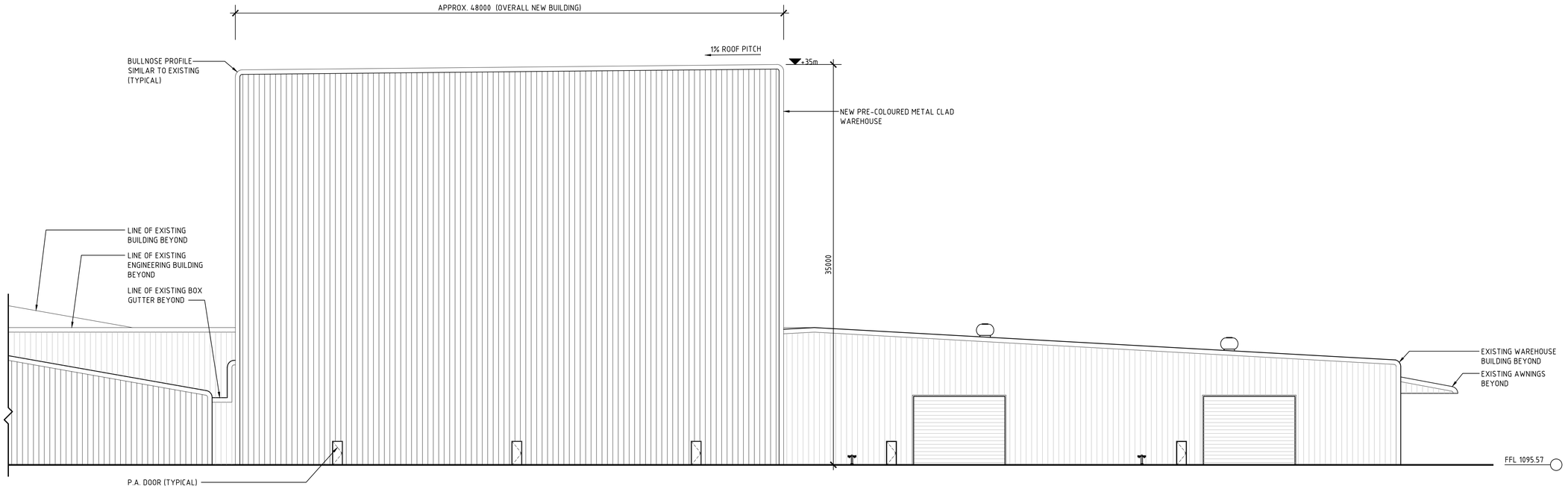
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
AUTOMATED STORAGE (SHT 2)

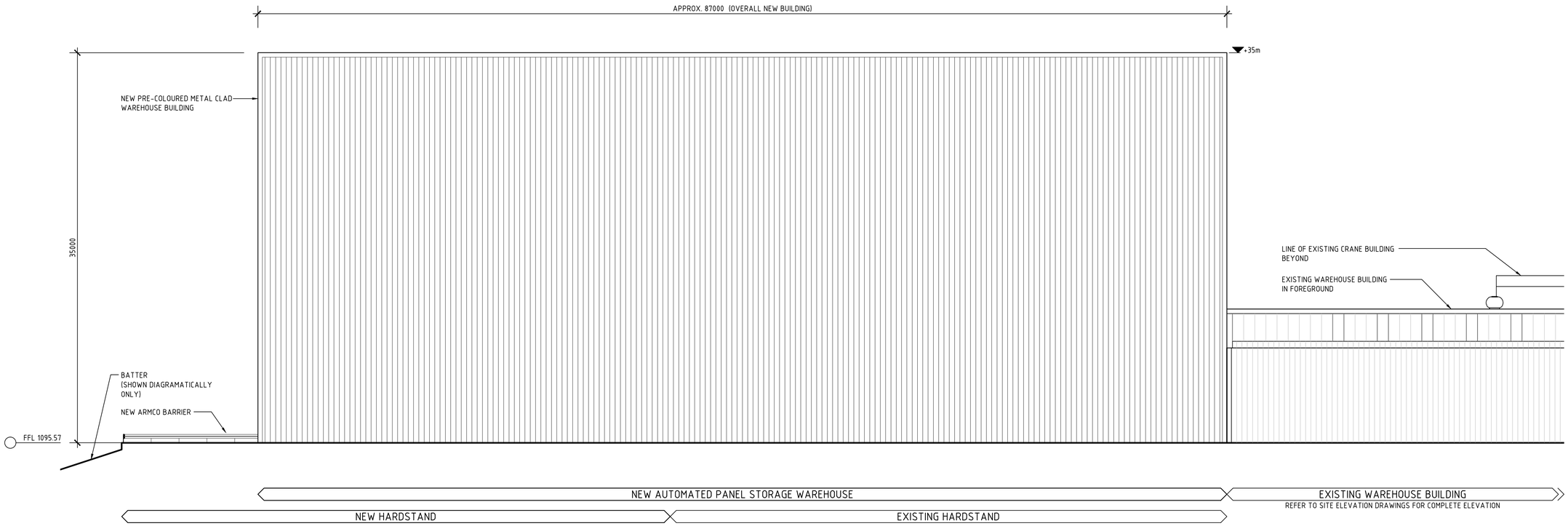
Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 311	A

NOTE:



1/310 NORTH ELEVATION



2/310 WEST ELEVATION

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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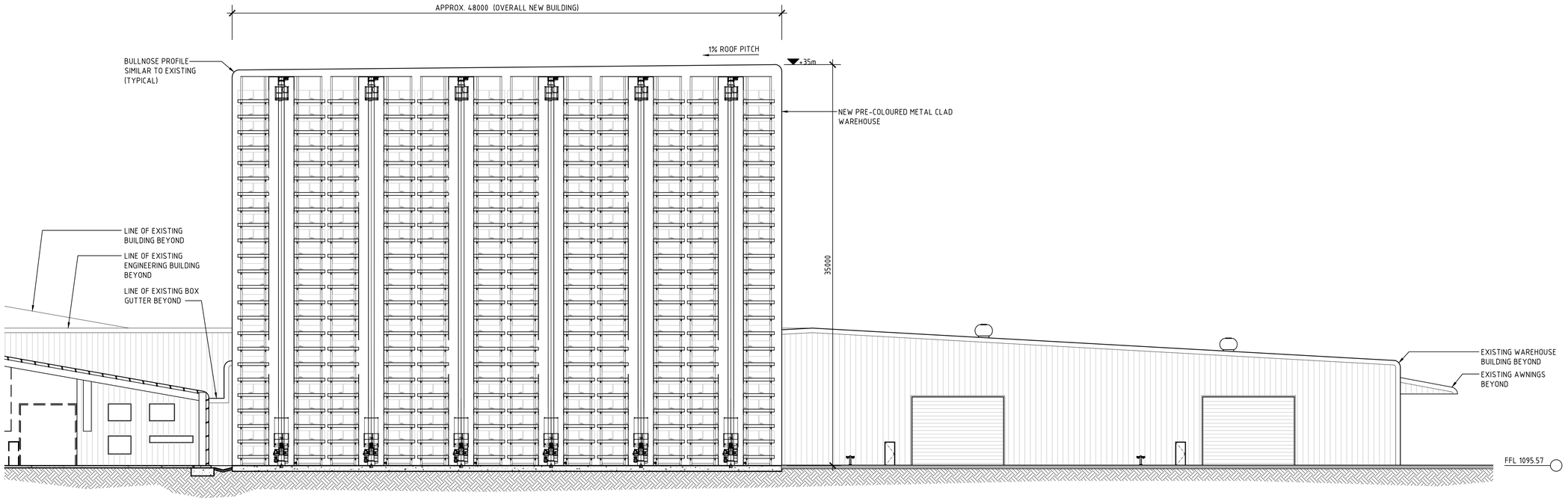
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

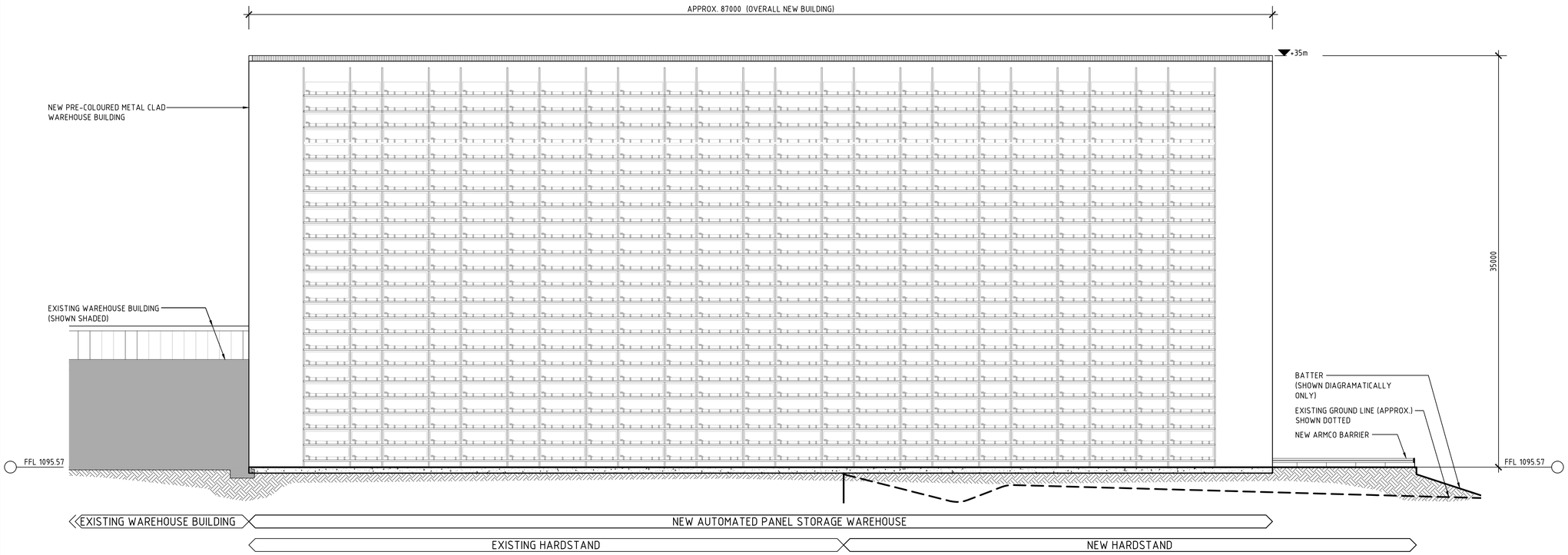
Drawing
AUTOMATED STORAGE (SHT 3)

Scale		Stage
1:200 (@ A1)		DA
Project Number	Drawing Number	Issue
19	DA 312	A

NOTE:



1/310 SECTION A-A



2/310 SECTION B-B

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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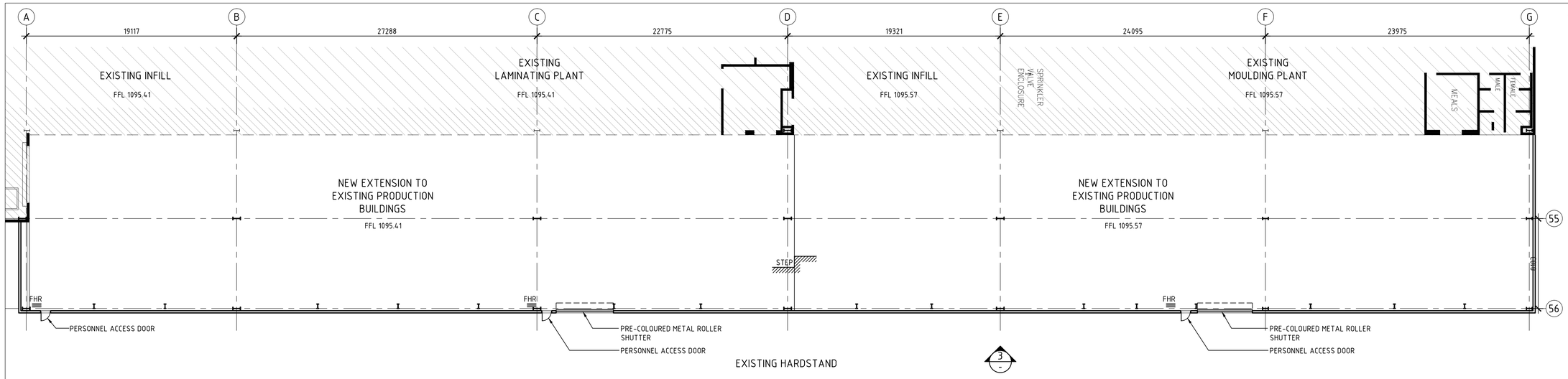
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
AUTOMATED STORAGE (SHT 4)

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 313	A



1 301 FLOOR PLAN

NOTE:

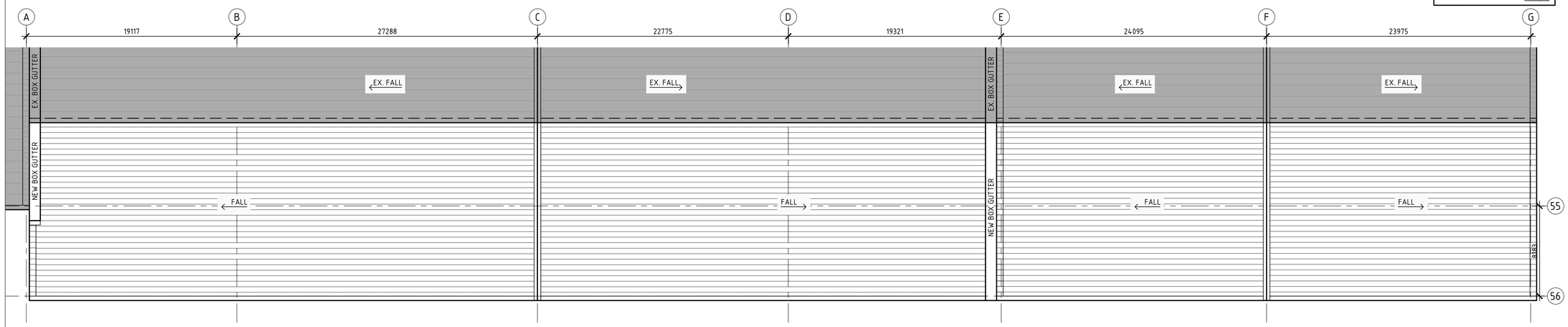
NEW ROOF PITCH TO MATCH EXISTING (TYPICAL)

LEGEND:

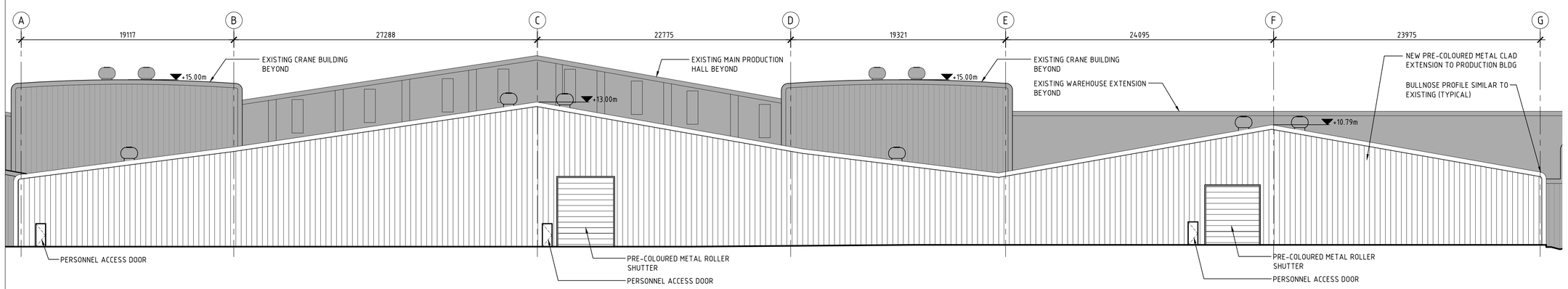
- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ROOF PLAN)
- PROPOSED NEW BUILDINGS (ROOF PLAN)
- EXISTING BUILDINGS (ELEVATIONS)
- PROPOSED NEW BUILDINGS (ELEVATIONS)

AREAS

SPACE	AREA
TOTAL	2179 m^2



2 ROOF PLAN



3 NORTH ELEVATION

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

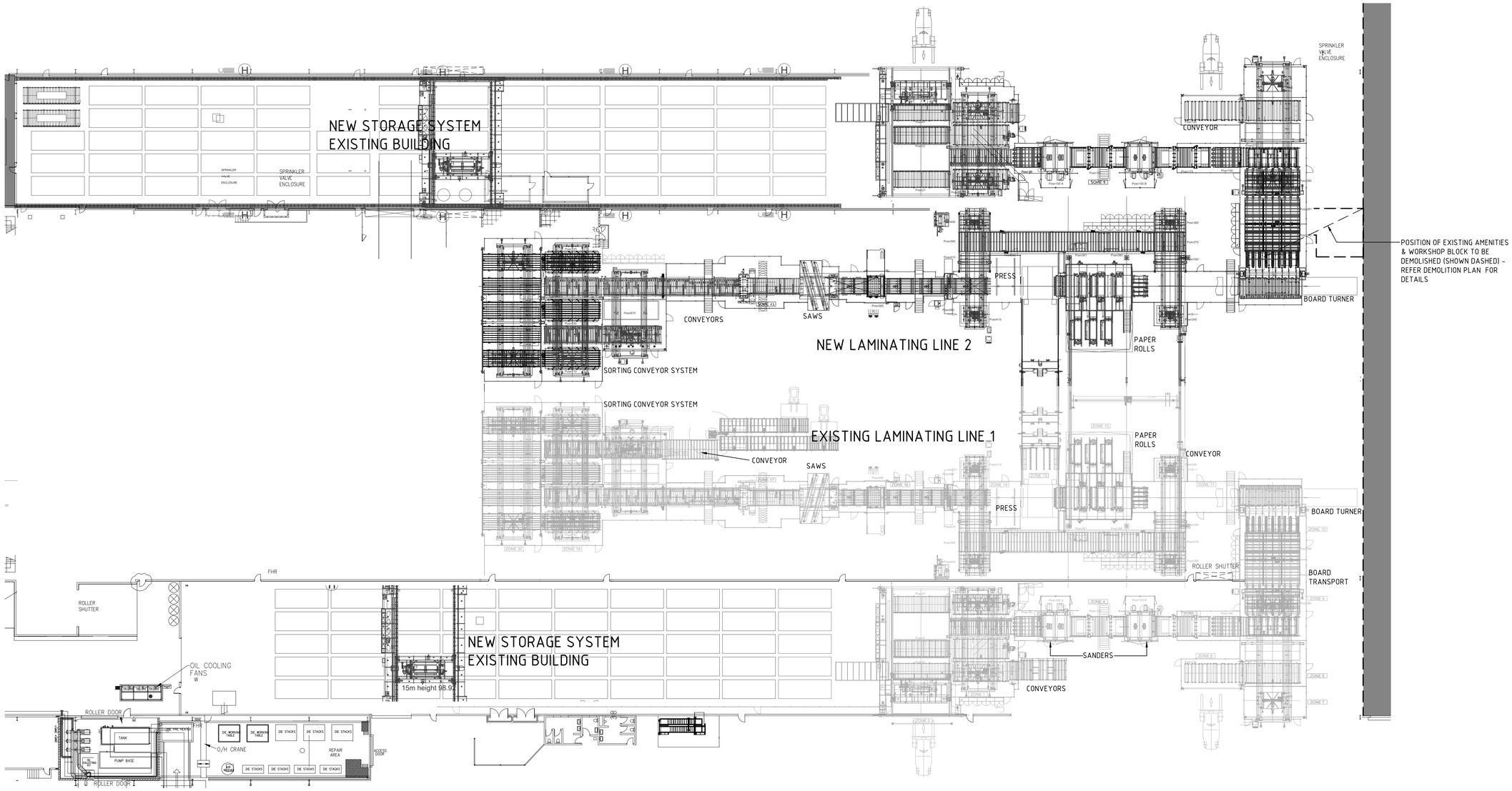
Drawing
EXTENSION TO
PRODUCTION BUILDINGS

Scale	Stage
1:200 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 320	A

LEGEND:

EXISTING BUILDINGS



1 / 301 DETAIL PLAN
330 SERIES DRAWINGS

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H	

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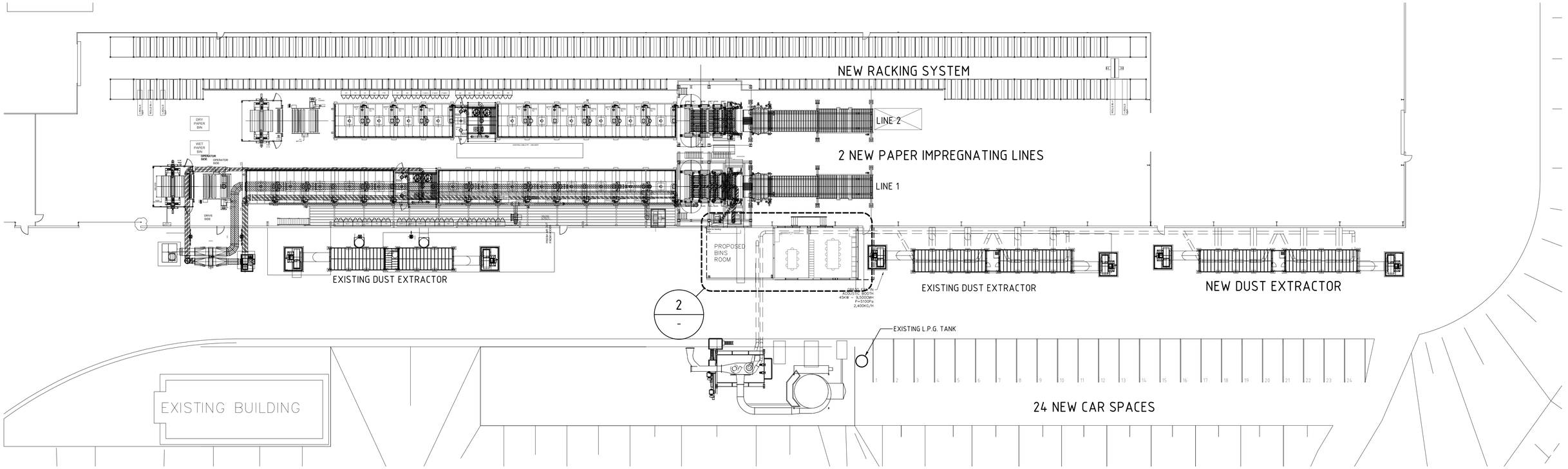
Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

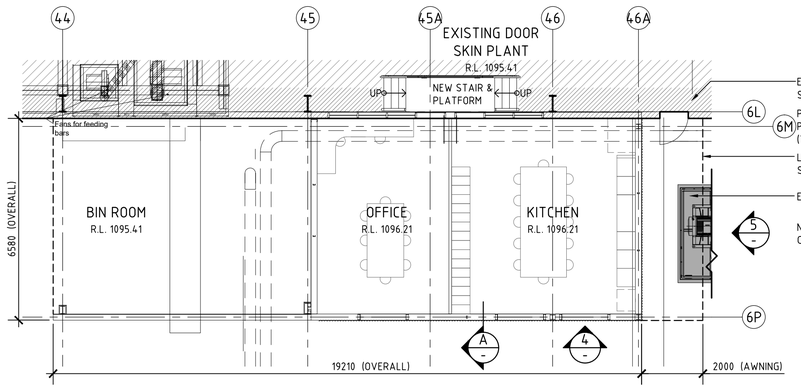
Drawing
LAMINATING LINE

Scale	Stage
APPROX 1:300 (@ A1)	DA

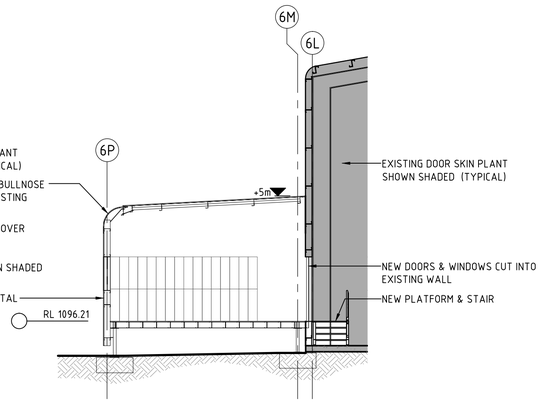
Project Number	Drawing Number	Issue
19	DA 330	A



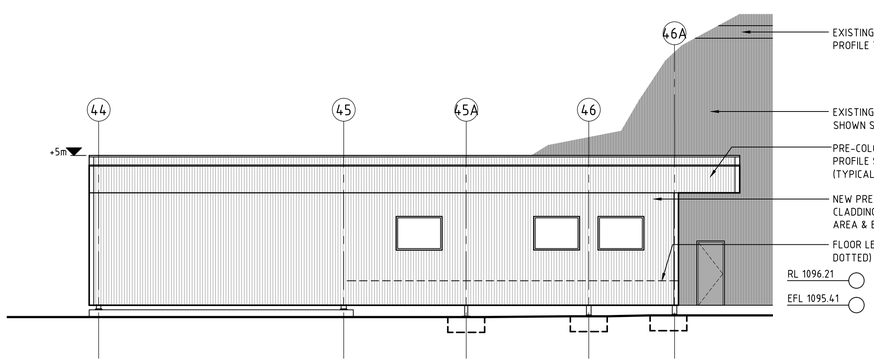
1 / 301 DETAIL PLAN
340 SERIES DRAWINGS 1:250



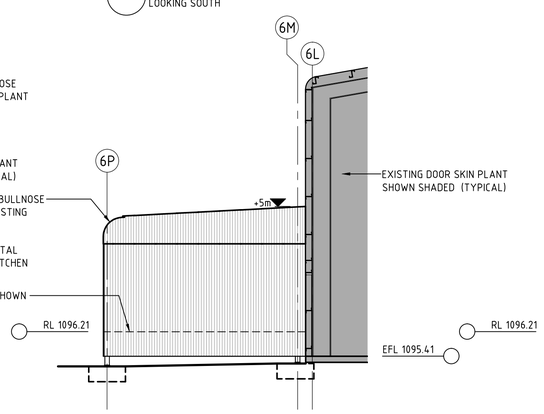
2 FLOOR PLAN
OFFICE, KITCHEN AREA & BIN ROOM



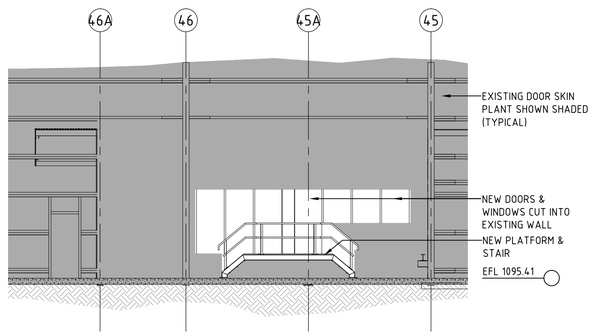
3 SECTION A-A
LOOKING SOUTH



4 EAST ELEVATION



5 NORTH ELEVATION



6 WEST ELEVATION
(FROM INSIDE EXISTING DOOR SKIN PLAN)

NOTE:

LEGEND:

- EXISTING BUILDINGS (FLOOR PLAN)
- EXISTING BUILDINGS (ELEVATION)
- PROPOSED NEW BUILDINGS (ELEVATION)

AREAS

SPACE	AREA
ENCLOSED	71
COVERED	55
TOTAL	126 m²

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
PAPER IMPREGNATING LINES

Scale	Stage
1:100 (@ A1) U.N.O.	DA

Project Number	Drawing Number	Issue
19	DA 340	A

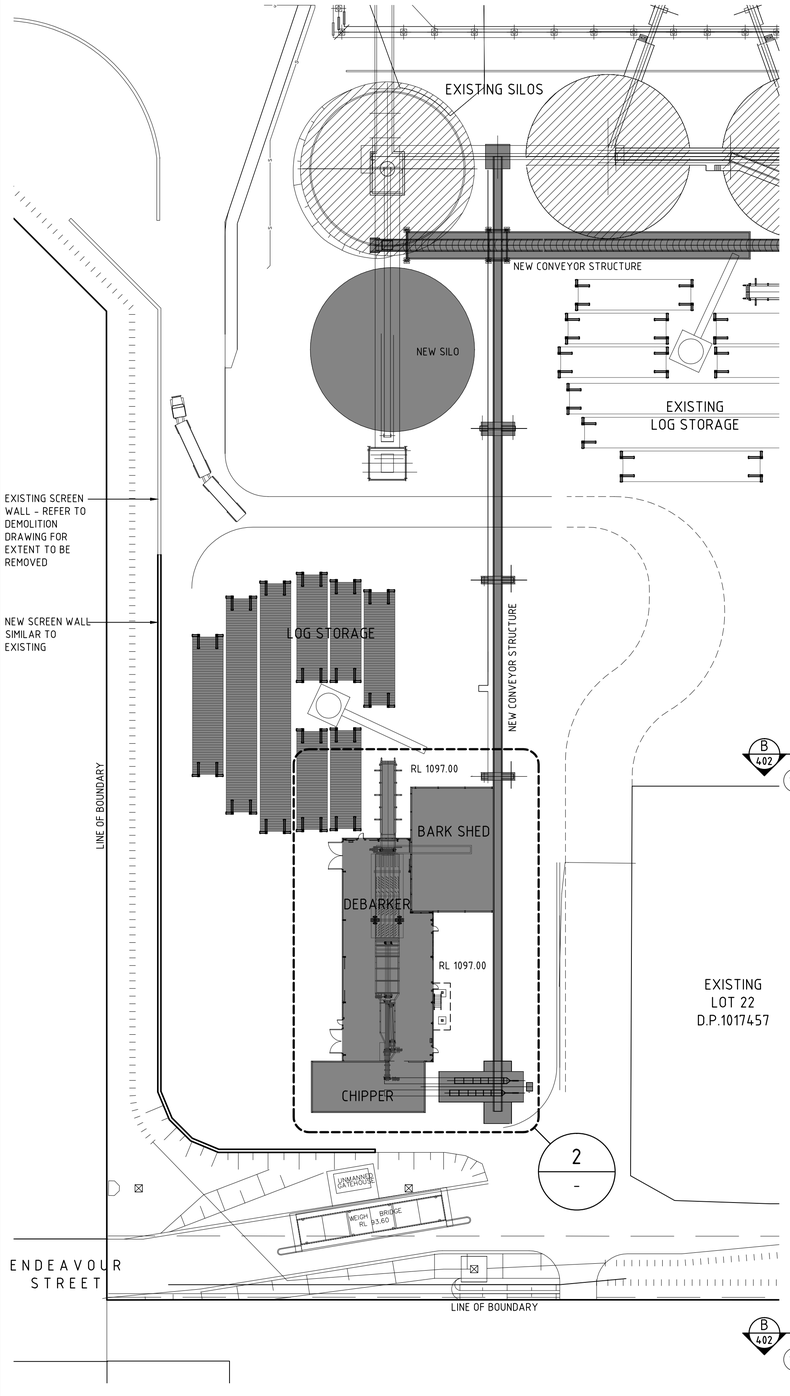
NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DRAWING DA-106 FOR DETAIL

LEGEND:

SITE PLAN:

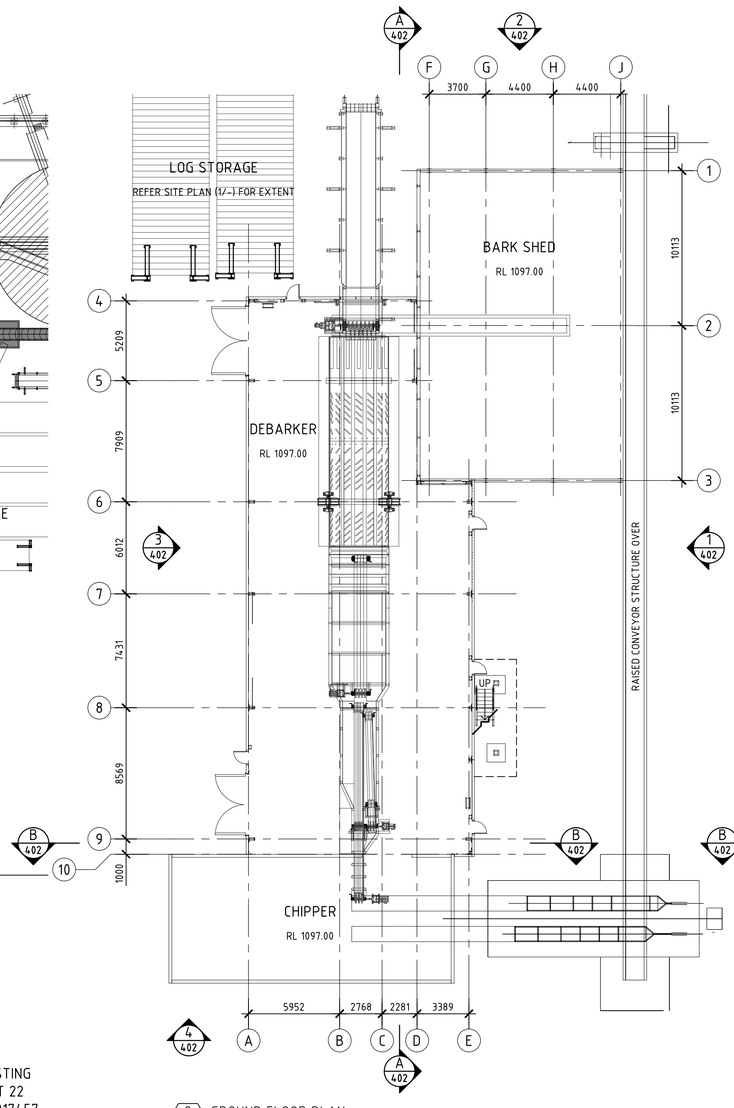
- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- NEW SWALE
- NEW PIPE



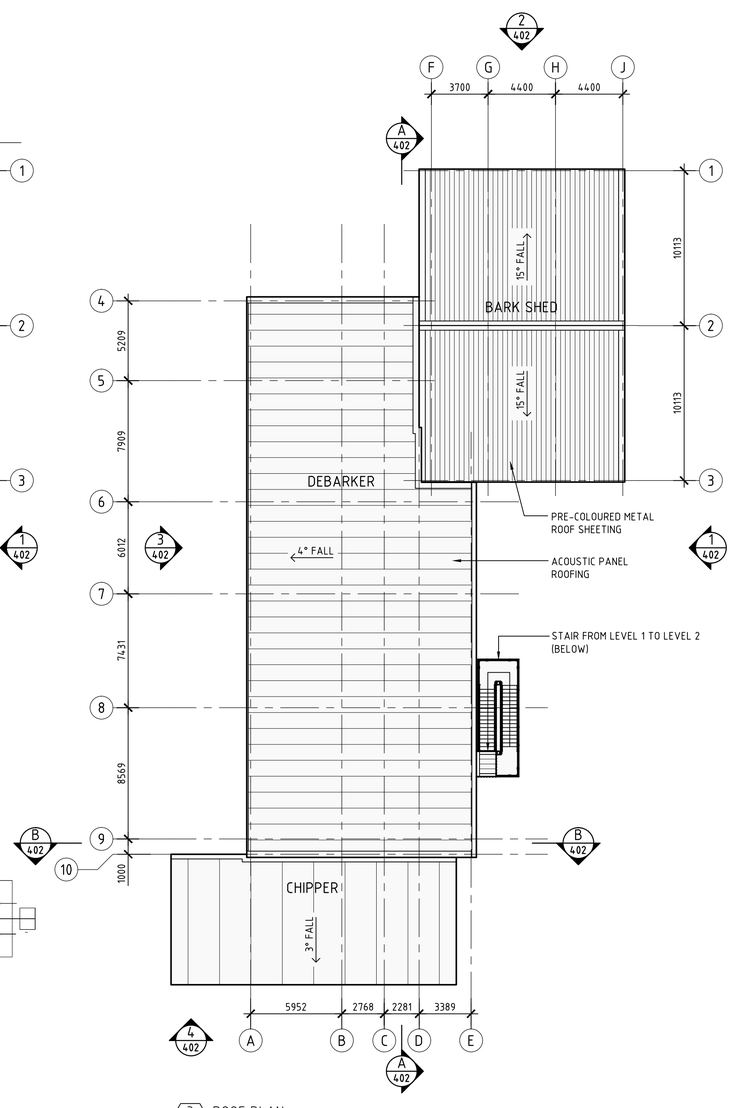
1 SITE PLAN
1:500

AREAS

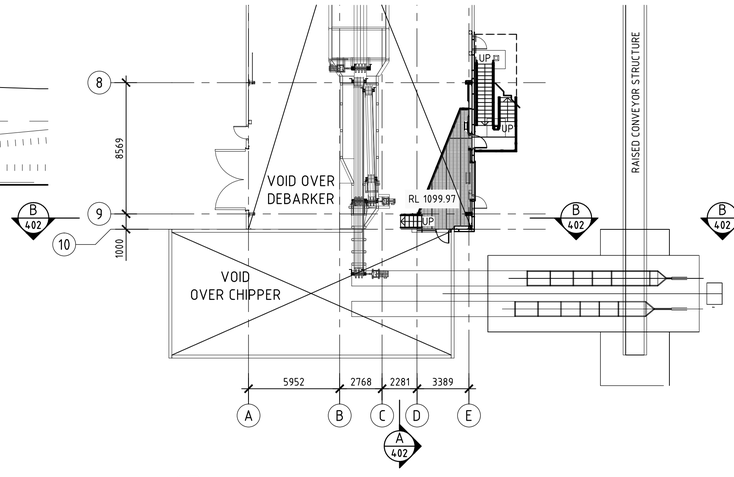
SPACE	AREA
TOTAL	876 m²



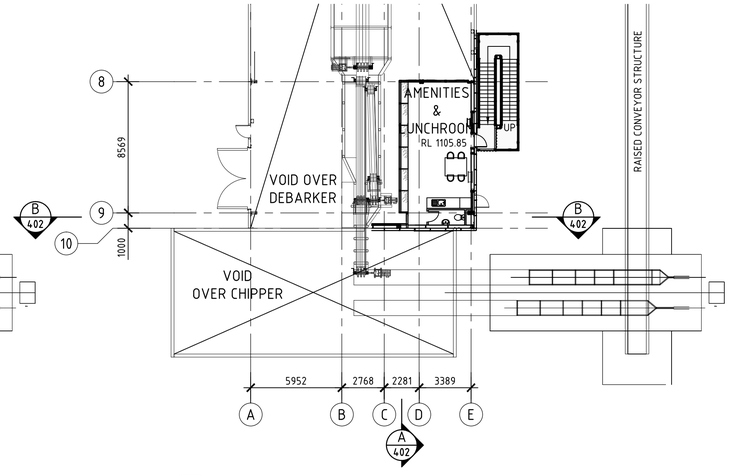
2 GROUND FLOOR PLAN



3 ROOF PLAN



4 FIRST FLOOR PLAN



5 SECOND FLOOR PLAN

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

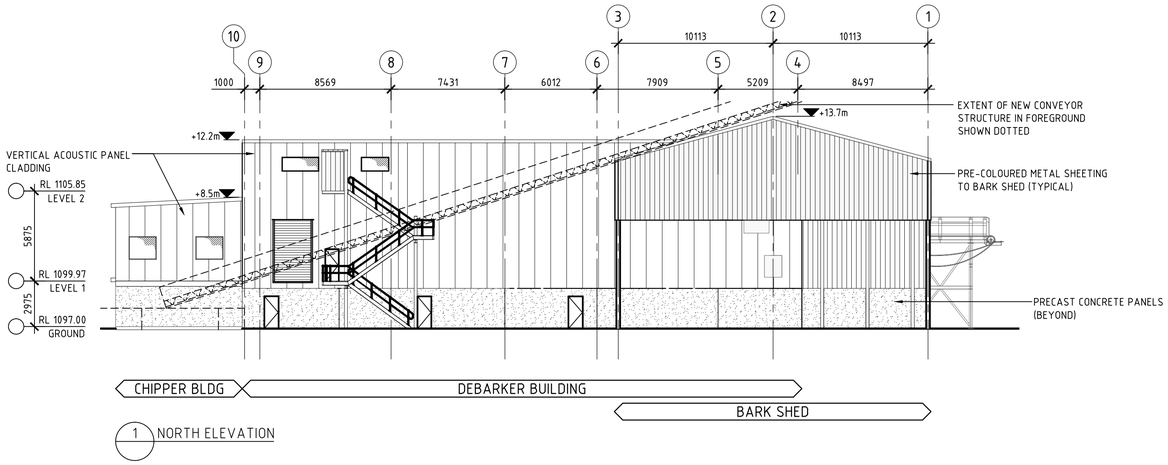
Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
LOG STORAGE, DEBARKER & CHIPPER (SHT 1)

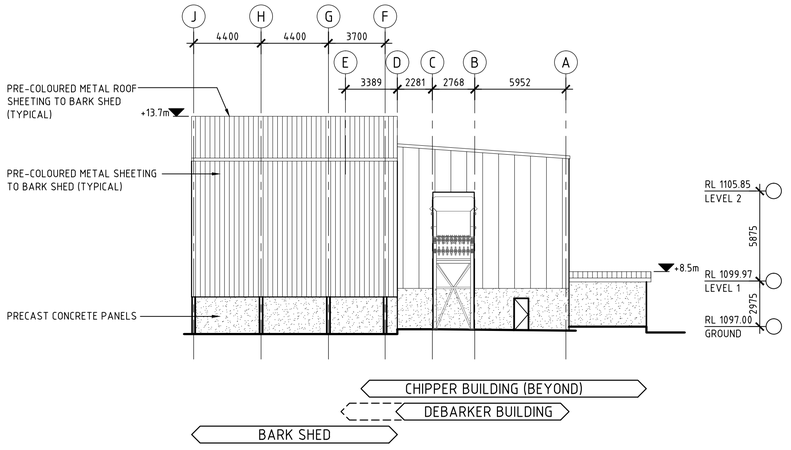
Scale	Stage
1:200 (@ A1) U.N.O.	DA

Project Number	Drawing Number	Issue
19	DA 401	A

NOTE:



1 NORTH ELEVATION



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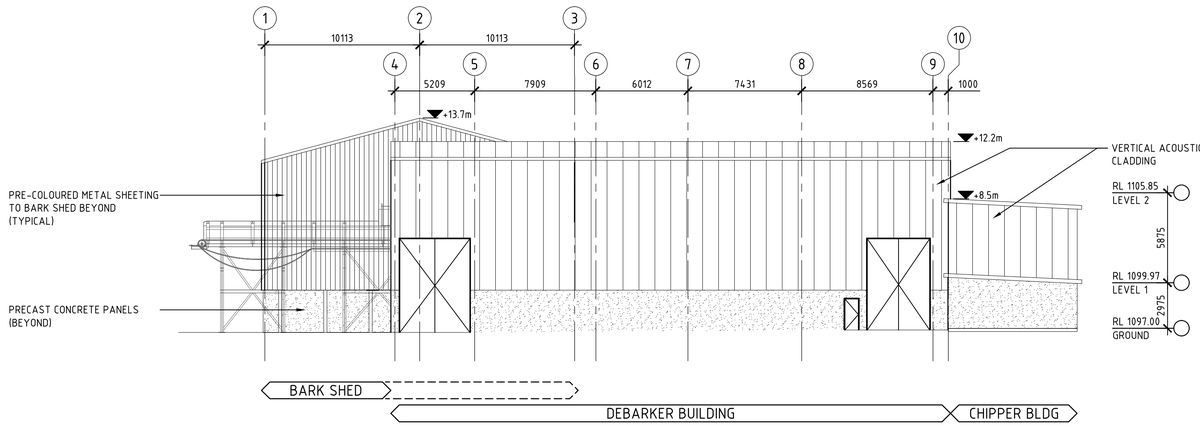

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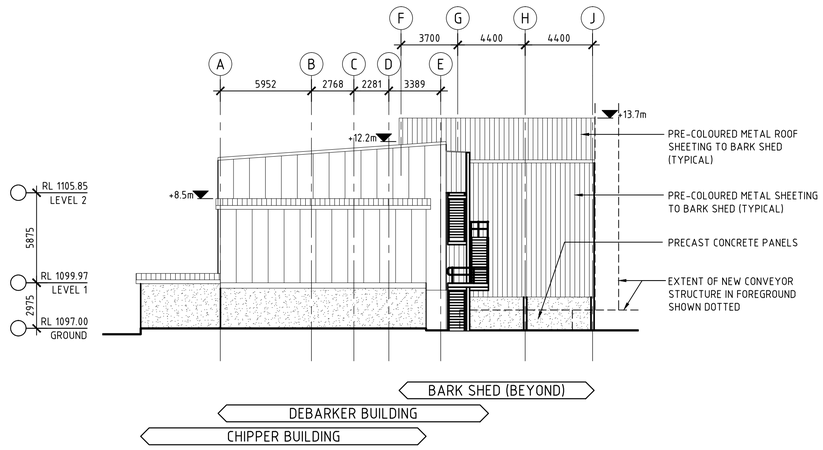

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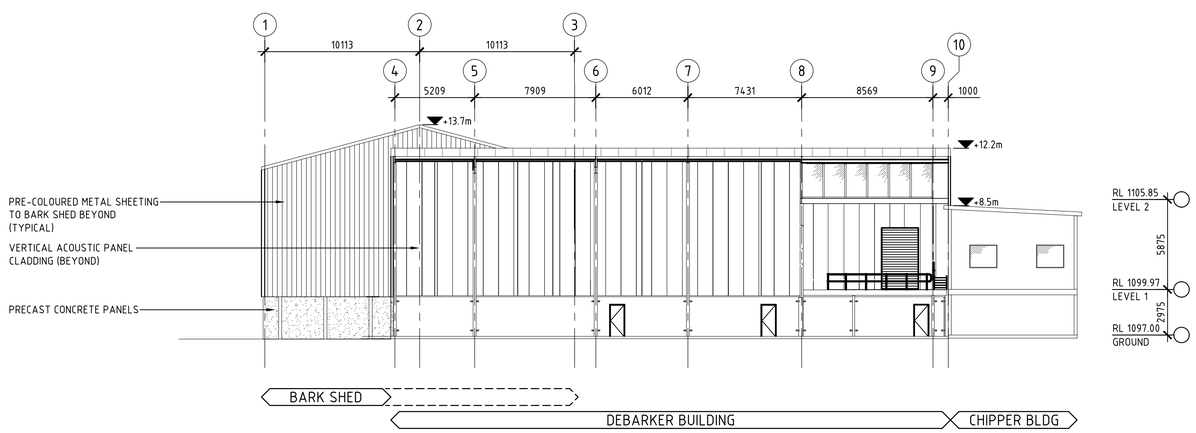
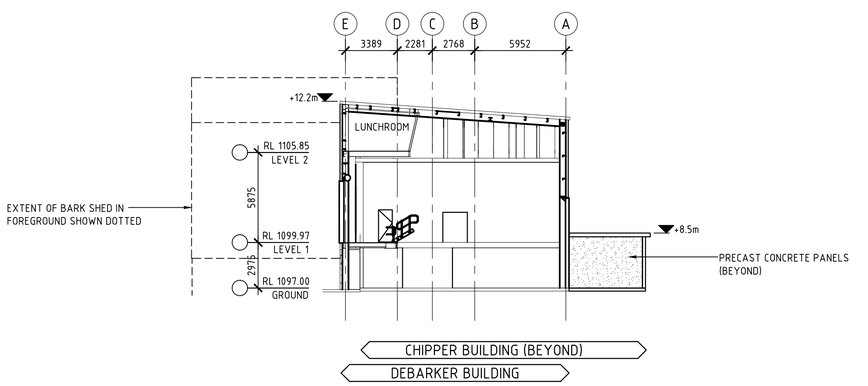


5 SECTION A-A



6 SECTION B-B

Issue	Description	Date	Drawn	Auth
A	DEVELOPMENT APPLICATION	19/5/16	P.J.H.	

BORG CONSTRUCTION
OFFICE:
2 WELLA WAY SOMERSBY, N.S.W. 2250 AUSTRALIA
Tel: 02 4340 9800 Fax: 02 4340 8293

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
LOG STORAGE, DEBARKER & CHIPPER (SHT 2)

Scale
1:200 (@ A1)

Stage
DA

Project Number
19

Drawing Number
DA 402

Issue
A

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

Determination of Development Application (Consolidated version)

Pursuant to Section 91 of the *Environmental Planning and Assessment Act 1979*

I, the Minister for Urban Affairs and Planning, as required by Section 91 of the *Environmental Planning and Assessment Act 1979*, determine the development application referred to in Schedule 1 by granting consent to that application subject to the conditions set out in Schedule 2 (File S91/02574/004)

The reasons for the imposition of conditions are to protect the environment and minimise adverse impact, to modify details of the development the subject of the development application, and to provide for environmental monitoring and reporting of the future performance of the development

As modified by DA 27/95 – M1, approved 3 May 2001

As modified by MOD-83-10-2002-i, approved 27 February 2003

As modified by MOD-27-2-2005-i, approved May 2005

As modified by MOD 4, approved May 2008

As modified by MOD 5, approved February 2012

As modified by MOD 6, approved November 2014

As modified by MOD 7, approved August 2015

Craig Knowles, MP
Minister for Urban Affairs and Planning

Sydney, 5 October 1995

SCHEDULE 1

Application made by: CSR Ltd

To: Minister for Urban Affairs and Planning

In respect of land being: Lot 1, DP 503975, Albion Street; lot 9, DP 204131, Albion Street; Lot 1, 411788, Lowes Mount Road; Lot 2, DP 411788, Cnr Albion Street and Lowes Mount Road; Lot 3 (Vol 8469 Fol 167), Albion Street; Lot 2, DP 785979, Lowes Mount Road; Part Lot 20, DP 661955, off Horace Street; Lot 1, DP 384289, Lowes Mount Road; Lot 1, DP 15528, Lowes Mount Road; Lot 1, DP 616190, Lowes Mount Road; Lot 11, DP 501034, Lowes Mount Road; Lot 12, DP 501034, Lowes Mount Road; Lot 1, DP 634357,

	Lowes Mount Road; Lot 2, DP 634657, Lowes Mount Road. Oberon; Lot 2902, DP 1056754
For the following development:	The development of lands owned by CSR and subsidiaries: to expand and upgrade the existing medium density fibre board (MDF) plant; to construct a new sawmill with planer and dryer; and to develop a tannin extraction plant (Radtan) to make resins for the particle board plant. It will also involve transporting an additional 380,000 tonnes pa of radiata pine logs into the facilities at Oberon from surrounding State forests by road. Additional raw materials will also be transported into each site by road to make the MDF. Finished products, sawn timber, and laminated MDF and door skins will also be moved out by trucks to local and interstate markets and to port facilities for export. CSR hope to move export product on to rail, if a commercially viable option can be negotiated. This will allow CSR to increase the total wood product produced at Oberon from 159,000 tonnes to 403,000 tonnes pa. The plant will operate 24 hours per day.
Development Application:	The Development Application No. DA 27/95 lodged with the Department of Urban Affairs and Planning on 24 July, 1995 accompanied by the environmental impact statement (EIS) entitled "Oberon Timber Facilities Expansion", July 1995, prepared by ERM Mitchell McCotter Pty Ltd.

ABBREVIATIONS AND INTERPRETATION

Applicant	Any person or entity obliged or entitled to act on this consent
Department	Department of Planning and Environment
Development	The development as described in DA 27/95 and the scope of which is described in the documents listed under condition 1 of this consent and any subsequent modifications made to DA 27/95.
Secretary	Secretary of the Department, or nominee
Council	The Oberon Council
DA	development application
EPA	Environment Protection Authority
EIS	environmental impact statement
EMP	environmental management plan
EMR	environmental management report
MDF	medium density fibre board
NOW	NSW Office of Water

SCHEDULE 2

CONDITIONS OF DEVELOPMENT CONSENT

1. The applicant shall carry out the development generally in accordance with:
   (a) Development Application No. 27/95, as amended by modification application DA 27/95 – M1, MOD-83-10-2002-i, MOD-27-2-2005-I, MOD 4 MOD 5, MOD 6 and MOD 7, and the accompanying Environmental Impact Statement (EIS), titled *Oberon Timber Facilities Expansion,* prepared by ERM Mitchell McCotter, dated 24 July 1995;
   (b) drawings numbered CSR4401/100/A/1000; CSR4401/100/A/1001; CSR4401/100/A/1002; CSR4401/100/A/1003; CSR4401/100/A/1004; CSR4401/100/A/1005; CSR4401/100/A/1006; CSR4401/100/A/1007; CSR4401/100/A/1008; CSR4401/100/A/1009; CSR4401/100/A/1010; CSR4401/100/A/1011; CSR4401/100/A/1012; CSR4401/100/A/1013; CSR4401/100/A/1014; CSR4401/280/A/1060A; CSR4401/280/A/1050; CSR4401/280/A/1051; CSR4401/280/A/1052; CSR4401/280/A/1053; CSR4401/280/A/1054; CSR4401/280/A/1506; CSR4401/280/A/1057; CSR4401/280/A/1058; CSR4401/280/A/1059; CSR4401/100/C/0000; CSR4401/100/C/0030A; CSR4401/100/C/0031A; CSR4401/100/C/0032A; CSR4401/100/C/0033A; CSR4401/100/C/0034A; CSR4401/100/C/0035A; CSR4401/100/C/0036A; CSR4401/100/C/0037A; CSR4401/100/C/0038A; CSR4401/100/C/0100; CSR4401/100/C/0390; CSR4401/100/C/0391; CSR4401/OBF95715A; CSR4401/200/C/1042C; CSR4401/OBF95725; CSR4401/OBF95726; and CSR4401/OBF95728 as amended by:
   (c) supplementary information, provided by ERM Mitchell McCotter, dated 12 September 1995;
   (d) supplementary drawings numbered CSR4401/1000395A; CSR4401/100/0396A; and CSR4401/280/0395;
   (e) supplementary information submitted by Jeld-Wen Fibre of Australia, dated 16 March 2001;
   (f) supplementary drawings numbered JW01/SP01A and JW01/SP02A, submitted by Jeld-Wen Fibre of Australia, dated 28 March 2001;
   (g) supplementary information submitted by Jeld-Wen Fibre of Australia, dated 20 April 2001;
   (h) supplementary drawings numbered JWO1/SPO3A and JW01/SP04A, submitted by Jeld-Wen Fibre of Australia, dated 20 April 2001;
   (i) supplementary information submitted by Brightwater Engineers Ltd, titled *CHH Oberon Bio-Fuel Proposal – Boiler Fuel System Upgrade and Expansion*, dated 9 July 2002;
   (j) supplementary information submitted by Brightwater Engineers Ltd, titled *CHH Oberon – Development Consent*, dated 9 September 2002;
   (k) Supplementary information submitted by Brightwater Engineers Ltd, titled *CHH Oberon – Development Consent*, dated 16 October 2002;
   (l) supplementary information submitted by Brightwater Engineers Ltd, titled *Carter Holt Harvey – Oberon NSW Calc 0162 Fuel Storage Bin Fire Protection,* prepared by CGL Fire Technologies and dated 16 October 2002;
   (m) supplementary information submitted by Brightwater Engineers Ltd, titled *CHH Oberon*, dated 2 December 2002; and
   (n) supplementary drawing, numbered A177-00/10005, submitted by Brightwater Engineers Ltd, dated 28 February 2002 information submitted by Brightwater Engineers Ltd, titled *CHH Oberon – Development Consent*, dated 9 September 2002;

(o) application to modify a development consent submitted by Debra Watson (Environmental Manager, Oberon Timber Complex) and dated 17 January 2005 and accompanying Statement of Environmental Effects titled – *JELD-WEN Coatings – Coatings Manufacturing Process Modification,* dated 2004;

(p) supplementary information submitted by Debra Watson (Environmental Manager, Oberon Timber Complex) dated 21 March 2005 titled *JELD-WEN chemical list update* and 30 March 2005 titled *JELD-WEN Paint Manufacturing Ingredients;*

(q) application to modify a development consent submitted on 2 April 2008 and accompanying Statement of Environmental Effects, titled *Proposed Paint Coating Line at Carter Holt Harvey Oberon Mouldings Operation*, prepared by Carter Holt Harvey, dated April 2008.

(r) application to modify a development consent submitted 7 July 2011 and accompanying *Environmental Assessment Factory Extensions (Borg Panels & JenWen)*, prepared by The Design Partnership, dated 21 September 2011, and the following associated plans and documents as submitted to the Department:

i. Plans numbered A00 Rev C; A01 Rev L; A02 Rev J; A03 Rev L; A03A Rev C; A04 Rev H; A05 Rev H; A06 Rev D; A07 Rev E, prepared by Borg Construction (various dates);

ii. Document titled *Oberon Stormwater Management Strategy* prepared by Parsons Brinkerhoff, dated June 2011.

iii. Stormwater drawings numbered 1000 to 1007 inclusive, prepared by Parsons Brinckerhoff, dated 26 May 2011, as amended by stormwater drawing numbered 1006, prepared by Parson Brinckerhoff, dated 8 November 2011

iv. Sediment and Erosion Control drawings numbered C01-B to C04-B prepared by Eclipse, dated 8 October 2011.

(s) application to modify a development consent submitted 20 June 2014 and accompanying *Environmental Assessment Factory Extensions (Woodchem Australia Pty Ltd)*, prepared by the Design Partnership, dated 16 June 2014, and associated plans and drawings numbered DA01, DA02, DA03 and DA04 prepared by Borg Group and dated 6 June 2014.

(t) application to modify a development consent submitted on 14 November 2014 and accompanying Environmental Impact Statement Factory Extensions (Borg Panels & JeldWen, Oberon), prepared by the Design Partnership, dated November 2014, and associated plans and drawings numbered DA01, DA02, DA03, DA04, DA05, DA06, DA07, DA08, DA09, DA10 prepared by Borg Group and dated April 2015.

In the event of an inconsistency between a condition of this consent and the documents listed above, the conditions of consent shall prevail to the extent of the inconsistency.

1A. The applicant shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or decommissioning of the development.

1B. The applicant shall comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:

(a) any reports, plans, strategies, programs or correspondence that are submitted in accordance with this approval; and

(b) the implementation of any actions or measures contained in these reports, plans, strategies, programs or correspondence.

2. The applicant shall, within one year enter into an agreement with The Oberon Council to consolidate all existing development consents relating to its particle board plant, the medium density fibre board plant, the use of the Black Bullock Road site (Lot 2, DP 789833) as a waste disposal site, and the use of Boyds property (Portion 91, Parish of Oberon) for burning timber waste.

3. Compliance with the requirements, if any, of the NSW Fire Brigades in respect to the upgrading of infrastructure, equipment and appliances to serve the development both during the construction period and after the commencement of operations.

4. The applicant or operator shall, within twelve months of the granting of development consent, submit to the Council a plan for the consolidation of all lots on each development site.

5. The development is to be conducted in a manner that will not interfere with the amenity of the locality by reason of the emission of noise, vibration, smell, fumes, smoke, vapour, steam, soot, ash, dust, waste water, waste products, grit, oil or by causing interference to television or radio reception or otherwise.

6. Unsightly matter is not to be exposed to view from any adjacent premises, or from any public place, to the satisfaction of the Council.

7. An application for approval, pursuant to Section 17A of the *Pollution Control Act* is to be made to the Environmental Protection Authority for a licence under the *Clean Air Act, Clean Waters Act* and *Noise Control Act*, as applicable.

8. The applicant or operator shall, within one (1) month from the date of consent, develop a programme to install directional lighting to reduce fugitive light emissions from both sites.

8A. Any exterior lighting installed as part of any modification to this approval must not cast light onto any adjoining property.

DESIGN AND CONSTRUCTION

9. Liquid fuel and chemical storage areas shall be constructed and bunded in accordance with the requirement of the *Dangerous Goods Act, 1975*.

10. Effluent treatment facilities shall be constructed to allow the applicant or operator to meet any requirements of a Trade Waste Agreement with the Council.

11. The first flush basins and detention basins shall be constructed and lined with suitable material, to minimise leakage and seepage to the satisfaction of the NOW.

12. A detailed works programme outlining the construction programme, timing, and staged commencement of new operations is to be submitted to the Council prior to building approval.

13. Measures shall be implemented and monitored to minimise dust generation and soil erosion during construction to the satisfaction (of) the NOW in conjunction with the Council (SEE SOIL & WATER MANAGEMENT).

14. All structures shall be erected generally in accordance with the DA drawings submitted with the application and the EIS. They shall be constructed in suitably coloured, non-reflective materials to the reasonable requirements of the Council.

15. The applicant or operator is required in the building application to make provision for emergency vehicle access generally in accordance with the substance and intent of clauses C2.3 and C2.4 of the Building Code of Australia. The applicant shall comply with any reasonable requirements relating to emergency egress for employees, provision of hydrants and any other reasonable requests relating to fire safety issues made by the NSW Fire Brigade.

16. During construction phase the applicant or operator shall:
    (a) provide hot line data on public enquiries and/or complaints to the Council fortnightly;
    (b) provide for a special Soil and Water Management Plan for the equipment and materials storage area, including bunding for fuel and hazardous materials; and
    (c) provide for a Fire Safety Management Plan during the construction phase, including a Materials Storage Plan to ensure a minimum of six (6) metres unrestricted access to the existing production facility is maintained.

(16A). The Proponent shall ensure that any new buildings and structures on the site are constructed in accordance with the relevant requirements of the BCA.

Notes:

- *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for any building works.*
- *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

16B. The Finished Floor Level of a floor slab of any building erected as part of any modification to this approval must not be constructed below 1094 metres AHD.

A report from a Registered Surveyor verifying compliance must be submitted to the Council after the floor slab has been poured and before work commences on any part of the building above slab level.

TRANSPORT

17. The applicant or operator shall ensure that within the Oberon Village Zone, heavy vehicle access to the plants covered by this DA is restricted to Carrington Avenue and North Street, and then only between the hours of 6.00am and 10.00pm on any day of the week.

18. Except as provided by condition 17, all heavy vehicle access to the plant shall be via town bypass roads, when available.

19. When agreement has been reached on the construction of the western extension of the Albion Street By-pass, the applicant shall, if requested by the Secretary, pay an amount towards the costs of construction.

20. The applicant shall pay the Council an amount of $700,000 for the upgrading of local roads and the construction of access to the development under Section 90 of the *Environmental Planning and Assessment Act, 1979*.

21. All internal roads, other trafficable and hard stand areas are to be constructed to provide a suitable hard surface to minimise dust levels and provide all weather access.

22. During the construction phase a formal letter of agreement between the Council and the applicant is to be provided for restoration works in acts of damage caused by construction activities to Council's roads.

23. The applicant or operator shall maximise the use of rail for transport of goods once the Tarana to Oberon branch line is re-opened and provides a competitive cost and service relative to other forms of transport.

    If the applicant or operator decides not to use rail transport it shall commission an independent audit of the economies of transport options to be provided to the Department.

TRADE WASTE

24. The applicant or operator shall enter a Trade Waste Agreement with the Council twenty one (21) days before the commencement of operations. The agreement shall include but not be limited to covering quantities, quality, timing of the release of wastes to the sewerage system, contingency plans in the event of breakdown of the effluent treatment facilities and monetary penalties for breaches of the standards.

    The Trade Waste Agreement shall be prepared in liaison with the NOW and the Environment Protection Authority.

25. All hazardous, liquid and/or solid, industrial waste is only to be disposed of off site at a waste disposal licensed by the EPA or with the written agreement of the EPA and the Council.

STORMWATER MANAGEMENT

26. A Stormwater Management Plan, generally in accordance with DA Drawing Nos. CSR4401/100/0395 Rev A; CSR4401/100/0396 Rev A; CSR4401/280/0395 shall be prepared in liaison with the NOW and implemented from the commencement of site works covered under this DA. The Plan should address the following issues, but not be limited to:
    (a) the installation and cleaning of pollutant traps and sedimentation basins;
    (b) monitoring of stormwater quality leaving the site; and
    (c) appropriate systems and procedures for the detecting of pollutants prior to them becoming environmental issues.

26A. Before the commencement of any stormwater infrastructure work approved under modification application number DA 27/95 MOD 5, the applicant shall update The Stormwater Management Plan in consultation with the NOW.

26B. Within 3 months of the approval of any modification to this consent that involves the construction of a building or work, the Stormwater Management Plan shall be updated to the satisfaction of the Secretary.

27. Any stormwater drainage system traversing or crossing a public road shall be enclosed within a sealed piped system and subject to any required lease agreement as required under the Roads Act.

27A. The Applicant shall ensure that stormwater management for the permanent and temporary hardstand areas for MOD 7 are designed in accordance with *Managing Urban Stormwater – Soils and Construction* (Landcom 2004).

SECTION 94AA CONTRIBUTIONS

28. The applicant or operator shall contribute $295,800 for community facilities which shall include the provision of mobile phone services, the upgrading of the tennis courts, indoor sports facility, the upgrading of Oberon swimming pool (inclusive of design costs) and television facilities.

(28A) The applicant shall, prior to the issue of a Construction Certificate for the proposed modification to the Doorskin factory building (DA 27/95 M1), contribute $3,125 to Oberon Council for Section 94 contributions, as prescribed by Council's Annual Fees and Charges Schedule.

(28B) The Applicant shall, prior to the commencement of any construction work associated with the proposed modification to the bio-fuel handling system (MOD-83-10-2002-i), contribute $1,840.00 to Oberon Council for Section 94 contributions, as prescribed by Council's Annual Fees and Charges Schedule.

CONTRIBUTIONS FOR WATER/SEWER

29. The applicant shall pay to the Council a sum of $110,000 for upgrading of the water supply system as required under the *Water Supply Authorities Act, 1987*.

NOISE CONTROL

30. The applicant shall implement appropriate design measures to meet the EPA criteria for noise control.

31. An acoustic compliance design report by a practising consultant in acoustics, accepted by the EPA, is to be submitted to the Council with the building application detailing:
    (a) the existing background noise level L90 dB(A) and the predicted noise levels at:
        (i) the nearest likely affected residence;
        (ii) the closest residential premises in Herborn Street;
        (iii) the Oberon High School at the closest external wall;
        (iv) the closest residence in Tasman Street;
        (v) the closest rural residence west of the factory premises;
        (vi) the closest rural residence north of the factory premises; and
        (vii) the closest rural residence east of the factory premises; and

    (b) the method of attenuating all noise generating equipment that is over background noise levels which shall be in accordance with the

requirements of the Environment Protection Authority Noise Control Manual.

32. The planned noise level for each of the aforementioned seven (7) sites shall meet the following standards.

Location	Noise level	Time period
Residential areas within Oberon	45 dB(A) 40 dB(A) 35 dB(A)	7:00am to 7:00pm 7:00pm to 10:00pm 10:00pm to 7:00am

Location	Noise level	Time period
Residential areas adjacent to industrial areas or main roads	50 dB(A) 45 dB(A) 40 dB(A)	7:00am to 7:00pm 7:00pm to 10:00pm 10:00pm to 7:00am

Location	Noise level	Time period
Dwellings within the industrial area	55 dB(A) 50 dB(A) 45 dB(A)	7:00am to 7:00pm 7:00pm to 10:00pm 10:00pm to 7:00am

The above criteria shall be met at the closest external wall of any of the buildings nominated. Noise emanating from the factory premises is not to be significantly tonal or impulsive in nature.

Where the above criteria cannot be achieved, acoustic treatment shall be provided for the affected residence(s) (including the High School) which is acceptable to residents, to ensure that internal noise levels do not exceed 10 dB(A) below the relevant external noise level criterion.

For the purposes of this clause, the land considered to be industrial is shown on the plan in Map 1.

33. During the construction period the L10 noise level due to construction activities shall not exceed the L90 background noise level by more than 5 dB(A).

Where construction activity noises are audible at residential premises, construction shall be limited to the following times:

Monday to Friday 7:00am to 7:00pm
Saturday 8:00am to 1:00pm
No construction on Sundays and Public Holidays

34. An acoustic compliance report, prepared by a practising consultant in acoustics, accepted by the Environment Protection Authority, is to be submitted to The Oberon Council and Environment Protection Authority every month during the construction period. This report is to address and comment on all circumstances where noise emanating from the premises exceeds the noise criteria in condition 32. The report shall outline remedial measures taken.

When all construction work is completed, the acoustic compliance report shall be presented to Council and the Environment Protection Authority as part of the first Environmental Management Report. This is to enable the developer to quickly identify noise problems and address them appropriately with competent

professional advice and allow the Council and the EPA to effectively monitor noise pollution/emissions from the premises.

35. The applicant or operator shall agree, within one (1) month from the date of consent, to a plan to monitor noise in a manner and at sites agreed by the EPA, in liaison with the Council, and operate them for three years.

The applicant or the operator shall provide the results of this noise monitoring every six (6) months to the EPA and the Council or upon request from the EPA.

35A. The Applicant shall ensure that acoustic panelling and insulation is used in the construction of the debarker enclosure.

AIR QUALITY

36. The applicant or operator is to liaise with the EPA to develop a pollution reduction programme for the existing timber processing facilities.

Agreement to the pollution reduction programme shall be in place prior to operation approved under this consent being commenced.

37. The development shall be managed so as to minimise dust and other airborne materials and other air emissions, including odours, to people occupying or using adjoining premises. Measure shall be implemented to minimise the impact of emissions beyond the boundaries of the site as deemed necessary in the review of the annual Environmental Management Reports required by condition 49.

37A. Unless otherwise agreed to by the EPA, the Applicant must ensure that the stockpiling of any sawdust on Lot 2902, DP 1056754 is:
(a) only for a period of up to 24 months; and
(b) no more than three (3) metres in height and enclosed on three sides so as to prevent the mobilisation of sawdust by wind, unless the stockpiles are fully covered by a tarpaulin.

SOIL AND WATER MANAGEMENT PLAN

38. The applicant or operator is required to liaise with the NOW in the preparation of a soil and water management plan. This plan is to be of a standard satisfactory to the NOW, in consultation with the Council.

39. The applicant or operator is to liaise with the NOW and the Council during the implementation of the soil and water management plan. Inspections are to be arranged, on-site to inspect control devices at the following stages:
- pre-factory construction
- during construction
- post construction

40. All control works are to be of standard of construction acceptable to the NOW.

41. The applicant or operator is to install a minimum of two piezometers to allow monitoring or ground water quality and quantity down stream of the water reservoir and water treatment ponds in liaison with the NOW.

41A. Before the commencement of any work under approved under modification application number DA 27/95 MOD 5, the applicant shall review and update the soil and water management plan to the satisfaction of the NOW. The updated plan must include specifications for erosion and sediment control, vegetation management and stormwater control.

41B. The applicant must obtain a Controlled Activity Approval under the Water Management Act 2000 for any works in or within 40m of a watercourse.

42C. The applicant must obtain a licence under the Water Act 1912 or Water Management Act 2000 (whichever is relevant) from the NSW Office of Water for any work that will or is likely to intercept or extract groundwater.

41D. The Applicant shall ensure that erosion sediment control structures for the temporary hardstand area (Lot 2902, DP 1056754) are constructed in accordance with *Managing Urban Stormwater: Soils and Construction, Vol. 1* (Landcom 2004).

LANDSCAPING

42. The applicant shall submit to the Council a landscape plan with the building application. This plan shall be properly drawn and labelled and show detailed proposals for the following:
    (a) landscaping of the four (4) metre high noise wall;
    (b) the maturity of the stock to be planted; and
    (c) an adequate automatic watering system, to the reasonable satisfaction of the Council.

43. Landscaping (including installation of an adequate watering system) is to be carried out and maintained in accordance with the approved landscape plan, to the reasonable satisfaction of the Council.

44. All landscaping areas are to be separated from adjoining driveways, manoeuvring areas and parking areas, by a square kerb approximately 150 mm in height, or alternative methods of construction, fences or other devices, to the reasonable satisfaction of the Council.

44A. Any existing landscaping that is removed from along the western boundary adjacent to Lowes Mountain Road as a result of any modification to this approval must be replaced to the satisfaction of the Council.

44B. Additional landscaping shall be carried out to the satisfaction of Council along the eastern boundary adjacent to the resin production facility prior to the issue of an Occupation Certificate for MOD 6.

PROPERTY ACQUISITION

45. The applicant shall:
    (a) within three (3) years from the date of the consent:
        - purchase Karingal Flats if requested, in writing, by the owner;
        - pay not less than market value having regard to the existing use of the land prior to the date of development consent;
        - pay reasonable compensation of the cost of disturbance and relocation; and

- if no agreement can be reached in regard to a request for purchase, pay reasonable costs, if any of the claimant in respect of expenses for legal advice and representation and expert witnesses in determining the value of the property and the terms of purchase;

(b) where agreement as to the acquisition details cannot be reached, between the applicant and the owner of Karingal Flats, within six months of the request to purchase, agree that either party may seek to have the matter arbitrated;

(c) where the applicant's offer to purchase has not been accepted within six months of the date of the offer, cease to have an obligation under this clause.

HAZARDS

(45A) Prior to the commencement of any construction work associated with the construction of the dry fuel storage bunker, the Applicant shall prepare and submit for the approval of the Secretary the studies set out under a) to b) below. Construction shall not commence until approval has been given by the Secretary and, with respect to the Fire Safety Study, approval has also been given by the Commissioner of the NSW Fire Brigades.

(a) A Fire Safety Study, covering all aspects detailed in the Department's Hazardous Industry Planning Advisory Paper No. 2 - Fire Safety Study Guidelines and the New South Wales Government's Best Practice Guidelines for Contaminated Water Retention and Treatment Systems. The Fire Safety Study shall also be submitted to the NSW Fire Brigades for approval.

(b) A Hazard and Operability Study, chaired by an independent, qualified person, approved by the Secretary prior to the commencement of the Study. The Study shall be carried out in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 8 - HAZOP Guidelines.

(45B) The Applicant shall update the existing site Fire Safety Study to include the relevant aspects of the modification and submit the updated study to the Secretary and the NSW Fire Brigades (or the Rural Fire Services if applicable) for approval. Construction other than preliminary works shall not commence until approval is given by the Secretary and the NSW Fire Brigades. In particular, the updated study should:

(a) review the presence of solvent vapours and dust in the plant areas (given the use of the coating materials and processes) and assign a hazardous area classification in accordance with AS 2430 *Classification of Hazardous Areas*. An outline of the safety requirements to comply with the hazardous area classification and risk minimisation measures such as use of appropriately rated electrical equipment and static bonding should be included [refer section 8 of Readi-Cote Primer Material Safety Data Sheet (MSDS)];

(b) detail the changes to be made to the fire fighting system and the contaminated fire fighting water retention system;

(c) demonstrate that the recommendations made in the MSDS for the materials to be used on site will be implemented; and

(d) demonstrate that the ventilation system is capable of maintaining the 10% of the lower explosion limit (LEL) recommended in the MSDS for Readi-Cote Primer.

45C. Before the commencement of any work under any modification to this approval, the applicant shall review and update the Fire Safety Study to the satisfaction of the Secretary and the NSW Fire Brigade.

ENVIRONMENTAL MANAGEMENT PLAN

46. The applicant or operator shall prepare an Environmental Management Plan (EMP) to show how the MDF plants, particleboard plant, sawmill & planer, Redtan plant and associated facilities, will, once in operation, achieve the environmental performance of the Environmental Protection Authority and the Council. The EMP shall be submitted to the EPA for its approval in conjunction with the Council, the NOW and the Department, at least 21 days before the new operations commence.

47. The applicant or operator shall employ an appropriately qualified, full time environmental officer, within three (3) months of the date of consent, to be responsible for ensuring all environmental safeguards proposed for the development and as required by this consent and other statutory approvals are enforced and monitored. These responsibilities shall also include not be limited to the preparation of and monitoring of the implementation of the EMP and EMR.

48. The EMP is to cover, but not be limited to:
    - liquid and solid waste management
    - metrological data
    - odour emission control
    - noise level control
    - dust control
    - soil and water management (including the stormwater system)
    - complaints register
    - ground water quality and quantity
    - surface water quality
    - the “essential service” (as defined by the Building Code of Australia) audit report and an emergency service plan audit report
    - any changes proposed as a result of the monitoring programme

    Analysis shall be carried out to “Standard Methods” by a N.A.T.A registered laboratory.

49. The applicant or operator shall prepare an Environmental Management Report (EMR) based on the results monitoring required in the EMP. The EMP shall be submitted to the EPA for its approval in conjunction with the Council, NOW, and the Department at the end of each twelve month period from the commencement of construction. The EMR shall:
    - present the results of the monitoring programme;
    - compare the results of the monitoring programme with base line data and offer interpretation of results;
    - outline any proposed changes to the EMP based on the results of monitoring;
    - list any complaints received regarding the development and outline measures taken to address them.

50. Provide a complaints hotline 1 800 number to contact the applicant or operator for complaints and public enquiry immediately upon commencement of construction phase.

The hotline is to be monitored every working day and all calls lodged, with details and action taken and a summary including in the annual Environmental Management Report.

51. Every five (5) years the applicant or operator shall have an independent audit of the environmental management reports by an independent person or organisation approved by the Department in consultation with the Council and submit it to the Department, EPA, NOW and the Council.

The report will be paid for by the applicant or operator.

DISPUTES

52. In the case of disputes in the implementation of the conditions of this consent the matter shall be referred to the Secretary for resolution.

LOT CONSOLIDATION

52A. The applicant must obtain a Subdivision Certificate for the consolidation of lot 25 DP 1148073 and lot 21 DP 1017457.

ANNUAL PERFORMANCE REPORTING

53. The Applicant shall, throughout the life of the development, prepare and submit for the approval of the Secretary of the Department, an Annual Environmental Management Report (AEMR). The AEMR shall review the performance of the development against the conditions of this consent and other licences and approvals relating to the development. The AEMR shall include, but not necessarily be limited to:
    (a) details of compliance with the conditions of this consent;
    (b) a comparison of the environmental impacts and performance of the development against the environmental impacts and performance predicted in those documents listed under condition 1 of this consent;
    (c) details of any complaints received in relation to the operation, an overview of how these complaints were handled, and the results of any actions taken by the Applicant to address the complaint;
    (d) results of all environmental monitoring required under this consent and other approvals, including interpretations and discussion by a suitably qualified person; and
    (e) a list of all occasions in the preceding twelve-month period when environmental performance goals for the development have not been achieved, indicating the reason for failure to meet the goals and the action taken to prevent recurrence of that type of incident.

The Applicant shall submit a copy of the AEMR to the Secretary of the Department, EPA and Oberon Shire Council every year.

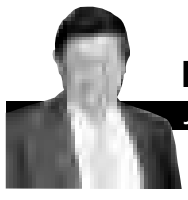
The Secretary may require the Applicant to address certain matters in relation to the environmental performance of the development, in response to review of the Annual Environmental Report and any comments received from Oberon Shire Council. Any action required to be undertaken shall be completed within such period as the Secretary of the Department may agree.

ACCESS TO INFORMATION

54. From the commencement of the construction of the project, the Proponent shall make the following information publicly available on its website:

(a) a copy of all current statutory approvals;
(b) a copy of the current plans and programs required under this approval;
(c) a summary of the monitoring results of the development, which have been reported in accordance with the various plans and programs approved under the conditions of this approval;
(d) a complaints register, which is to be updated on a monthly basis;
(e) a copy of the most current Annual Environmental Management Report;
(f) a copy of any Independent Environmental Audit, and the Proponent's response to the recommendations in any audit; and
(g) any other matter required by the Secretary.

Time to recognise some local heroes



Federal politics
John Cobb

IN light of Anzac Day's approach and as part of the Commonwealth Government's Saluting Their Service Program, we are calling on the people of Calare to nominate local heroes for a certificate of appreciation from the Prime Minister, the Minister for Veterans Affairs and myself.

These certificates are a means of expressing the gratitude of the nation, and of Calare, to those who served in the defence forces or on the home front in the Second World War, or in wars, conflicts or peacekeeping operations since 1945.

Individuals can nominate themselves, friends or family who have served in eligible wars, conflicts and peacekeeping operations.

Deceased eligible persons can also be nominated by family members.

Application forms are available from http://www.dva.gov.au/sites/default/files/dvaforms/D0755.pdf.

Guidelines for applicants are also available at http://www.dva.gov.au/commemorations-memorials-and-war-graves/honours-medals-and-awards.

Nominations will close at 5pm on April 1, 2016.

■■■

LOCAL organisations that need support to preserve and conserve our Australian heritage are invited to apply for a Community Heritage Grant.

The program provides grants of up to $15,000 each to help organisations preserve and maintain nationally significant cultural heritage collections.

In Calare we are home to some of the oldest towns in regional Australia. We have a vibrant history that forms an important part of our national story.

Local libraries, archives, museums, historical societies, indigenous groups and migrant community groups with a significant historical collection may be eligible for funding.

All those not-for-profit organisations with heritage responsibilities at a local level in Calare should apply for a grant.

These grants provide both funding for conservation projects and access to expertise from highly experienced professionals in our national collecting institutions.

The 2016 Community Heritage Grants Program is managed by the National Library, in conjunction with the National Archives of Australia, the National Film and Sound Archive and the National Museum of Australia.

Applications close May 9, 2016 and can be submitted online at www.nla.gov.au/chg.

■■■

A LONG week in Canberra paid off with the Government's Senate voting reform bill finally passing through the parliament.

The reforms are about ensuring that every individual's vote goes where they intend it to and that your vote cannot be hijacked through deals done between groups.

The reforms include the introduction of optional preferential above-the-line voting, with advice to the voter on the ballot paper to vote above the line by numbering at least six of the boxes in the order of the voter's choice (with the number one as the voter's first choice).

END: The bushfire season will soon come to an end. The district has seen some nasty blazes in recent years, including this one in early 2014.

Vigilance urged even as the bushfire season ends

THE bushfire danger period within the Chifley/Lithgow Team area will come to an end on April 1.

The NSW Rural Fire Service said that from Friday, April 1, fire permits will no longer be required for the Oberon, Bathurst and Lithgow local government areas for standard pile burns and agricultural burns.

NSW RFS Superintendent Greg Wardle said all members of the public must still abide by the law when conducting hazard reduction burns.

"Penalties still apply for failing to notify neighbours that you are lighting a fire and for allowing fires to escape," he said.

"Even though the weather is cooling down, there is still the potential for fires to threaten life, property and the environment.

"We encourage people to seek advice from their local NSW RFS Fire Control Centre on how to safely conduct hazard reduction activities such as slashing, trittering and burning, and how to prepare their homes for the next bushfire season."

To notify an intention to burn or arrange a Bushfire Hazard Reduction Certificate, contact Oberon Fire Control Centre on 6336 0493.

Although fire permits are no longer required, property owners in Bathurst Regional Council and Lithgow City Council areas must still ensure they abide by the open burning policy issued by their council.

Borg Panels Expansion Project

Community Consultation Forum

Oberon Community Centre - 31 March 2016, 1:30 - 5:30pm

The Oberon Panels Particle Board project represents a significant investment in the region, enabling the expansion of the existing facility and the size of the workforce. Since the December 2015 announcement Borg Panels has continued to progress the planning stages of its expansion.

Attending the community forum will be Borg CEO Jim Snelson, Plant Manager Greg Muir and Regulatory Manager Victor Bendevski to outline the proposed expansion and answer questions in relation to plan.

We look forward to your attendance.

BORG PANELS

RM2476809

CCC Meeting 22.12.15

Attendance

Peter Hotham, Spiro Kavaleiros, Ian Makins, Fran and Tim Charge, Brian Dellow, Kathy Sajowitz, Gary Wallace, Mark Pointon, Bob & Sally Parrington, John Borg, Jim Snelson, , Victor Bendveski, Julie Booth.

Information session to communicate and meet with community re new raw board line

Jim Snelson addressed meeting with details regarding the new project.

Major benefit for Oberon and the community is the future and ongoing security for the site, providing employment and growth.

The raw board plant will strengthen and secure MDF plant.

The raw board plant will be an industry leader with leading edge technology.

Timeframe estimates:

- Plans submitted for approval by February 2016.
- Extensions to begin at the end of 2016.
- Production looking towards end of 2017.

Questions raised and addressed in meeting:

1. Available fibre resources.
   Jim responded that we are not using up the full capacity of our fibre contract
2. Noise concerns from Caravan Park in regards to another chipper.
   Mobile chippers to be removed which will decrease noise levels. John told owners of the Caravan Park it is a priority of the site to ensure noise levels are at an acceptable and controlled level as we aim to be around for a long time. Bob and Sally from the caravan park have asked to come to site to see and understand what is being planned at the site, John felt that was a good idea.
3. Timeframe for noise reduction.
   6 month time frame for better control of noise.
4. Where will the new line and buildings be situated.
   Plans and maps to be available when finalised as to exact size and situation of the new line.
5. Product sizes, types and will the products be leaving site raw or with improvement.
   The product will not leave the site raw but will be laminated before leaving site.
6. Why not put laminate on MDF only.
   Different products suit different finished goods.
7. Truck movement, how often and how many.
   Increased truck movement. Average increase will be 2:1.
8. Volume expected from site.
   Not known at this stage

9. Has the company considered using recycled timber.
   Cost and quality determine this but the best product is created out of fibre.
10. Water requirements associated with the production of raw board.
    Water requirement not high for this product as it is a very dry product not like MDF.
11. The community's major question concerned the impact on the local roads.
    Company is well aware of impact on roads and has been dealing with maritime services and the truck movement is still low for class surface A roads. The company is still investigating environmental and road impacts.
12. Have SEARS and EPA been notified.
    It is the Company's intention to hold meetings with the key stake holders and forum with Oberon CCC committee.
13. Have you got support from Federal and State Government.
    Government bodies have been briefed and involved as the project moves on.
14. Where is the raw board machinery and equipment coming from.
    Mostly from Germany some from Italy also some of the larger gear to be built on site. The Company aims to do as much as possible themselves as the site workshop is being ramped up along with CNC in preparation for the Raw Board Line.
15. What's the involvement of local engineering businesses/ employment associated with construction of new line.
    The Company will need to bring in labour as we will not be able to keep up with the work and engineering required for this project.

Tim asked for John/Jim to attend meeting with Oberon Business association second Wednesday of February at 6pm. (10.2.2016).

John communicated to the meeting that the site is undertaking a big clean up, but would like to have tours on site so people get to see what we are about.

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Borg Panels Particleboard Project Planning focus meeting

5th February 2016
10:00am – 2:00pm
Victor Bendevski Borg Manufacturing

Attendees: John Borg, Jim Snelson, Tony Preston, Greg Muir, Borg Manufacturing.
Andrew Neil, The Design Partnership.

10:00am – 10:30am	**Introduction** Company Overview Jim Snelson (CEO)	Meeting room
10:30am -11:15am	**Project briefing.** The Project Andrew Neil (Director)	Meeting room
11:15am-12:00pm	**The Site** Site tour	MDF site
12:00pm -12:30pm	**Lunch** Light lunch provided	Meeting room
12:30pm-2:00pm	**Q&A about The Project.** Open forum about agency concerns.	Meeting Room

Additional Instructions:

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Borg Panels Particleboard Project, Oberon Council Meeting

23rd March 2016
2:00pm – 3:45pm
Victor Bendevski Borg Manufacturing

Attendees: Jim Snelson, Greg Muir, Borg Manufacturing.

Mayor Kathy Sajowitz, Clr John Morgan, Clr Jill Evans, Clr Kerry Gibbons, Clr Clive McCarthy, Clr Neil Francis Oberon City Council.

Victor Benevski, Chris Schumacher, Jaclyn Burns, Sharon Swanell, Exe Staff

2:00pm – 2:15pm	**Introduction** Company Overview Jim Snelson (CEO)	Council Chambers
2:15pm - 2:45pm	**Project briefing** The Project Jim Snelson (CEO)	Council Chambers
2:45-3:30pm	**Q&A about The Project** Council Members Victor Bendevski & Jim Snelson	Council Chambers

Additional Notes:

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JS introduction into the broader Borg Panels Operation

- JS project briefing with reasons as to why Borg Panels is undertaking The Project – "Is to control our own destiny" and be able to compete with imported product securing the future of the Borg Panels factory.

Q&A from council members:

- Aboriginal Heritage Information Management System (AHIMS) was brought up to address planned changes for King Stockyard creek – CSR project, Aboriginal artefacts. Council requested we review our current database searches to date.
- Traffic & Road Safety – Area of which council requires clarification
    - Traffic Management plan –direction of movements
    - Parking off site at Gate 4 in driveway – 6 trucks have been seen banked up – dangerous on foggy mornings
    - Weighbridge removed at Gate 6 which should result in less congestion
    - Trucks will be with swipe cards
    - Split movements around gates
    - Endeavour st quality, Albion st & Duckmaloi rd
    - JS highlighted that the increase in trucks will be partially offset by the decrease in trucks that were originally bringing in PB to the site
    - JS explanation of Mixed Telematics system within Borg Oberon fleet providing further safety.

- Is Borg going to ask its contractors to install Mixed Telematics.? We are rolling out to the rest of our fleet.
- Raised concern over competition with Structaflor – JS highlighted that Borg will be producing a completely different product – carcass vs flooring.
- Helicopter approval on plan – registered (H) pad on premises?
- Noise – noisy plant and equipment, Borg continuously addressing and have addressed multiple sound issues.
- Councils requests that Oberon LEP Noise buffer be considered in the EIS.
- Noise wall constituent – location
    - Gate 6 - turning bay Lowes Mount rd.
    - Along football field? Where else.
- Lot 8 – lot 22 DP1017457 – include in label "Woodchem not part of submission" – Capacity – label on community Concept diagram.
- Dust and Fugitive Dust Emissions controls
- Abattoir was raised as a potential flood area, its runoff water treatment ponds are quite close to the creek. Has flooded some time ago but not recently, needs review.
- Water hydrology for council easement near the football field.
- Water usage on site post development, reliance on council system and trade waste requirement/scenarios abatement.
- Councillor raised concerns about Albion st. residential development blocks

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    - Near Dennis O'Connell transport, Eastern side Residential Blocks have the approval to build.
- Council suggested to bring samples for Community Meeting
- Plant out Northern mound to improve amenity
- Council members raised that community meeting, 31st March, is a good opportunity to present all the changes that have been made throughout site to improve community i.e. noise, emissions, water etc.

SENIOR'S WEEK ACTIVITIES AROUND OBERON

Senior's week is coming up starting on Friday 1 April and running through to Sunday 10 April.

A range of activities are on around the region during the week, here are some highlights:

1. Monday, 1pm - 3pm 4 April

Investigating your Family History. At the Community Technology Centre, 48 Ross St

A workshop on how to get started, what you need to get started, where to look for information, how to record your information.

2. Wednesday 11am - 1pm 6 April

Brain Food Activities. At the Community Technology Centre, 48 Ross St

Learn about activities that can improve your memory, adult colouring books, activities on a computer or tablet, exercise and food that you can eat.

3. Thursday 12 noon 7 April

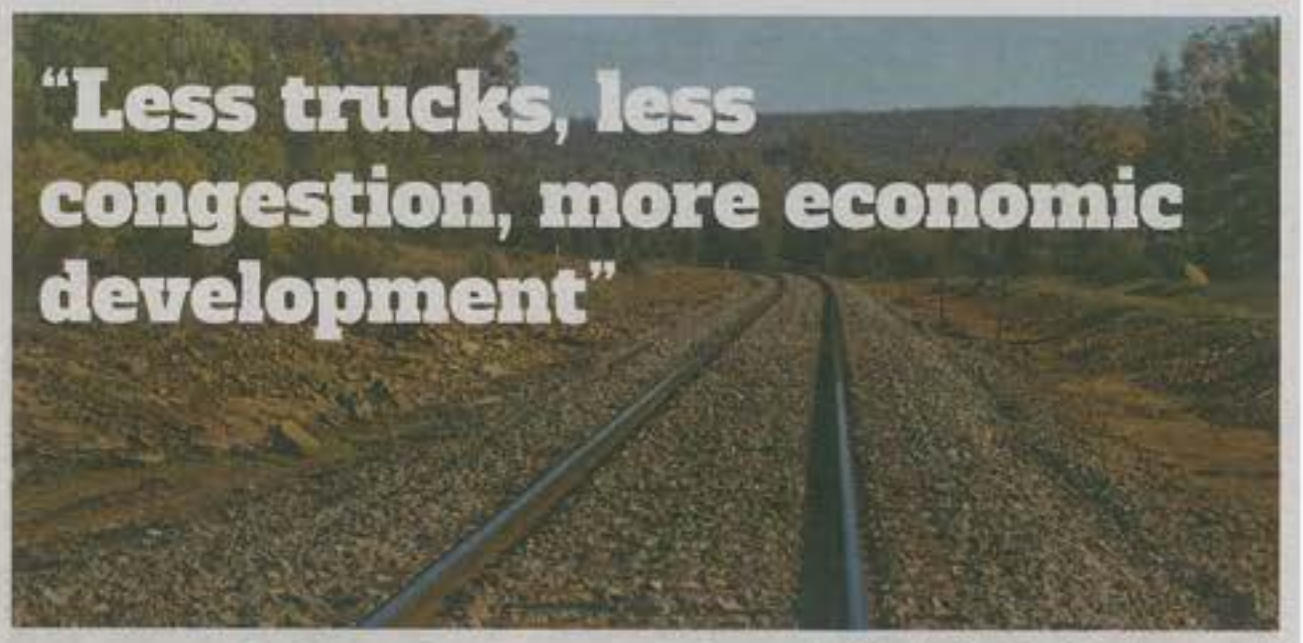
Senior Citizens Luncheon. At Burraga Sport's Club, Burraga

Contact Charles Lamburn for further details on 6337 0325

4. Friday, 11am 8 April

Seniors Concert and Luncheon at the RSL.

All the Free tickets being distributed by Oberon Council are GONE. Tickets are still available from the Oberon RSL for$15. Contact the RSL for further details on 6336 1607



Centroc calls for Inland Rail to be fast tracked.

"We are not wedded to any delivery model. At the same time the case has been made for the cost benefit of Inland Rail and we are very supportive of the more detailed work being undertaken by Regional Development Australia Central West on the Economic Growth that will be realised in this region," said Cr West, Chair of Centroc.

"Centroc hopes that the Inland Rail is built to a modern future-standard, sufficient to drive modal-shift from long-haul road to rail and to push for economic development for the regions along the line to ensure commercial viability," said Cr West, Chair of Centroc.

On a national level the Inland Rail project will improve the global competitiveness of Australia's key exports, through providing a reliable rail transport alternative for agricultural and mining; it will also facilitate the creation of thousands of jobs during and after construction, many in rural and regional areas.

"The Inland Rail project will generate substantial economic benefit to Central NSW," said Cr Keith, Chair of the Melbourne Brisbane Inland Rail Association.

"We hope the Federal Government will commit to a workable funding model for this project, to ensure the 10 years completion window is achieved." said Cr Keith.

Cr Bill West, Chair of Centroc and Cr Ken Keith, the Chair of the Melbourne Brisbane Inland Rail Association, are arranging meetings with key Ministers to progress

Borg Panels Expansion Project

Community Consultation Forum

Oberon Community Centre - 31 March 2016, 1:30 - 5:30pm

The Oberon Panels Particle Board project represents a significant investment in the region, enabling the expansion of the existing facility and the size of the workforce. Since the December 2015 announcement Borg Panels has continued to progress the planning stages of its expansion.

Attending the community forum will be Borg CEO Jim Snelson, Plant Manager Greg Muir and Regulatory Manager Victor Bendevski to outline the proposed expansion and answer questions in relation to plan.

We look forward to your attendance.

BORG PANELS

Borg Panel Manufacturing, Oberon NSW

Traffic Impact Assessment Report

30011699

For: Borg Construction
Date: 06 May 2016

Project Name:	Borg Panels, Oberon Traffic Impact Assessment
Internal Reference:	30011699
Report prepared for:	Borg Construction

REVIEWS AND APPROVALS FOR ISSUE

Revision	Date	Author	Reviewer	Approval
0	02/12/2015	S Botross	N Vukic	M Haverland
1	16/12/2015	S Botross	N Vukic	M Haverland
2	22/04/2016	S Botross	J Hedge	M Haverland
3	06/05/2016	S Botross	J Hedge	M Haverland

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APPENDIX D: SIDRA INTERSECTION RESULTS (EXISTING CONDITIONS)

APPENDIX E: VEHICLE TURNING MOVEMENTS (OPERATIONAL CONDITIONS)

APPENDIX F: SIDRA INTERSECTION RESULTS (OPERATIONAL CONDITIONS)

1. INTRODUCTION

1.1 Background

SMEC Australia Pty Ltd (SMEC) was engaged by Borg Construction to prepare a Traffic Impact Assessment (TIA) Report for the proposed expansion of the existing Medium-Density Fibreboard (MDF) manufacturing facility located at 124 Lowes Mount Road, Oberon NSW.

This report was prepared to support the lodgement of a development application to Oberon Council and Department of Planning and Environment seeking approval for the proposed development and addresses the requirements of the Secretary's Environmental Assessment Requirements (SEARs) dated 28 May 2015.

1.2 Scope

This report investigates the expected traffic impacts as a result of the proposed development. The purpose of the TIA is to:

- Review the existing transport network
- Determine the impacts on the road network during the construction phase
- Determine the impacts of additional traffic on the existing transport network
- Recommend mitigation and management measures to minimise the impacts identified.

The remainder of this report is structured as follows:

- **Section 2** describes the development proposal
- **Section 3** describes the existing traffic conditions based on traffic survey data collected for this study
- **Section 4** assesses the traffic impacts associated with the construction and operational phases of the proposed development at the start of the operational phase in 2019 and at the end of a 10-year period in 2029
- **Section 5** details the parking requirements as per the Oberon Council Development Control Plan (DCP)
- **Section 6** describes the mitigation and management measures recommended to minimise the impacts identified in Section 4.

2. DEVELOPMENT PROPOSAL

2.1 Site location

The subject site is located at 124 Lowes Mount Road, Oberon within the local government area (LGA) of Oberon. The site is currently occupied by a MDF processing facility and is located within the northern outskirts of the Oberon township, approximately 1.5 kilometres from the town centre.

The site comprises Lot 26 DP 1200697 and occupies an area of approximately 40 hectares.

Lowes Mount Road forms the western boundary of the site; unoccupied land is located to the north and east; and a sporting field and various light industrial sites form the southern boundary. Further south of the site are the town centre and general residential region of Oberon. The subject site and its surroundings are shown in Figure 2-1.

Figure 2-1: Subject site locality

Existing access points along Lowes Mount Road are either boom-gate operated or supervised by site personnel. Vehicles accessing the site include staff private vehicles and contractors' heavy vehicle fleet, which consists of 19 metre semi-trailers and 19-26 metre B-double trucks. Staff and visitor access are to be provided via Gate 4 while deliveries and despatch would occur via Gates 4 and 6 which are located on Lowes Mount Road. Access points are illustrated in Figure 2-2.

Figure 2-2: Site access

2.2 Proposed development plan

The proposed development at the Borg site will involve the expansion of existing manufacturing and storage facilities to enable greater MDF and new particle board production line. Development works will include the construction of the following key infrastructure:

- A log yard, chipping area, silos, flaking building
- Dryer and screening areas
- New production hall and administration area
- Automated moulding, particle board, laminated board and finished board warehouses
- Additional moulding operation, laminating line and sanding line
- Installation of two new paper treaters and storage system.

The extent of the proposed expansion works as well as existing and proposed infrastructure are illustrated in Figure 2-3.

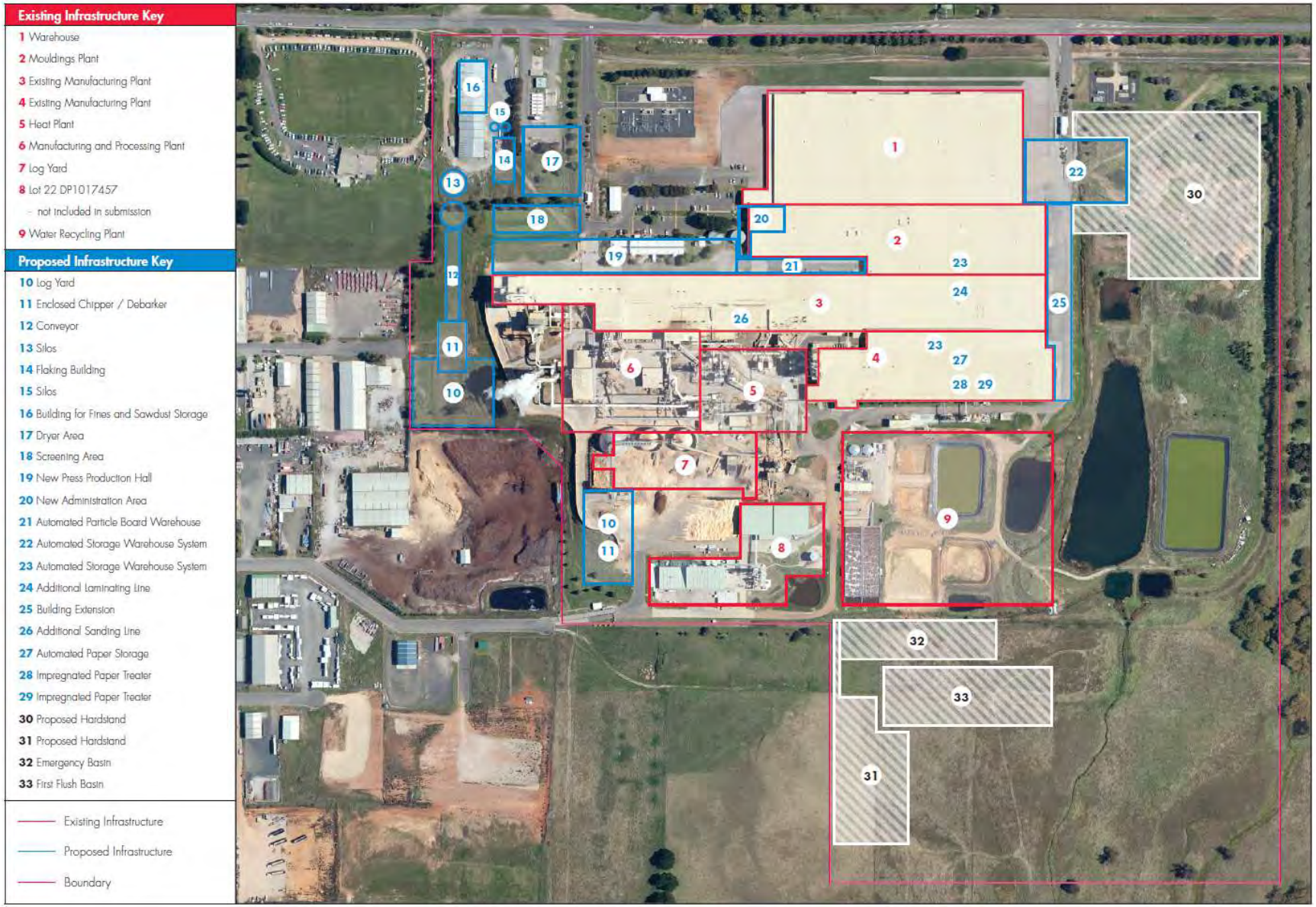


Figure 2-3: Existing and proposed infrastructure (Source: Borg Construction, 5 May 2016)

Currently, there are 114 car parking spaces supplied onsite for staff, which are accessible via Gate 4. An additional 117 car spaces are proposed to accommodate the increase in staffing in 2029. There is to be a total of 231 car spaces allocated for the future development. It is noted that the car park will also be utilised by construction personnel during the construction phase of the development while any parking overflow will be allotted in proposed hardstands.

Staff and delivery personnel will access the site via Gates 4 and 6, which are to be equipped with a new swipe-card entry system. A heavy vehicle circulation route internal to the site is proposed and will assist in the movement of trucks from the gate houses to the required destinations.

Visitor parking spaces are to be provided prior to the secured gate at Gate 4 while existing visitor spaces at Gate 6 are to be removed. The proposed onsite parking layout is contained in Appendix A.

3. EXISTING CONDITIONS ASSESSMENT

3.1 Land use

As per the Oberon Council Local Environmental Plan (LEP) 2013, the land zone classification of the subject site is IN1 General Industrial. The surrounding land uses include primary production, general and large-lot residential and forestry.

The objectives for an IN1 General Industrial zone as stated in the LEP are to offer a range of industrial and warehouse land uses, encourage employment opportunities, minimise adverse impacts of the industry on other land uses, and support and protect industrial land for such uses.

3.2 Existing road network

A site investigation was undertaken on Tuesday 25 August 2015 to identify current traffic conditions and develop an appreciation of the site and its surrounding road network. The key observations made during the site visit have been incorporated in this report.

3.2.1 *Lowes Mount Road*

Lowes Mount Road is a two-way single lane road with a north-south alignment. The carriageway width varies between 8 and 15 metres where the latter accommodates a separated right-turn lane into the subject site. Site access is provided off Lowes Mount Road via Gate 4 and Gate 6. A right-turn lane that is 60 metres in length is provided at the Gate 6 entry.

Formalised on-street parking is not provided along Lowes Mount Road. However, a wide grass verge provides sufficient parking area for vehicles adjacent to the carriageway.

Lowes Mount Road has a speed limit of 60 kilometres per hour at its southern end and 100 kilometres per hour north of the site. A pedestrian and cyclist shared path runs parallel to Lowes Mount Road along the eastern side of the road. There are no pedestrian crossing facilities within the immediate area surrounding the site.

Within the vicinity of the site, pavement linemarking is faded and raised pavement markers have reduced reflectivity due to wear by traffic. The road pavement condition varies between good and poor along its length. During the site inspection, sections of road were observed to be newly resurfaced while other areas remained damaged.

Figure 3-1 shows Lowes Mount Road within close proximity to the subject site.

Figure 3-1: Lowes Mount Road (looking south), just north of Gate 6

3.2.2 *Albion Street*

Albion Street is a single lane, two-way road with an east-west configuration. The carriageway is approximately 18 metres wide; it comprises of a single traffic lane and 4.5-metre wide kerbside lanes in both directions. Albion Street forms part of the heavy vehicle route between Oberon and the Sydney greater metropolitan area, and mostly consists of light industrial land uses.

Albion Street has a sign posted speed limit of 60 kilometres per hour within the town and 70 kilometres per hour near the town outskirts. Towards its western end, pavement linemarking is faded and the road pavement is considered to be in poor condition. Pedestrian footpaths are not provided along its length.

Figure 3-2 shows a cross-section of Albion Street near its intersection with Endeavour Street.

Figure 3-2: Albion Street (looking west) at its intersection with Endeavour Street

3.2.3 *Horace Street*

Horace Street has a north-south alignment and is located toward the southern boundary of the subject site. It is around 270 metres in length and is a no-through road at its northern end.

Horace Street functions as an access road for multiple industrial and warehouse facilities. The intersection of Horace Street with Albion Street is a give way control. However, there are no signs and linemarking to enforce controls at the intersection.

3.2.4 *Endeavour Street*

Endeavour Street has a north-south alignment with a 12-metre wide undivided carriageway. Unrestricted on-street parking is permitted along both sides of Endeavour Street.

Endeavour Street is a no-through road with a U-turn bay at its northern end. The signposted speed limit on Endeavour Street is 50 kilometres per hour. Its intersection with Albion Street is a give way control.

3.2.5 *O'Connell Road*

O'Connell Road is a divided two-way single-lane street with a north-south alignment. The unsealed road verge varies in width between approximately 2 and 5 metres. On-street parking is not formally provided along O'Connell Road and there are no pedestrian or cyclist facilities along the corridor.

The speed limit along O'Connell Road is 60 kilometres per hour at its southern end. The speed limit increases to 100 kilometres per hour about 300 metres north of the O'Connell Road/

Albion Street roundabout. O'Connell Road forms the heavy vehicle route between Oberon and Bathurst.

3.3 Public transport facilities

Public transport facilities are not provided within the area surrounding the proposed development site.

3.4 Pedestrian and cyclist network

A shared pedestrian and cyclist pathway is provided along the site frontage on Lowes Mount Road. The path is 1.5 metres wide and has an asphaltic surface. Footpaths and kerb ramps are generally provided on both sides of North Street and at most intersections between the site and the Oberon town centre.

The adjacent roadway is considerably elevated in comparison to the pathway and is physically separated by a wide grass verge which varies between three and eight metres. A typical cross section of the shared pedestrian and cyclist path, with warning signage of the road ahead, is shown in Figure 3-3.

Pedestrian and bicycle pathway warning signage is installed at the site access points at both Gate 4 and Gate 6 on Lowes Mount Road (Figure 3-4).

Figure 3-3: Shared path existing condition

Figure 3-4: Warning signage for shared path crossing

3.5 Intersection analysis

3.5.1 *Traffic count surveys*

SMEC commissioned traffic surveys at key locations surrounding the subject site. The purpose of the surveys was to determine existing traffic conditions at key intersections. Figure 3-5 illustrates the location of surveys commissioned.

Surveys were conducted at the following intersections:

- Site 1: Abercrombie Road and Rupert Street (give way)
- Site 2: O'Connell Road and Albion Street (give way)

- Site 3: Lowes Mount Road and Albion Street (give way)
- Site 4: Albion Street and Horace Street (give way)
- Site 5: Albion Street and Endeavour Street (give way)
- Site 6: North Street and Carrington Avenue (give way)
- Site 7: Oberon Street, Ross Street and unnamed road (give way)
- Site 8: Duckmaloi Road and Albion Road (give way).

These surveys were undertaken on Tuesday 25 August 2015 during the morning (6am to 9am) and afternoon (3pm to 6pm) peak periods.

Continuous mid-block traffic surveys were undertaken for a one-week period between Tuesday 25 August and Tuesday 1 September 2015, at the following locations:

- O'Connell Road (north of Albion Street)
- Lowes Mount Road (north of Albion Street)
- Duckmaloi Road (south-east of Albion Street).

Figure 3-5 shows the location of the traffic survey locations while the survey data is provided in Appendix B.

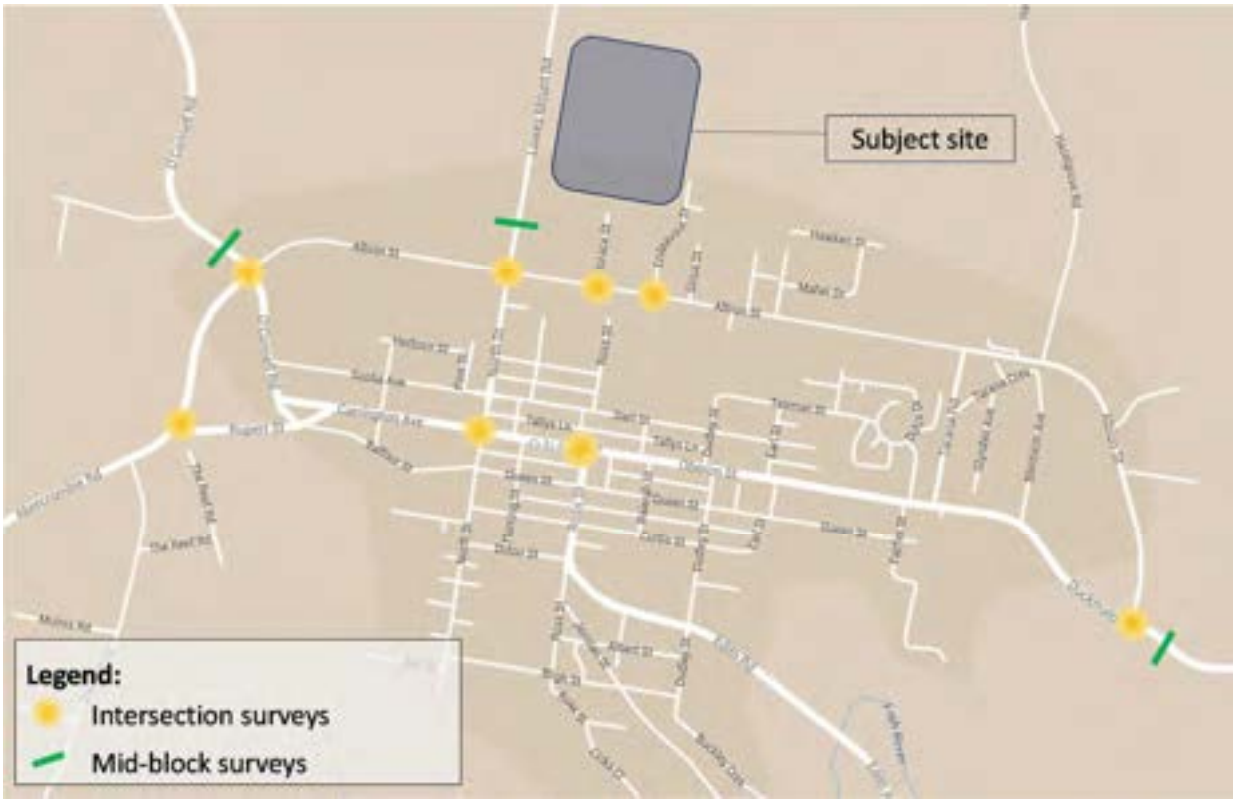


Figure 3-5: Key intersection and mid-block survey sites

3.5.2 *Summary of results for existing conditions*

SIDRA Intersection, version 6.1, was used to assess the performance of the eight intersections listed in Section 3.5.1 of this report. Table 3-1 indicates the Roads and Maritime Services (Roads and Maritime) levels of service criteria. Level of service D or better is generally accepted as appropriate operation.

Table 3-1: Roads and Maritime level of service criteria

Level of service	Average delay (sec)	Stop, give way or yield signs	Traffic signals and roundabouts
A	<14	Good operation	Good operation
B	15 to 28	Acceptable delays and spare capacity	Good operation with acceptable delays
C	29 to 42	Satisfactory but accident study required	Satisfactory
D	43 to 56	Near capacity, crash study required	Operating near capacity
E	57 to 70	At capacity requires other control mode	At capacity, at signals, incidents will cause excessive delays
F	>70	At capacity with long delays	At capacity with long delays

Existing vehicle turning movements at the key intersections have been included in this report as Appendix C while detailed results of the SIDRA intersection performance assessment are provided in Appendix D. Existing conditions at the key intersections for both the AM and PM peak hours are summarised in Table 3-2 and Table 3-3, respectively.

The key findings from the intersection analysis are that all intersections are currently operating at an acceptable level of service A during both AM and PM peak periods.

Table 3-2: Existing conditions – intersection analysis results, AM peak hour

Intersection	Existing conditions			
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)
Site 1: Abercrombie Road - Rupert Street	1	3.7	0.04	A
Site 2: O'Connell Road - Albion Street	3	5.4	0.08	A
Site 3: Lowes Mount Road - Albion Street	3	6.0	0.09	A
Site 4: Albion Street - Horace Street	<1	1.0	0.06	A
Site 5: Albion Street - Endeavour Street	<1	0.9	0.05	A
Site 6: North Street - Carrington Avenue	3	3.8	0.09	A

Site 7: Oberon Street - Ross Street - unnamed road	2	3.2	0.08	A
Site 8: Duckmaloi Road - Albion Road	1	2.5	0.03	A

Note (1): The level of service is based on the worst movement of the intersection for unsignalised intersections, for details refer to Appendix D

Table 3-3: Existing conditions – intersection analysis results, PM peak hour

Intersection	Existing conditions			
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)
Site 1: Abercrombie Road - Rupert Street	1.2	3.8	0.05	A
Site 2: O'Connell Road - Albion Street	3.0	5.0	0.08	A
Site 3: Lowes Mount Road - Albion Street	4.2	6.2	0.11	A
Site 4: Albion Street - Horace Street	0.7	1.0	0.07	A
Site 5: Albion Street - Endeavour Street	0.7	1.1	0.07	A
Site 6: North Street - Carrington Avenue	3.0	4.1	0.10	A
Site 7: Oberon Street - Ross Street - unnamed road	4.0	3.2	0.15	A
Site 8: Duckmaloi Road - Albion Road	0.9	2.5	0.02	A

Note (1): The level of service is based on the worst movement of the intersection for unsignalised intersections, for details refer to Appendix D

4. TRAFFIC IMPACT ASSESSMENT

4.1 Proposal overview

Borg Construction has proposed to expand its existing MDF panel processing facility to increase the production and manufacture of particle board. It is anticipated that the future development will be fully operational by the end of 2019. Expansion works will include the construction of new buildings as well as internal modifications to existing buildings, as explained in Section 2.2

4.2 Construction phase

4.2.1 *Construction traffic generation*

Construction works are expected to be conducted over a 24-month period, which is to commence in January 2017. Construction works would take place between 6am and 6pm, Monday to Saturday while no works are to be undertaken on Sundays.

The traffic generation associated with equipment transportation is assumed to be conducted during site establishment and limited to off-peak periods. This component has not been considered in the construction traffic generation since vehicles would deliver equipment once and would remain on site until the completion of the proposed development works.

An estimate of the number of peak heavy vehicle movements for construction is summarised in Table 4-1. Construction traffic generation is based on typical construction activities and the anticipated levels of staffing that are expected for the construction phase of the proposed development.

Table 4-1: Construction traffic generation

Phase	Duration of peak	Vehicle movements per day (two-way trip)	Number of personnel
Site establishment and construction	24 months	240 trips per day (light vehicles) 60 trips per day (heavy vehicles)	Maximum 120 per day

It is assumed that construction personnel would access the site prior to the general AM and PM peak periods, namely, 6am to 7am and 3pm to 4pm, respectively. Therefore, this would not have a significant impact on the existing transport network at this time.

The existing designated heavy vehicle routes to the site would be utilised by trucks associated with the construction phase. The routes include Duckmaloi Road to Albion Street and O'Connell Road to Albion Street, which form the heavy vehicle routes from the Sydney and Bathurst regions, respectively.

4.2.2 *Construction impacts*

The key findings of the construction phase impact assessment are:

- The construction phase is likely to have minimal impact on the existing transport network, with the majority of the vehicle movements occurring outside of the general peak periods
- No public transport provisions are required to support the construction phase of the works
- There will be no impacts on the existing pedestrian and cyclist network during construction.

4.3 Operational phase

4.3.1 *Operational traffic generation*

At the commencement of the proposed operational phase in 2019, there will be approximately 184 light vehicles accessing the site per day. In 2029, there will be an estimated 194 light vehicles entering the site per day. These estimates are based on the current number of staff and daily vehicle movements into the site for existing operations and the proposed operations for the expanded site.

In 2019 and 2029, there will be 109 and 160 trucks entering the site per day, respectively. Currently, truck movements to and from the site are generally uniform and occur between 6am and 6pm. Hence, heavy vehicles movements are assumed to be evenly distributed over a 12 hour period during the operational phase. Based on this, it is estimated that the number of trucks entering the site in 2019 and 2029 will be 10 and 14 trucks per peak hour, respectively.

Light vehicle movements due to site staff, and, heavy vehicle movements due to materials delivery and product export are summarised in Table 4-2 and Table 4-3, respectively.

Table 4-2: Operational traffic generation for light vehicles

Operational year	Number of personnel	Vehicle movements per day	
		One-way trip	Two-way trip
Existing	231	146	292
2019	291	184	368
2029	306	194	388

Table 4-3: Operational traffic generation for heavy vehicles

Operational year	Vehicle movements per day		Vehicle movements per peak hour	
	One-way trip	Two-way trip	One-way trip	Two-way trip
Existing	61	122	6	12
2019	109	218	10	20
2029	160	320	14	28

Figure 4-1 to Figure 4-4 illustrate an estimate of origin and destination traffic patterns for the proposed traffic generated as a result of the proposed development expansion. This estimate is based on current origin and destination data for light vehicles and heavy vehicles travelling to and from the site. The percentage split of light vehicle and heavy vehicle routes is expected to remain comparable in 2019 and 2029, and hence, has been used to evaluate the traffic impact on the road network during those years.

Figure 4-1: Light vehicle traffic distribution - AM peak period

Figure 4-2: Light vehicle traffic distribution - PM peak period

Figure 4-3: Heavy vehicle traffic distribution - AM peak period

Figure 4-4: Heavy vehicle traffic distribution - PM peak period

At present, the site operates 24 hours per day, 365 days per year. No change is proposed to operating times under the development proposal. Site personnel undertake works as per the following shift times:

- Morning shift, 6:30am to 2:30pm
- Day shift, 2:30pm to 10:30pm
- Night shift, 10:30pm to 6:30am
- Full day shift, 6am to 6pm.

It has been assumed that the additional site personnel will be engaged in shift work with start and end times similar to those currently in place at the site. The forecast traffic generation attributed to additional site personnel is assumed to have no impact on the road network since arrival and departure times occur outside AM and PM peak periods. Therefore, the traffic impacts have been considered to be negligible.

It is noted that only five of the eight key intersection sites would be impacted by forecasted truck movements, as can be seen in Figure 4-3 and Figure 4-4. The intersections include Sites 2, 3, 4, 5 and 8 (refer to Section 3.5.1).

Currently, there are six trucks arriving at the site during the peak hour which generates an average arrival rate of one truck every 10 minutes. In 2029, there will be 14 trucks arriving at the site during the peak hour, generating an average arrival rate of one truck every four minutes and 17 seconds. A swipe-card entry system is to be installed at Gates 4 and 6 to accelerate heavy vehicle arrival procedures at the gatehouse. Typically, a swipe-card entry scheme would not require a truck to occupy the gatehouse for a period greater than four minutes which would remove the potential for queuing of trucks onto Lowes Mount Road. In the case that delays are experienced upon arrival, the driveway length of 110 metres prior to the gatehouses would be able to store waiting trucks clear of the roadway. Hence, this system with the proposed location of the gatehouses is considered to be appropriate for improving safety for road users within the area.

4.3.2 *Site access*

Existing site access arrangements will be maintained on Lowes Mount Road, that is, via Gate 4 for employees and Gate 4 and 6 for distribution trucks. Currently, log trucks access the site via Gate 5, which is to be maintained during future scenarios.

The existing geometry of access points adequately allow for 19 metre semi-trailers and 19-26 metre B-double trucks swept paths. As there are no works proposed to change the access layout and contractors' fleet, the ingress and egress swept paths are considered to be sufficient during future operational phases.

4.3.3 *Operational impacts*

SIDRA Intersection, version 6.1, was used to assess the operational impacts on the key intersections. A summary of the operational conditions at the key intersections during AM and PM peak periods in 2019 and 2029 are provided in Table 4-4 to Table 4-7, respectively.

The forecast vehicle turning movements at the key intersections are contained in Appendix E. These movements incorporate the additional heavy vehicle movements and existing turning movements.

Detailed results of the SIDRA intersection performance assessment for the forecast conditions in 2019 and 2029 are provided in Appendix F.

Table 4-4: Operational conditions (2019) – intersection analysis results, AM peak hour

Intersection	Forecast conditions				
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)	Current level of service
Site 1: Abercrombie Road - Rupert Street	1	3.7	0.04	A	A
Site 2: O'Connell Road - Albion Street	3	5.5	0.08	A	A
Site 3: Lowes Mount Road - Albion Street	4	6.2	0.09	A	A
Site 4: Albion Street - Horace Street	<1	0.9	0.06	A	A
Site 5: Albion Street - Endeavour Street	<1	0.8	0.06	A	A
Site 6: North Street - Carrington Avenue	3	3.8	0.09	A	A
Site 7: Oberon Street - Ross Street - unnamed road	2	3.2	0.8	A	A
Site 8: Duckmaloi Road - Albion Road	1	3.0	0.03	A	A

Note (1): The level of service is based on the worst movement of the intersection for unsignalised intersections, for details refer to Appendix F.

Table 4-5: Operational conditions (2019) – intersection analysis results, PM peak hour

Intersection	Forecast conditions				
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)	Current level of service
Site 1: Abercrombie Road - Rupert Street	1	3.8	0.05	A	A
Site 2: O'Connell Road - Albion Street	3	5.1	0.08	A	A
Site 3: Lowes Mount Road - Albion Street	5	6.4	0.11	A	A

Intersection	Forecast conditions				
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)	Current level of service
Site 4: Albion Street - Horace Street	1	0.9	0.08	A	A
Site 5: Albion Street - Endeavour Street	2	1.0	0.08	A	A
Site 6: North Street - Carrington Avenue	3	4.1	0.10	A	A
Site 7: Oberon Street - Ross Street - unnamed road	4	3.2	0.15	A	A
Site 8: Duckmaloi Road - Albion Road	1	2.9	0.03	A	A

Note (1): The level of service is based on the worst movement of the intersection for unsignalised intersections, for details refer to Appendix F.

Table 4-6: Operational conditions (2029) – intersection analysis results, AM peak hour

Intersection	Forecast conditions				
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)	Current level of service
Site 1: Abercrombie Road - Rupert Street	1	3.7	0.04	A	A
Site 2: O'Connell Road - Albion Street	3	5.5	0.08	A	A
Site 3: Lowes Mount Road - Albion Street	4	6.3	0.10	A	A
Site 4: Albion Street - Horace Street	<1	0.9	0.07	A	A
Site 5: Albion Street - Endeavour Street	<1	0.8	0.06	A	A
Site 6: North Street - Carrington Avenue	3	3.8	0.09	A	A
Site 7: Oberon Street - Ross Street - unnamed road	2	3.2	0.08	A	A
Site 8: Duckmaloi Road - Albion Road	2	3.1	0.04	A	A

Note (1): The level of service is based on the worst movement of the intersection for unsignalised intersections, for details refer to Appendix F.

Table 4-7: Operational conditions (2029) – intersection analysis results, PM peak hour

Intersection	Forecast conditions				
	Queue length (m)	Average delay (s)	Degree of saturation	Level of service (1)	Current level of service
Site 1: Abercrombie Road - Rupert Street	1	3.8	0.05	A	A
Site 2: O'Connell Road - Albion Street	3	5.2	0.08	A	A
Site 3: Lowes Mount Road - Albion Street	5	6.4	0.11	A	A
Site 4: Albion Street - Horace Street	<1	0.9	0.08	A	A
Site 5: Albion Street - Endeavour Street	<1	1.0	0.08	A	A
Site 6: North Street - Carrington Avenue	3	4.1	0.10	A	A
Site 7: Oberon Street - Ross Street - unnamed road	4	3.2	0.15	A	A
Site 8: Duckmaloi Road - Albion Road	3	3.7	0.08	A	A

Note (1): The level of service is based on the worst movement of the intersection for unsignalised intersections, for details refer to Appendix F.

The key findings of the operational phase impact assessment are:

- All impacted intersections surrounding the site are operating at an acceptable level of service A during AM and PM peak periods
- All intersections experience minor increases in queue lengths and average delays, which are considered to have a negligible impact on the current road network. A comparison of data for existing conditions and 2029 operations indicates the greatest increase in queue length and average delay are 1.2 metres and 2.3 seconds, respectively, which occurs at Site 8
- Traffic generated due to additional site personnel is to occur outside of AM and PM peak periods, and therefore, is considered to have a negligible impact on the existing road network.

5. PARKING ASSESSMENT

5.1 Car parking provision

Oberon Council DCP 2001 stipulates a minimum onsite parking provision for industrial developments, specifically factories. The car parking requirement is determined by the gross floor area (GFA) of the future development, the number of factory units as part of the future development, or the number of employees per shift, whichever is greatest. The parking rates as per the DCP are as follows:

- One space per 100 m^2 GFA, or
- Two spaces per factory unit, or
- 0.75 spaces per employee per shift.

Automated processes, such as board moulding, laminating and finishing operations, and storage areas, for fines, sawdust and paper, will constitute a large portion of the proposed development. Hence, the number of onsite staff required would be lesser than that of a typical industrial site with manual handling processes. Therefore, determination of the required parking is considered to be more appropriately measured based on the number of employees per shift.

Based on this assumption and the number of employees as per Table 5-1, a minimum of 231 car parking spaces are required to be provided in 2029. Since it is proposed to supply 231 parking spaces, the parking provision for the proposed development is considered satisfactory.

Table 5-1: Employee shift times

Shift	Existing		2019	2029
	Number of employees	Percentage contribution	Number of employees	Number of employees
Morning	154	66%	193	203
Day	32	14%	41	43
Night	46	20%	58	61
Total	**232**	**100%**	**292**	**307**

It is noted that the for the purpose of this analysis, employees working as part of the full day shift, that is, 6am to 6pm, have been allotted to the morning and night shifts accordingly.

Oberon Council's DCP does not supply a visitor parking provision for industrial developments. Similarly, the Roads and Maritime *Guide to Traffic Generating Developments* (version 2.2, October 2002) does not specify a visitor parking rate for factories. Consequently, SMEC has reviewed the number of visitor parking spaces as a proportional relationship to the increase in GFA.

Table 5-2: Visitor parking

Development	GFA (m^2)	Required parking (based on GFA) (minimum)	Proposed parking
Existing	83,900	4	-
Proposed	100,550	5	5

Based on the existing visitor parking rate, there would be a need to provide a minimum of five visitor spaces for the future development. It is proposed to supply five visitor spaces, which is considered to be satisfactory.

Currently, visitor parking spaces are located at Gate 6, which is the designated access for heavy vehicles. As part of the future development, visitor spaces will be located at Gate 4, which is closer to site administration operations and will improve access to instructions from site personnel.

5.1.1 *Accessible parking provision*

Oberon Council's DCP does not stipulate a parking provision for accessible car parking. According to the *Australian Human Right Commission Guideline on the application of the Premises Standards* (version 2, 2013) and the *Draft Access Code for Buildings Section 1.3,* the proposed development is classified as a Class 5, 6, 7b, 8 and 9a (ie. factory) building and has a disabled car parking provision of one space for every 100 car parking spaces or part thereof.

There is a total of 231 staff car parking spaces to be provided. Applying the accessible parking rate as per the Guideline and Draft Access Code, it is required to provide three accessible spaces for the proposed development.

5.2 Car parking layout

The proposed on-site car parking is to be located towards the western boundary of the site and accessible via Gate 4 on Lowes Mount Road. The car spaces are proposed as 90-degree parking spaces off the parking aisles. AS2890.1 requires car parking spaces for employee parking to be provided as Class 1A parking spaces with a minimum aisle width of 5.8 metres wide. It is noted that easier manoeuvrability of vehicles into and out of parking spaces is achievable by supplying a 6.2m wide parking aisle. At the blind aisle adjacent to the existing main high voltage substation, the aisle is extended by a minimum of 1m beyond the end-most car parking spaces, and the end-most spaces are widened by a minimum of 300mm. Council's DCP specifies car parking spaces are to be provided with minimum dimensions of 2.5 metres wide by 5.5 metres long.

Accessible car parking spaces are to be provided in accordance with AS2890.1. Spaces are to be provided with minimum of 2.4 meters wide and 5.4 meters long with an adjacent shared area.

The proposed car park layout is in accordance with the minimum requirements as set out in Oberon Council's DCP and AS2890.1. Hence, the proposed car park layout is considered satisfactory.

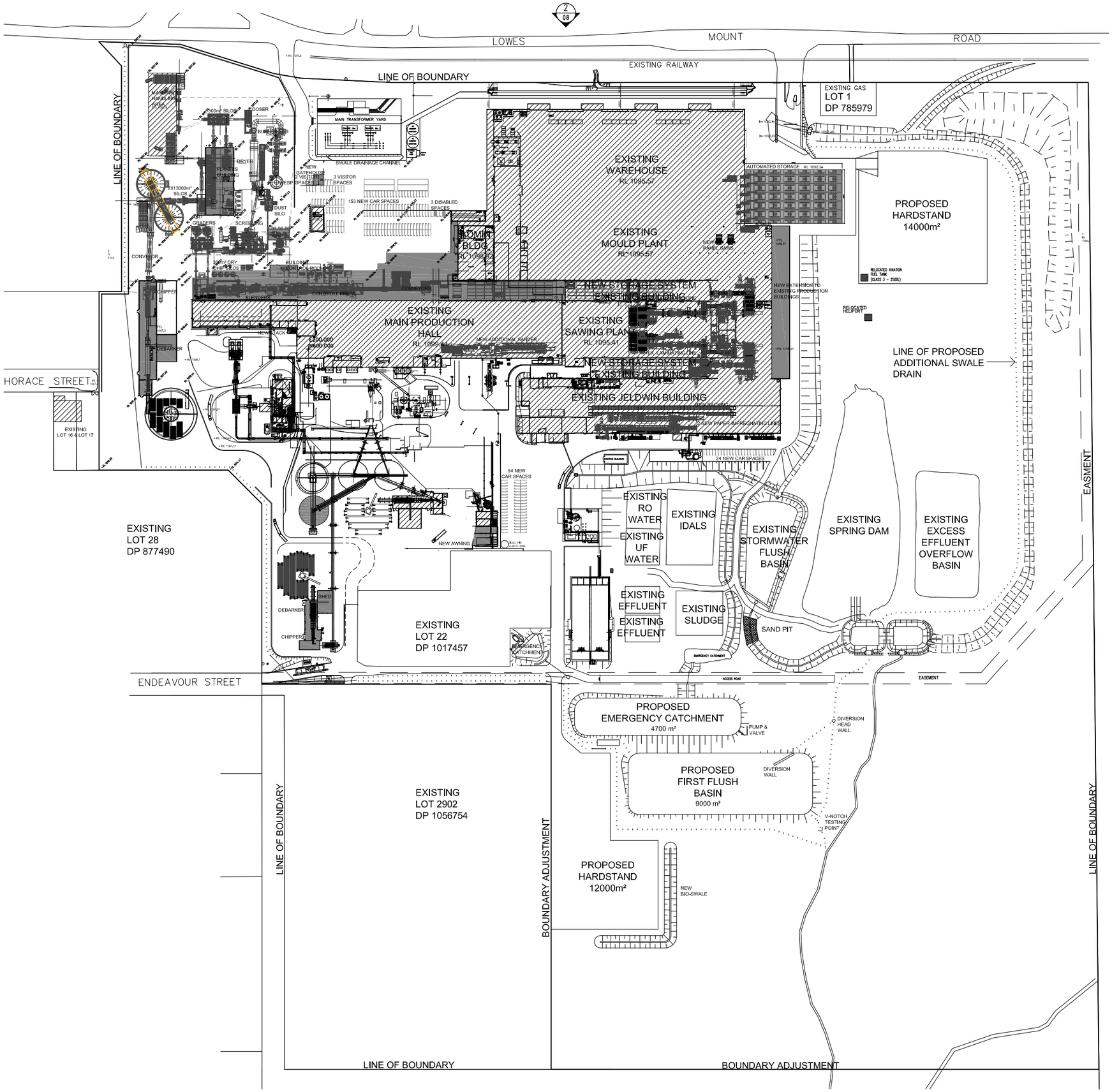
6. MITIGATION AND MANGAGEMENT MEASURES

The traffic impacts during the construction and operation of the development will be negligible and will be absorbed into the existing transport network. The proposed mitigation and management measures are recommended to ensure the construction traffic and road pavement assets are managed appropriately

Preliminary mitigation measures proposed for minimising impacts due to the construction development and transportation of construction materials, components and equipment are:

- Preparation of a detailed Construction Traffic Management Plan for the construction phase of the development in accordance with Roads and Maritime's *Traffic Control at Worksites Manual* (version 4.0 June 2010), which specifies:
  - Hours of haulage, which do not impose on peak periods and school drop-off and pick-up times
  - Haulage routes, including the source of locations and their access points for the site
  - Designated areas within the site for truck movements, parking, loading and unloading,
  - Sequence for implementing traffic works and traffic management devices if required
  - Safety principles for construction activities, such as speed limits around the site and procedures for specific activities
  - Procedures for inspections and record keeping for maintaining traffic control measures
- Undertake a pavement inspection pre- and post-construction to ensure the pavement condition has not been further degraded due to construction traffic.

APPENDIX A: PROPOSED SITE LAYOUT



NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DA 04 CONSOLIDATION PLAN FOR DETAIL

REFER TO KEY PLAN FOR REFERENCES TO DOCUMENTATION OF NEW WORKS

LEGEND:

- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- NEW SWALE
- NEW PIPE
- VALVE

Issue	Description	Date	Drawn	Auth
	xxx UNDER REVISION xxx			
P9	PRELIMINARY	4/5/16		
P8	PRELIMINARY	27/4/16		
P7	PRELIMINARY	20/4/16		
P6	PRELIMINARY	18/4/16		
P5	PRELIMINARY	15/4/16		
P4	PRELIMINARY	12/4/16		
P3	PRELIMINARY	12/4/16		
P2		24/3/16		
P1		18/3/16		

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE PLAN

Scale
APPROX 1:1750 (@ A1)

Stage
DA

Project Number
19

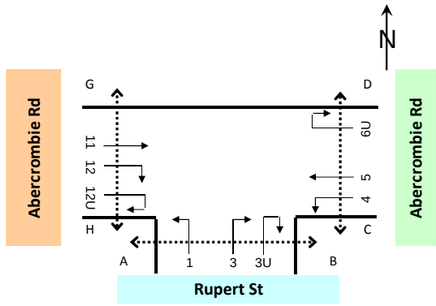
Drawing Number
DA 02

Issue
XX

APPENDIX B: TRAFFIC SURVEY DATA

Suburb : Oberon
Location : 1. Abercrombie Rd / Rupert St
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

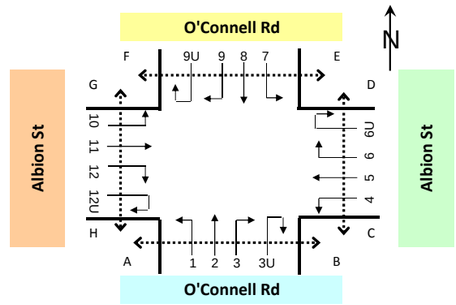
Approach	Rupert St												Abercrombie Rd											
Direction	Direction 1 (Left Turn)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	12	4	0	**16**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	4	8	2	**14**	0	0	0	**0**
6:15 to 7:15	14	3	0	**17**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	6	8	2	**16**	0	0	0	**0**
6:30 to 7:30	14	5	0	**19**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	9	9	2	**20**	0	0	0	**0**
6:45 to 7:45	14	4	0	**18**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	11	7	5	**23**	0	0	0	**0**
7:00 to 8:00	17	3	0	**20**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	15	4	4	**23**	0	0	0	**0**
7:15 to 8:15	18	4	0	**22**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	14	4	4	**22**	0	0	0	**0**
7:30 to 8:30	18	2	0	**20**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	15	3	3	**21**	0	0	0	**0**
7:45 to 8:45	25	2	0	**27**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	14	6	0	**20**	0	0	0	**0**
8:00 to 9:00	23	2	0	**25**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	11	6	0	**17**	0	0	0	**0**
AM Totals	**52**	**9**	**0**	**61**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**30**	**18**	**6**	**54**	**0**	**0**	**0**	**0**
15:00 to 16:00	41	1	4	**46**	0	0	0	**0**	0	0	0	**0**	3	0	0	**3**	16	2	0	**18**	0	0	0	**0**
15:15 to 16:15	49	1	4	**54**	1	0	0	**1**	0	0	0	**0**	4	0	0	**4**	14	1	0	**15**	0	0	0	**0**
15:30 to 16:30	53	0	1	**54**	1	0	0	**1**	0	0	0	**0**	3	0	0	**3**	16	1	0	**17**	0	0	0	**0**
15:45 to 16:45	53	0	0	**53**	2	0	0	**2**	0	0	0	**0**	1	0	0	**1**	16	1	0	**17**	0	0	0	**0**
16:00 to 17:00	53	0	0	**53**	2	0	0	**2**	0	0	0	**0**	1	0	0	**1**	23	1	0	**24**	0	0	0	**0**
16:15 to 17:15	50	0	0	**50**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	22	1	0	**23**	0	0	0	**0**
16:30 to 17:30	43	0	0	**43**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	22	2	0	**24**	0	0	0	**0**
16:45 to 17:45	41	0	0	**41**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	18	2	0	**20**	0	0	0	**0**
17:00 to 18:00	37	0	0	**37**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	13	2	0	**15**	0	0	0	**0**
PM Totals	**131**	**1**	**4**	**136**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**4**	**52**	**5**	**0**	**57**	**0**	**0**	**0**	**0**



Approach																	Abercrombie Rd												Crossing Pedestrians						
Direction																	Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)											
Time Period																	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	A	B	C	D		G	H	Total
6:00	to	7:00															13	8	0	**21**	6	0	0	**6**	0	0	0	**0**	0	0	0	0		0	0	**0**
6:15	to	7:15															12	5	0	**17**	9	0	0	**9**	0	0	0	**0**	0	0	0	0		0	0	**0**
6:30	to	7:30															10	5	0	**15**	13	1	0	**14**	0	0	0	**0**	0	0	0	0		0	0	**0**
6:45	to	7:45															9	3	0	**12**	19	1	0	**20**	0	0	0	**0**	0	0	0	0		0	0	**0**
7:00	to	8:00															8	5	0	**13**	26	2	0	**28**	0	0	0	**0**	0	0	0	0		0	0	**0**
7:15	to	8:15															10	8	0	**18**	30	2	0	**32**	0	0	0	**0**	0	0	0	0		0	0	**0**
7:30	to	8:30															9	8	0	**17**	35	2	0	**37**	0	0	0	**0**	0	0	0	0		0	0	**0**
7:45	to	8:45															11	10	0	**21**	37	2	4	**43**	0	0	0	**0**	0	0	0	0		0	0	**0**
8:00	to	9:00															14	7	1	**22**	42	2	4	**48**	0	0	0	**0**	0	0	0	0		0	0	**0**
AM Totals																	**35**	**20**	**1**	**56**	**74**	**4**	**4**	**82**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		**0**	**0**	**0**
15:00	to	16:00															9	6	0	**15**	35	2	0	**37**	0	0	0	**0**	0	0	0	0		0	0	**0**
15:15	to	16:15															9	7	0	**16**	35	2	0	**37**	0	0	0	**0**	0	0	0	0		0	0	**0**
15:30	to	16:30															12	7	3	**22**	38	3	0	**41**	0	0	0	**0**	0	0	0	0		0	0	**0**
15:45	to	16:45															10	9	4	**23**	36	2	0	**38**	0	0	0	**0**	0	0	0	0		0	0	**0**
16:00	to	17:00															10	8	4	**22**	38	3	0	**41**	0	0	0	**0**	0	0	0	0		0	0	**0**
16:15	to	17:15															12	7	5	**24**	37	4	0	**41**	0	0	0	**0**	0	0	0	0		0	0	**0**
16:30	to	17:30															10	6	2	**18**	33	3	0	**36**	0	0	0	**0**	0	0	0	0		0	0	**0**
16:45	to	17:45															14	3	1	**18**	31	3	0	**34**	0	0	0	**0**	0	0	0	0		0	0	**0**
17:00	to	18:00															17	3	1	**21**	21	2	0	**23**	0	0	0	**0**	0	0	0	0		0	0	**0**
PM Totals																	**36**	**17**	**5**	**58**	**94**	**7**	**0**	**101**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		**0**	**0**	**0**

Suburb : Oberon
Location : 2. O'Connell Rd / Albion St
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

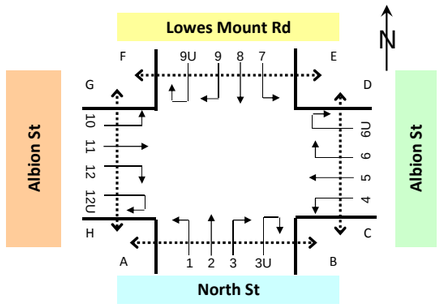
Approach	O'Connell Rd																Albion St															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	0	0	0	**0**	26	3	0	**29**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	0	6	2	**8**	8	4	0	**12**	0	2	0	**2**
6:15 to 7:15	0	0	0	**0**	24	3	0	**27**	1	0	0	**1**	0	0	0	**0**	0	0	0	**0**	1	4	2	**7**	11	5	0	**16**	0	1	0	**1**
6:30 to 7:30	0	0	0	**0**	25	2	0	**27**	2	0	0	**2**	0	0	0	**0**	0	0	0	**0**	3	7	4	**14**	12	8	0	**20**	0	1	0	**1**
6:45 to 7:45	1	0	0	**1**	29	1	0	**30**	2	0	0	**2**	0	0	0	**0**	1	0	0	**1**	4	6	4	**14**	13	5	1	**19**	0	1	0	**1**
7:00 to 8:00	1	0	0	**1**	29	1	2	**32**	2	0	0	**2**	0	0	0	**0**	1	0	0	**1**	6	6	4	**16**	17	6	1	**24**	0	2	0	**2**
7:15 to 8:15	2	0	0	**2**	38	1	2	**41**	3	0	0	**3**	0	0	0	**0**	4	0	0	**4**	6	6	4	**16**	22	8	1	**31**	0	2	0	**2**
7:30 to 8:30	2	0	0	**2**	47	1	2	**50**	3	0	0	**3**	0	0	0	**0**	4	0	0	**4**	4	3	1	**8**	23	8	1	**32**	0	2	0	**2**
7:45 to 8:45	1	0	0	**1**	52	0	2	**54**	5	0	0	**5**	0	0	0	**0**	4	0	0	**4**	5	7	1	**13**	26	10	0	**36**	0	2	0	**2**
8:00 to 9:00	1	0	0	**1**	54	2	0	**56**	4	0	0	**4**	0	0	0	**0**	5	0	0	**5**	6	6	0	**12**	24	9	0	**33**	0	0	0	**0**
AM Totals	**2**	**0**	**0**	**2**	**109**	**6**	**2**	**117**	**7**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**6**	**12**	**18**	**6**	**36**	**49**	**19**	**1**	**69**	**0**	**4**	**0**	**4**
15:00 to 16:00	0	0	0	**0**	70	1	0	**71**	2	0	0	**2**	0	0	0	**0**	0	0	0	**0**	7	2	0	**9**	17	5	0	**22**	0	1	0	**1**
15:15 to 16:15	0	0	0	**0**	70	1	0	**71**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	8	2	0	**10**	28	3	0	**31**	1	0	0	**1**
15:30 to 16:30	2	0	0	**2**	65	3	1	**69**	1	0	0	**1**	0	0	0	**0**	3	0	0	**3**	10	1	0	**11**	39	3	1	**43**	1	0	0	**1**
15:45 to 16:45	2	0	0	**2**	53	4	2	**59**	1	0	0	**1**	0	0	0	**0**	3	0	0	**3**	13	0	0	**13**	50	4	2	**56**	1	0	0	**1**
16:00 to 17:00	2	0	0	**2**	44	5	2	**51**	1	0	0	**1**	0	0	0	**0**	4	0	0	**4**	13	0	0	**13**	62	4	2	**68**	1	0	0	**1**
16:15 to 17:15	4	0	0	**4**	40	5	2	**47**	0	0	0	**0**	1	0	0	**1**	5	0	0	**5**	12	1	0	**13**	62	4	2	**68**	0	0	0	**0**
16:30 to 17:30	3	0	0	**3**	43	3	3	**49**	0	1	0	**1**	1	0	0	**1**	6	0	0	**6**	12	1	0	**13**	54	7	1	**62**	0	0	0	**0**
16:45 to 17:45	4	0	0	**4**	44	3	3	**50**	0	1	0	**1**	1	0	0	**1**	7	0	0	**7**	9	1	0	**10**	43	9	0	**52**	0	0	0	**0**
17:00 to 18:00	5	0	0	**5**	40	3	3	**46**	1	1	0	**2**	1	0	0	**1**	7	0	0	**7**	9	1	0	**10**	30	10	0	**40**	0	0	0	**0**
PM Totals	**7**	**0**	**0**	**7**	**154**	**9**	**5**	**168**	**4**	**1**	**0**	**5**	**1**	**0**	**0**	**1**	**11**	**0**	**0**	**11**	**29**	**3**	**0**	**32**	**109**	**19**	**2**	**130**	**1**	**1**	**0**	**2**



Approach	O'Connell Rd																Albion St																Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)												
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	A	B	C	D	E	F	G	H	Total
6:00 to 7:00	42	13	0	**55**	10	0	1	**11**	0	2	0	**2**	0	0	0	**0**	5	0	0	**5**	10	2	0	**12**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
6:15 to 7:15	38	11	0	**49**	14	0	0	**14**	0	2	0	**2**	0	0	0	**0**	5	0	0	**5**	9	2	0	**11**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
6:30 to 7:30	40	6	0	**46**	19	0	1	**20**	1	2	0	**3**	0	0	0	**0**	6	0	0	**6**	10	3	0	**13**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
6:45 to 7:45	37	6	0	**43**	24	0	1	**25**	1	3	0	**4**	0	0	0	**0**	6	0	0	**6**	10	4	0	**14**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:00 to 8:00	40	9	0	**49**	25	0	1	**26**	1	3	0	**4**	0	0	0	**0**	6	0	0	**6**	10	4	0	**14**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:15 to 8:15	41	9	0	**50**	29	2	1	**32**	4	2	0	**6**	0	0	0	**0**	5	0	0	**5**	8	4	0	**12**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:30 to 8:30	38	8	0	**46**	42	3	0	**45**	4	1	0	**5**	0	0	0	**0**	4	0	0	**4**	4	6	0	**10**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:45 to 8:45	36	11	0	**47**	46	3	1	**50**	6	0	0	**6**	0	0	0	**0**	5	0	0	**5**	4	5	0	**9**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
8:00 to 9:00	26	8	0	**34**	50	3	1	**54**	6	0	0	**6**	0	0	0	**0**	4	0	0	**4**	5	6	0	**11**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
AM Totals	**108**	**30**	**0**	**138**	**85**	**3**	**3**	**91**	**7**	**5**	**0**	**12**	**0**	**0**	**0**	**0**	**15**	**0**	**0**	**15**	**25**	**12**	**0**	**37**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
15:00 to 16:00	10	5	1	**16**	41	2	0	**43**	1	1	0	**2**	0	0	0	**0**	2	1	0	**3**	2	3	0	**5**	0	0	0	**0**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
15:15 to 16:15	13	6	1	**20**	47	2	0	**49**	3	1	0	**4**	0	0	0	**0**	3	1	0	**4**	5	3	0	**8**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
15:30 to 16:30	18	7	2	**27**	56	2	2	**60**	4	2	0	**6**	0	0	0	**0**	4	1	0	**5**	7	4	3	**14**	3	0	0	**3**	1	0	0	**1**	0	0	0	0	0	0	0	0	**0**
15:45 to 16:45	20	9	2	**31**	60	2	4	**66**	6	2	0	**8**	0	0	0	**0**	4	1	0	**5**	9	8	4	**21**	3	0	0	**3**	1	0	0	**1**	0	0	0	0	0	0	0	0	**0**
16:00 to 17:00	19	7	1	**27**	56	2	4	**62**	7	1	0	**8**	0	0	0	**0**	6	1	0	**7**	11	7	4	**22**	4	0	0	**4**	1	0	0	**1**	0	0	0	0	0	0	0	0	**0**
16:15 to 17:15	17	5	1	**23**	51	1	4	**56**	5	1	0	**6**	0	0	0	**0**	5	0	0	**5**	8	6	4	**18**	3	0	0	**3**	1	0	0	**1**	0	0	0	0	0	0	0	0	**0**
16:30 to 17:30	26	4	0	**30**	51	1	2	**54**	7	0	0	**7**	0	0	0	**0**	5	0	0	**5**	8	4	2	**14**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
16:45 to 17:45	35	3	0	**38**	38	1	1	**40**	7	0	0	**7**	0	0	0	**0**	6	0	0	**6**	7	0	1	**8**	2	0	0	**2**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
17:00 to 18:00	43	2	0	**45**	44	0	1	**45**	7	0	0	**7**	0	0	0	**0**	5	0	0	**5**	8	0	1	**9**	1	0	0	**1**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
PM Totals	**72**	**14**	**2**	**88**	**141**	**4**	**5**	**150**	**15**	**2**	**0**	**17**	**0**	**0**	**0**	**0**	**13**	**2**	**0**	**15**	**21**	**10**	**5**	**36**	**5**	**0**	**0**	**5**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Suburb : Oberon
Location : 3. Lowes Mount Rd / Albion St
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

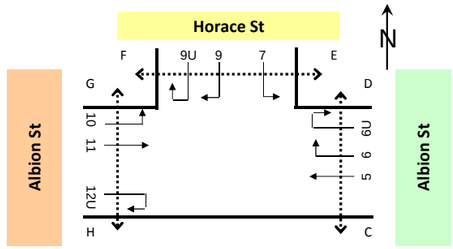
Approach	North St																Albion St															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	6	1	0	**7**	29	0	1	**30**	23	1	0	**24**	1	0	0	**1**	19	1	1	**21**	5	11	2	**18**	8	0	0	**8**	0	0	0	**0**
6:15 to 7:15	4	1	0	**5**	25	0	0	**25**	24	2	1	**27**	1	0	0	**1**	27	4	1	**32**	9	10	2	**21**	6	1	0	**7**	0	0	0	**0**
6:30 to 7:30	8	1	0	**9**	23	0	0	**23**	26	2	1	**29**	1	0	0	**1**	34	9	2	**45**	10	14	4	**28**	7	1	1	**9**	0	1	0	**1**
6:45 to 7:45	11	1	0	**12**	27	0	0	**27**	30	2	1	**33**	1	0	0	**1**	38	11	2	**51**	15	17	6	**38**	5	1	1	**7**	0	1	0	**1**
7:00 to 8:00	12	1	0	**13**	25	0	0	**25**	24	3	1	**28**	0	0	0	**0**	33	11	2	**46**	19	14	5	**38**	2	3	1	**6**	0	1	0	**1**
7:15 to 8:15	16	1	0	**17**	31	0	0	**31**	28	3	0	**31**	0	0	0	**0**	31	7	2	**40**	24	15	5	**44**	5	4	1	**10**	0	1	0	**1**
7:30 to 8:30	12	1	0	**13**	25	0	0	**25**	32	4	0	**36**	0	0	0	**0**	31	4	0	**35**	26	16	2	**44**	3	5	0	**8**	0	0	0	**0**
7:45 to 8:45	20	1	0	**21**	25	0	0	**25**	28	5	0	**33**	0	0	0	**0**	36	3	0	**39**	23	16	0	**39**	5	7	0	**12**	0	0	0	**0**
8:00 to 9:00	21	1	0	**22**	26	0	4	**30**	34	6	6	**46**	0	0	0	**0**	42	3	0	**45**	27	12	0	**39**	6	6	0	**12**	0	0	0	**0**
AM Totals	**39**	**3**	**0**	**42**	**80**	**0**	**5**	**85**	**81**	**10**	**7**	**98**	**1**	**0**	**0**	**1**	**94**	**15**	**3**	**112**	**51**	**37**	**7**	**95**	**16**	**9**	**1**	**26**	**0**	**1**	**0**	**1**
15:00 to 16:00	22	1	0	**23**	33	5	1	**39**	48	6	1	**55**	1	0	0	**1**	62	4	9	**75**	16	8	0	**24**	5	7	0	**12**	1	0	0	**1**
15:15 to 16:15	26	1	0	**27**	39	5	1	**45**	54	4	1	**59**	1	0	0	**1**	57	5	1	**63**	17	9	0	**26**	6	7	0	**13**	1	0	0	**1**
15:30 to 16:30	29	1	0	**30**	37	4	1	**42**	44	4	0	**48**	1	0	0	**1**	55	5	0	**60**	22	9	1	**32**	4	5	0	**9**	2	0	0	**2**
15:45 to 16:45	28	0	0	**28**	42	1	0	**43**	33	4	1	**38**	1	0	0	**1**	49	4	0	**53**	24	13	2	**39**	6	5	0	**11**	1	0	0	**1**
16:00 to 17:00	32	1	0	**33**	40	1	0	**41**	31	2	1	**34**	1	0	0	**1**	50	4	0	**54**	26	12	2	**40**	8	4	0	**12**	1	1	0	**2**
16:15 to 17:15	29	1	0	**30**	40	1	0	**41**	31	3	1	**35**	0	0	0	**0**	52	1	0	**53**	23	9	2	**34**	8	3	0	**11**	1	1	0	**2**
16:30 to 17:30	25	1	0	**26**	41	1	0	**42**	34	4	2	**40**	0	0	0	**0**	56	2	0	**58**	20	11	1	**32**	9	4	0	**13**	0	1	0	**1**
16:45 to 17:45	24	1	0	**25**	38	0	0	**38**	33	3	1	**37**	0	0	0	**0**	60	1	1	**62**	17	9	0	**26**	10	1	0	**11**	0	1	0	**1**
17:00 to 18:00	18	0	0	**18**	43	1	0	**44**	25	2	1	**28**	0	0	0	**0**	47	1	1	**49**	14	9	0	**23**	14	2	0	**16**	0	0	0	**0**
PM Totals	**72**	**2**	**0**	**74**	**116**	**7**	**1**	**124**	**104**	**10**	**3**	**117**	**2**	**0**	**0**	**2**	**159**	**9**	**10**	**178**	**56**	**29**	**2**	**87**	**27**	**13**	**0**	**40**	**2**	**1**	**0**	**3**



Approach	Lowes Mount Rd																Albion St																Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)												
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	A	B	C	D	E	F	G	H	Total
6:00 to 7:00	3	1	1	**5**	16	0	0	**16**	6	1	0	**7**	0	0	0	**0**	25	3	0	**28**	11	9	0	**20**	4	1	0	**5**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
6:15 to 7:15	2	1	0	**3**	14	1	0	**15**	8	1	0	**9**	0	0	0	**0**	23	3	0	**26**	15	12	0	**27**	2	1	0	**3**	0	0	0	**0**	0	0	1	0	0	0	0	0	**1**
6:30 to 7:30	2	1	0	**3**	14	1	0	**15**	6	2	0	**8**	0	0	0	**0**	20	0	0	**20**	13	13	0	**26**	4	2	0	**6**	0	0	0	**0**	0	0	1	0	0	0	0	0	**1**
6:45 to 7:45	2	2	0	**4**	14	2	0	**16**	4	1	0	**5**	0	0	0	**0**	17	0	0	**17**	13	12	0	**25**	5	1	0	**6**	0	0	0	**0**	0	0	1	0	0	0	0	0	**1**
7:00 to 8:00	3	2	0	**5**	10	2	0	**12**	5	2	0	**7**	0	0	0	**0**	16	1	0	**17**	15	16	0	**31**	8	1	0	**9**	0	0	0	**0**	0	0	1	0	0	0	0	0	**1**
7:15 to 8:15	6	4	0	**10**	14	1	0	**15**	5	3	0	**8**	0	0	0	**0**	15	1	0	**16**	13	13	0	**26**	12	3	0	**15**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
7:30 to 8:30	8	6	0	**14**	17	1	0	**18**	8	2	0	**10**	0	0	0	**0**	10	1	0	**11**	14	11	0	**25**	14	2	0	**16**	0	0	0	**0**	0	0	0	0	0	1	0	0	**1**
7:45 to 8:45	8	6	0	**14**	22	0	1	**23**	9	2	0	**11**	0	0	0	**0**	9	1	0	**10**	18	13	0	**31**	16	2	0	**18**	0	0	0	**0**	0	0	0	0	0	1	0	0	**1**
8:00 to 9:00	8	7	4	**19**	29	0	1	**30**	9	1	0	**10**	0	0	0	**0**	5	0	0	**5**	17	11	0	**28**	20	3	0	**23**	0	0	0	**0**	0	0	0	0	0	1	0	0	**1**
AM Totals	**14**	**10**	**5**	**29**	**55**	**2**	**1**	**58**	**20**	**4**	**0**	**24**	**0**	**0**	**0**	**0**	**46**	**4**	**0**	**50**	**43**	**36**	**0**	**79**	**32**	**5**	**0**	**37**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**2**
15:00 to 16:00	6	10	0	**16**	49	1	0	**50**	11	6	0	**17**	0	0	0	**0**	9	1	0	**10**	29	22	1	**52**	35	3	0	**38**	1	0	0	**1**	0	0	0	2	1	0	0	0	**3**
15:15 to 16:15	9	8	0	**17**	52	0	0	**52**	14	4	0	**18**	0	0	0	**0**	8	3	0	**11**	31	23	1	**55**	36	1	0	**37**	1	0	0	**1**	0	0	0	6	1	0	0	0	**7**
15:30 to 16:30	9	7	0	**16**	54	1	0	**55**	21	1	0	**22**	0	0	0	**0**	7	3	0	**10**	34	18	5	**57**	39	1	0	**40**	1	0	0	**1**	0	0	2	6	1	0	0	0	**9**
15:45 to 16:45	13	5	0	**18**	54	2	0	**56**	24	1	0	**25**	0	0	0	**0**	6	5	0	**11**	26	16	6	**48**	19	1	0	**20**	1	0	0	**1**	0	0	2	6	0	0	0	0	**8**
16:00 to 17:00	18	5	1	**24**	52	2	0	**54**	29	0	0	**29**	0	0	0	**0**	4	7	0	**11**	23	12	5	**40**	17	0	0	**17**	0	0	0	**0**	0	0	2	4	0	0	0	0	**6**
16:15 to 17:15	17	5	1	**23**	35	2	0	**37**	29	0	0	**29**	0	0	0	**0**	3	6	0	**9**	17	10	5	**32**	17	1	0	**18**	0	0	0	**0**	1	0	2	0	0	0	1	0	**4**
16:30 to 17:30	15	5	1	**21**	32	2	0	**34**	24	1	0	**25**	0	0	0	**0**	7	5	0	**12**	17	10	2	**29**	16	1	0	**17**	0	0	0	**0**	1	0	0	0	0	0	1	0	**2**
16:45 to 17:45	13	5	1	**19**	30	2	0	**32**	20	1	0	**21**	0	0	0	**0**	11	3	0	**14**	22	5	1	**28**	22	1	0	**23**	0	0	0	**0**	1	0	0	0	0	0	1	0	**2**
17:00 to 18:00	9	1	0	**10**	43	4	0	**47**	15	1	0	**16**	0	0	0	**0**	17	1	0	**18**	28	4	1	**33**	24	1	0	**25**	0	0	0	**0**	1	0	0	0	0	0	1	0	**2**
PM Totals	**33**	**16**	**1**	**50**	**144**	**7**	**0**	**151**	**55**	**7**	**0**	**62**	**0**	**0**	**0**	**0**	**30**	**9**	**0**	**39**	**80**	**38**	**7**	**125**	**76**	**4**	**0**	**80**	**1**	**0**	**0**	**1**	**1**	**0**	**2**	**6**	**1**	**0**	**1**	**0**	**11**

Suburb : Oberon
Location : 4. Albion St / Horace St
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

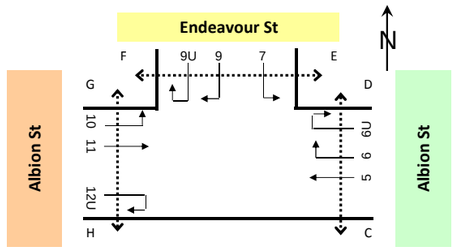
Approach	Albion St											
Direction	Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	35	12	0	**47**	0	0	0	**0**	0	0	0	**0**
6:15 to 7:15	41	13	0	**54**	0	0	0	**0**	0	0	0	**0**
6:30 to 7:30	48	20	0	**68**	1	0	0	**1**	0	0	0	**0**
6:45 to 7:45	52	22	0	**74**	1	0	0	**1**	0	0	0	**0**
7:00 to 8:00	44	19	0	**63**	2	0	0	**2**	0	0	0	**0**
7:15 to 8:15	49	22	0	**71**	5	0	0	**5**	0	0	0	**0**
7:30 to 8:30	50	23	0	**73**	4	0	0	**4**	0	0	0	**0**
7:45 to 8:45	51	23	0	**74**	7	0	0	**7**	0	0	0	**0**
8:00 to 9:00	58	24	0	**82**	8	0	0	**8**	0	0	0	**0**
AM Totals	**137**	**55**	**0**	**192**	**10**	**0**	**0**	**10**	**0**	**0**	**0**	**0**
15:00 to 16:00	67	21	0	**88**	10	1	0	**11**	0	0	0	**0**
15:15 to 16:15	68	21	0	**89**	10	1	0	**11**	1	0	0	**1**
15:30 to 16:30	70	20	2	**92**	11	2	0	**13**	1	0	0	**1**
15:45 to 16:45	59	18	3	**80**	10	1	0	**11**	2	0	0	**2**
16:00 to 17:00	64	17	3	**84**	4	1	0	**5**	2	0	0	**2**
16:15 to 17:15	66	15	3	**84**	3	1	0	**4**	1	0	0	**1**
16:30 to 17:30	69	17	1	**87**	2	0	0	**2**	1	0	0	**1**
16:45 to 17:45	66	15	0	**81**	1	0	0	**1**	0	0	0	**0**
17:00 to 18:00	62	14	0	**76**	0	0	0	**0**	0	0	0	**0**
PM Totals	**193**	**52**	**3**	**248**	**14**	**2**	**0**	**16**	**2**	**0**	**0**	**2**



Approach	Horace St												Albion St												Crossing Pedestrians						
Direction	Direction 7 (Left Turn)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12U (U Turn)										
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	C	D	E	F	G	H	Total
6:00 to 7:00	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	1	0	0	**1**	30	13	1	**44**	0	0	0	**0**	0	1	0	0	0	0	**1**
6:15 to 7:15	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	1	1	0	**2**	33	16	1	**50**	0	0	0	**0**	0	1	0	0	0	0	**1**
6:30 to 7:30	0	1	0	**1**	0	0	0	**0**	0	0	0	**0**	1	1	0	**2**	30	15	1	**46**	0	0	0	**0**	0	1	0	0	0	0	**1**
6:45 to 7:45	0	1	0	**1**	1	0	0	**1**	0	0	0	**0**	5	1	0	**6**	26	14	2	**42**	0	0	0	**0**	0	1	0	0	0	0	**1**
7:00 to 8:00	0	1	0	**1**	1	0	0	**1**	0	0	0	**0**	7	2	0	**9**	26	19	2	**47**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:15 to 8:15	0	1	0	**1**	1	0	0	**1**	0	0	0	**0**	9	1	0	**10**	28	18	1	**47**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:30 to 8:30	1	0	0	**1**	4	0	0	**4**	0	0	0	**0**	11	1	0	**12**	35	22	1	**58**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:45 to 8:45	3	0	0	**3**	6	0	0	**6**	0	0	0	**0**	11	1	0	**12**	39	25	0	**64**	0	0	0	**0**	0	0	0	0	0	1	**1**
8:00 to 9:00	3	0	0	**3**	9	0	0	**9**	0	0	0	**0**	11	0	0	**11**	41	23	0	**64**	0	0	1	**1**	0	0	0	0	0	1	**1**
AM Totals	**3**	**1**	**0**	**4**	**11**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**19**	**2**	**0**	**21**	**97**	**55**	**3**	**155**	**0**	**0**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**1**	**2**
15:00 to 16:00	6	0	0	**6**	12	2	0	**14**	0	0	0	**0**	4	2	0	**6**	69	25	1	**95**	0	0	0	**0**	0	1	0	0	0	0	**1**
15:15 to 16:15	7	0	0	**7**	10	2	0	**12**	0	0	0	**0**	5	1	0	**6**	84	25	1	**110**	0	0	0	**0**	0	1	0	0	0	0	**1**
15:30 to 16:30	9	0	0	**9**	10	3	0	**13**	0	0	0	**0**	6	0	0	**6**	77	18	0	**95**	0	0	0	**0**	0	0	0	0	0	0	**0**
15:45 to 16:45	6	0	0	**6**	10	3	0	**13**	0	0	0	**0**	5	0	0	**5**	69	18	0	**87**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:00 to 17:00	6	0	0	**6**	13	2	0	**15**	0	0	0	**0**	6	0	0	**6**	66	20	0	**86**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:15 to 17:15	8	0	0	**8**	10	1	0	**11**	0	0	0	**0**	6	1	0	**7**	59	20	0	**79**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:30 to 17:30	7	0	0	**7**	8	0	0	**8**	0	0	0	**0**	5	1	0	**6**	61	20	0	**81**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:45 to 17:45	7	0	0	**7**	9	0	0	**9**	0	0	0	**0**	4	1	0	**5**	61	14	0	**75**	0	0	0	**0**	0	0	0	0	0	0	**0**
17:00 to 18:00	5	0	0	**5**	7	0	0	**7**	0	0	0	**0**	3	1	0	**4**	57	7	0	**64**	0	0	0	**0**	0	0	0	0	0	0	**0**
PM Totals	**17**	**0**	**0**	**17**	**32**	**4**	**0**	**36**	**0**	**0**	**0**	**0**	**13**	**3**	**0**	**16**	**192**	**52**	**1**	**245**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**

Suburb : Oberon
Location : 5. Albion St / Endeavour St
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

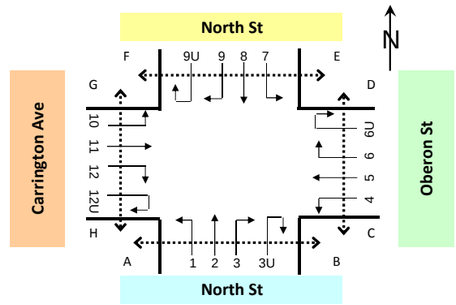
Approach	Albion St											
Direction	Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	34	7	0	**41**	0	2	0	**2**	0	0	0	**0**
6:15 to 7:15	40	9	0	**49**	2	2	0	**4**	0	0	0	**0**
6:30 to 7:30	47	12	0	**59**	3	1	0	**4**	0	0	0	**0**
6:45 to 7:45	49	13	0	**62**	3	0	0	**3**	0	0	0	**0**
7:00 to 8:00	46	12	0	**58**	3	0	0	**3**	0	0	0	**0**
7:15 to 8:15	53	13	0	**66**	1	0	0	**1**	0	0	0	**0**
7:30 to 8:30	54	15	0	**69**	0	0	0	**0**	0	0	0	**0**
7:45 to 8:45	59	18	0	**77**	0	1	0	**1**	0	0	0	**0**
8:00 to 9:00	60	18	0	**78**	0	1	0	**1**	0	0	0	**0**
AM Totals	**140**	**37**	**0**	**177**	**3**	**3**	**0**	**6**	**0**	**0**	**0**	**0**
15:00 to 16:00	70	17	0	**87**	1	0	0	**1**	0	0	0	**0**
15:15 to 16:15	72	16	0	**88**	1	0	0	**1**	0	0	0	**0**
15:30 to 16:30	71	18	2	**91**	2	0	0	**2**	0	0	0	**0**
15:45 to 16:45	60	13	3	**76**	2	0	0	**2**	0	0	0	**0**
16:00 to 17:00	63	10	3	**76**	2	1	0	**3**	0	0	0	**0**
16:15 to 17:15	64	13	3	**80**	2	1	0	**3**	0	0	0	**0**
16:30 to 17:30	68	12	1	**81**	0	1	0	**1**	0	0	0	**0**
16:45 to 17:45	66	13	0	**79**	0	1	0	**1**	0	0	0	**0**
17:00 to 18:00	59	12	0	**71**	0	0	0	**0**	0	0	0	**0**
PM Totals	**192**	**39**	**3**	**234**	**3**	**1**	**0**	**4**	**0**	**0**	**0**	**0**



Approach	Endeavour St												Albion St												Crossing Pedestrians						
Direction	Direction 7 (Left Turn)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12U (U Turn)										
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	C	D	E	F	G	H	Total
6:00 to 7:00	0	3	0	**3**	0	6	0	**6**	0	0	0	**0**	1	5	0	**6**	28	8	1	**37**	2	0	0	**2**	0	1	1	1	1	1	**5**
6:15 to 7:15	0	2	0	**2**	0	5	0	**5**	0	0	0	**0**	1	7	0	**8**	31	8	1	**40**	3	0	0	**3**	0	1	1	1	1	2	**6**
6:30 to 7:30	0	1	0	**1**	1	8	0	**9**	0	0	0	**0**	1	6	0	**7**	28	9	1	**38**	3	0	0	**3**	0	1	1	1	1	2	**6**
6:45 to 7:45	0	0	0	**0**	2	8	0	**10**	0	0	0	**0**	2	7	0	**9**	22	8	2	**32**	2	0	0	**2**	0	0	1	0	1	2	**4**
7:00 to 8:00	0	0	0	**0**	2	5	0	**7**	0	0	0	**0**	5	9	0	**14**	21	10	2	**33**	1	0	0	**1**	0	0	0	0	0	1	**1**
7:15 to 8:15	0	1	0	**1**	2	6	0	**8**	0	0	0	**0**	5	7	0	**12**	24	13	1	**38**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:30 to 8:30	1	1	0	**2**	1	6	0	**7**	0	0	0	**0**	5	7	0	**12**	32	15	1	**48**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:45 to 8:45	1	1	0	**2**	0	4	0	**4**	0	0	0	**0**	5	8	0	**13**	37	15	0	**52**	0	0	0	**0**	0	0	0	0	0	0	**0**
8:00 to 9:00	1	1	0	**2**	1	5	0	**6**	0	0	0	**0**	3	8	0	**11**	41	14	0	**55**	0	0	0	**0**	0	0	0	0	0	0	**0**
AM Totals	**1**	**4**	**0**	**5**	**3**	**16**	**0**	**19**	**0**	**0**	**0**	**0**	**9**	**22**	**0**	**31**	**90**	**32**	**3**	**125**	**3**	**0**	**0**	**3**	**0**	**1**	**1**	**1**	**1**	**2**	**6**
15:00 to 16:00	0	2	0	**2**	8	6	0	**14**	0	0	0	**0**	5	8	0	**13**	74	17	1	**92**	0	0	0	**0**	0	0	0	1	1	1	**3**
15:15 to 16:15	3	3	0	**6**	8	6	0	**14**	0	0	0	**0**	6	10	0	**16**	84	15	1	**100**	0	0	0	**0**	0	0	0	1	1	1	**3**
15:30 to 16:30	3	2	0	**5**	9	4	0	**13**	0	0	0	**0**	5	6	0	**11**	79	12	0	**91**	0	0	0	**0**	0	0	0	1	0	1	**2**
15:45 to 16:45	3	2	0	**5**	8	7	0	**15**	0	0	0	**0**	4	5	0	**9**	69	14	0	**83**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:00 to 17:00	3	2	0	**5**	6	6	0	**12**	0	0	0	**0**	4	4	0	**8**	66	15	0	**81**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:15 to 17:15	1	0	0	**1**	5	5	0	**10**	0	0	0	**0**	5	2	0	**7**	62	16	0	**78**	0	0	0	**0**	0	0	0	0	0	1	**1**
16:30 to 17:30	1	0	0	**1**	6	5	0	**11**	0	0	0	**0**	5	2	0	**7**	63	17	0	**80**	0	0	0	**0**	0	0	0	0	1	1	**2**
16:45 to 17:45	2	0	0	**2**	3	2	0	**5**	0	0	0	**0**	4	2	0	**6**	68	10	0	**78**	0	0	0	**0**	0	0	0	0	1	1	**2**
17:00 to 18:00	2	0	0	**2**	3	2	0	**5**	0	0	0	**0**	2	2	0	**4**	57	5	0	**62**	0	0	0	**0**	0	0	0	0	1	1	**2**
PM Totals	**5**	**4**	**0**	**9**	**17**	**14**	**0**	**31**	**0**	**0**	**0**	**0**	**11**	**14**	**0**	**25**	**197**	**37**	**1**	**235**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**2**	**2**	**5**

Suburb : Oberon
Location : 6. North St / Oberon St / Carrington Ave
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

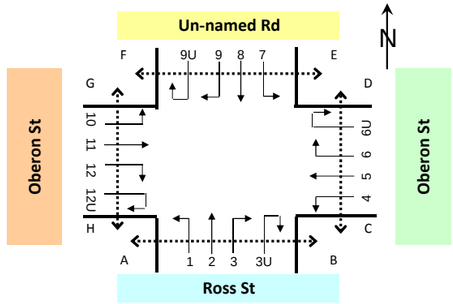
Approach	North St																Oberon St															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	2	0	0	**2**	6	0	0	**6**	6	0	0	**6**	0	0	0	**0**	7	0	0	**7**	24	0	0	**24**	46	0	0	**46**	0	0	0	**0**
6:15 to 7:15	2	0	0	**2**	6	0	0	**6**	8	0	0	**8**	0	0	0	**0**	7	0	0	**7**	38	1	0	**39**	46	0	1	**47**	0	0	0	**0**
6:30 to 7:30	3	0	0	**3**	8	0	0	**8**	8	0	0	**8**	0	0	0	**0**	7	0	0	**7**	43	2	0	**45**	48	0	1	**49**	0	0	0	**0**
6:45 to 7:45	6	0	0	**6**	9	0	0	**9**	6	0	0	**6**	0	0	0	**0**	3	0	0	**3**	42	2	0	**44**	44	0	1	**45**	0	0	0	**0**
7:00 to 8:00	7	0	0	**7**	8	1	0	**9**	10	0	0	**10**	0	0	0	**0**	5	2	0	**7**	47	2	2	**51**	40	3	1	**44**	0	0	0	**0**
7:15 to 8:15	10	0	0	**10**	11	1	0	**12**	11	0	0	**11**	0	0	0	**0**	12	2	0	**14**	47	1	2	**50**	45	5	0	**50**	1	0	0	**1**
7:30 to 8:30	12	1	0	**13**	9	2	0	**11**	18	0	0	**18**	0	0	0	**0**	16	2	0	**18**	49	1	2	**52**	46	5	0	**51**	1	0	0	**1**
7:45 to 8:45	11	1	0	**12**	13	2	0	**15**	26	0	0	**26**	0	0	0	**0**	23	2	1	**26**	48	5	2	**55**	48	5	0	**53**	1	0	0	**1**
8:00 to 9:00	11	1	0	**12**	17	1	0	**18**	28	0	0	**28**	0	0	0	**0**	31	0	2	**33**	61	5	0	**66**	46	2	2	**50**	1	0	0	**1**
AM Totals	**20**	**1**	**0**	**21**	**31**	**2**	**0**	**33**	**44**	**0**	**0**	**44**	**0**	**0**	**0**	**0**	**43**	**2**	**2**	**47**	**132**	**7**	**2**	**141**	**132**	**5**	**3**	**140**	**1**	**0**	**0**	**1**
15:00 to 16:00	8	0	0	**8**	12	0	0	**12**	30	0	0	**30**	0	0	0	**0**	26	0	0	**26**	66	0	0	**66**	47	0	0	**47**	0	0	0	**0**
15:15 to 16:15	8	0	0	**8**	11	0	0	**11**	30	0	0	**30**	0	0	0	**0**	33	0	0	**33**	70	0	0	**70**	51	0	0	**51**	0	0	0	**0**
15:30 to 16:30	8	0	0	**8**	12	0	0	**12**	32	0	0	**32**	0	0	0	**0**	43	0	0	**43**	75	0	1	**76**	59	0	0	**59**	0	0	0	**0**
15:45 to 16:45	5	5	0	**10**	16	0	0	**16**	29	0	0	**29**	0	0	0	**0**	39	0	0	**39**	75	0	1	**76**	55	1	2	**58**	0	0	0	**0**
16:00 to 17:00	10	5	0	**15**	17	0	0	**17**	23	0	0	**23**	0	0	0	**0**	34	0	0	**34**	73	0	1	**74**	56	1	2	**59**	0	0	0	**0**
16:15 to 17:15	8	5	0	**13**	20	0	0	**20**	20	0	0	**20**	0	0	0	**0**	29	0	0	**29**	76	0	1	**77**	58	1	2	**61**	0	0	0	**0**
16:30 to 17:30	8	5	0	**13**	19	0	0	**19**	13	0	0	**13**	0	0	0	**0**	19	0	0	**19**	74	0	0	**74**	55	1	2	**58**	0	0	0	**0**
16:45 to 17:45	9	0	0	**9**	17	0	0	**17**	15	0	0	**15**	0	0	0	**0**	16	0	0	**16**	70	0	1	**71**	62	0	0	**62**	0	0	0	**0**
17:00 to 18:00	3	0	0	**3**	18	0	0	**18**	15	0	0	**15**	0	0	0	**0**	16	0	0	**16**	76	0	1	**77**	56	2	0	**58**	0	0	0	**0**
PM Totals	**21**	**5**	**0**	**26**	**47**	**0**	**0**	**47**	**68**	**0**	**0**	**68**	**0**	**0**	**0**	**0**	**76**	**0**	**0**	**76**	**215**	**0**	**2**	**217**	**159**	**3**	**2**	**164**	**0**	**0**	**0**	**0**



Approach	North St																Carrington Ave												Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)												
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	A	B	C	D	E	F	G	H	Total
6:00 to 7:00	16	0	1	**17**	3	1	0	**4**	4	1	0	**5**	0	0	0	**0**	3	0	0	**3**	22	0	1	**23**	2	0	0	**2**	0	0	0	**0**	0	0	0	0	1	0	0	0	**1**
6:15 to 7:15	21	0	1	**22**	2	1	0	**3**	4	2	0	**6**	0	0	0	**0**	5	0	0	**5**	26	1	0	**27**	2	0	0	**2**	0	0	0	**0**	0	0	0	0	1	0	0	0	**1**
6:30 to 7:30	23	3	2	**28**	1	0	0	**1**	8	2	0	**10**	0	0	0	**0**	8	0	0	**8**	36	2	0	**38**	1	0	0	**1**	0	0	0	**0**	0	2	0	0	1	0	0	0	**3**
6:45 to 7:45	26	3	2	**31**	4	0	0	**4**	9	1	0	**10**	0	0	0	**0**	12	0	0	**12**	34	4	0	**38**	2	0	0	**2**	0	0	0	**0**	0	4	0	0	1	0	0	0	**5**
7:00 to 8:00	26	5	2	**33**	10	0	0	**10**	12	1	0	**13**	0	0	0	**0**	11	0	0	**11**	37	5	0	**42**	1	0	0	**1**	0	0	0	**0**	0	4	0	0	1	0	0	0	**5**
7:15 to 8:15	28	6	2	**36**	12	1	0	**13**	15	1	0	**16**	0	0	0	**0**	11	0	0	**11**	50	5	0	**55**	3	0	0	**3**	0	0	0	**0**	0	4	0	0	1	0	0	0	**5**
7:30 to 8:30	29	4	0	**33**	18	1	0	**19**	9	3	0	**12**	0	0	0	**0**	10	0	0	**10**	58	4	0	**62**	7	0	0	**7**	0	0	0	**0**	0	4	0	0	2	0	0	0	**6**
7:45 to 8:45	32	4	0	**36**	21	1	1	**23**	9	3	0	**12**	0	0	0	**0**	11	0	0	**11**	62	3	0	**65**	8	0	3	**11**	0	0	0	**0**	0	2	0	1	1	1	0	1	**6**
8:00 to 9:00	42	2	0	**44**	22	1	2	**25**	8	3	0	**11**	0	0	0	**0**	13	1	0	**14**	73	2	0	**75**	11	0	3	**14**	0	0	0	**0**	0	2	0	1	1	2	0	1	**7**
AM Totals	**84**	**7**	**3**	**94**	**35**	**2**	**2**	**39**	**24**	**5**	**0**	**29**	**0**	**0**	**0**	**0**	**27**	**1**	**0**	**28**	**132**	**7**	**1**	**140**	**14**	**0**	**3**	**17**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**1**	**3**	**2**	**0**	**1**	**13**
15:00 to 16:00	101	0	0	**101**	34	1	2	**37**	10	0	0	**10**	0	0	0	**0**	11	0	0	**11**	67	0	0	**67**	9	0	0	**9**	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**
15:15 to 16:15	113	0	0	**113**	40	0	0	**40**	16	0	0	**16**	0	0	0	**0**	10	0	0	**10**	72	0	0	**72**	11	0	0	**11**	0	0	0	**0**	0	0	0	0	1	1	0	0	**2**
15:30 to 16:30	110	0	0	**110**	42	0	0	**42**	16	0	0	**16**	0	0	0	**0**	9	0	0	**9**	82	0	0	**82**	11	0	0	**11**	0	0	0	**0**	0	0	0	0	1	5	0	1	**7**
15:45 to 16:45	100	0	0	**100**	40	0	0	**40**	18	0	0	**18**	0	0	0	**0**	13	0	0	**13**	87	2	0	**89**	10	0	0	**10**	0	0	0	**0**	2	0	0	0	1	8	0	1	**12**
16:00 to 17:00	97	0	0	**97**	33	0	0	**33**	17	0	0	**17**	0	0	0	**0**	12	0	0	**12**	99	2	0	**101**	8	0	0	**8**	0	0	0	**0**	2	1	0	0	1	8	0	1	**13**
16:15 to 17:15	83	2	0	**85**	21	0	0	**21**	14	0	0	**14**	0	0	0	**0**	12	0	0	**12**	105	3	0	**108**	5	0	0	**5**	0	0	0	**0**	2	1	0	0	0	7	0	1	**11**
16:30 to 17:30	74	2	0	**76**	19	0	0	**19**	15	0	0	**15**	0	0	0	**0**	11	0	0	**11**	97	3	0	**100**	4	0	0	**4**	0	0	0	**0**	3	1	0	0	0	3	0	0	**7**
16:45 to 17:45	75	2	0	**77**	14	0	0	**14**	11	1	0	**12**	0	0	0	**0**	6	0	0	**6**	88	2	0	**90**	1	0	0	**1**	0	0	0	**0**	1	2	0	0	0	1	0	0	**4**
17:00 to 18:00	66	3	0	**69**	16	0	0	**16**	11	2	0	**13**	0	0	0	**0**	6	0	0	**6**	80	2	0	**82**	1	0	0	**1**	0	0	0	**0**	3	1	1	0	0	1	0	0	**6**
PM Totals	**264**	**3**	**0**	**267**	**83**	**1**	**2**	**86**	**38**	**2**	**0**	**40**	**0**	**0**	**0**	**0**	**29**	**0**	**0**	**29**	**246**	**4**	**0**	**250**	**18**	**0**	**0**	**18**	**0**	**0**	**0**	**0**	**5**	**2**	**1**	**0**	**1**	**9**	**0**	**1**	**19**

Suburb : Oberon
Location : 7. Oberon St / Ross St / Un-named Rd
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

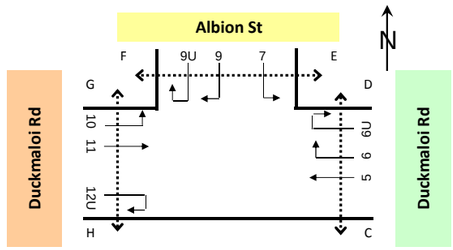
Approach	Ross St																Oberon St															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	30	0	1	**31**	0	0	0	**0**	4	0	0	**4**	0	0	0	**0**	4	1	0	**5**	36	2	0	**38**	1	0	0	**1**	0	0	0	**0**
6:15 to 7:15	33	0	0	**33**	0	0	0	**0**	5	1	0	**6**	0	0	0	**0**	2	1	0	**3**	37	3	0	**40**	1	0	0	**1**	0	0	0	**0**
6:30 to 7:30	36	0	0	**36**	3	0	0	**3**	5	1	0	**6**	0	0	0	**0**	6	0	0	**6**	44	4	0	**48**	2	0	0	**2**	0	0	0	**0**
6:45 to 7:45	44	1	0	**45**	5	0	0	**5**	6	1	0	**7**	0	0	0	**0**	8	0	0	**8**	48	4	0	**52**	4	0	1	**5**	0	0	0	**0**
7:00 to 8:00	46	2	0	**48**	6	0	0	**6**	6	1	0	**7**	0	0	0	**0**	7	0	0	**7**	57	3	0	**60**	3	0	1	**4**	1	0	0	**1**
7:15 to 8:15	47	2	0	**49**	7	0	0	**7**	6	0	0	**6**	0	0	0	**0**	7	0	0	**7**	77	2	0	**79**	7	0	1	**8**	1	0	0	**1**
7:30 to 8:30	48	2	0	**50**	8	0	0	**8**	6	0	0	**6**	0	0	0	**0**	6	1	0	**7**	80	1	0	**81**	8	0	1	**9**	1	0	0	**1**
7:45 to 8:45	50	2	0	**52**	12	0	0	**12**	9	0	0	**9**	0	0	0	**0**	13	1	0	**14**	92	1	1	**94**	8	0	0	**8**	2	0	0	**2**
8:00 to 9:00	48	1	0	**49**	21	0	0	**21**	10	0	0	**10**	0	0	0	**0**	22	1	0	**23**	94	2	2	**98**	13	0	0	**13**	1	0	0	**1**
AM Totals	**124**	**3**	**1**	**128**	**27**	**0**	**0**	**27**	**20**	**1**	**0**	**21**	**0**	**0**	**0**	**0**	**33**	**2**	**0**	**35**	**187**	**7**	**2**	**196**	**17**	**0**	**1**	**18**	**2**	**0**	**0**	**2**
15:00 to 16:00	56	2	0	**58**	16	0	0	**16**	17	2	0	**19**	0	0	0	**0**	22	1	0	**23**	89	2	0	**91**	7	0	0	**7**	1	0	0	**1**
15:15 to 16:15	69	2	0	**71**	13	0	0	**13**	15	2	0	**17**	0	0	0	**0**	19	1	0	**20**	93	2	0	**95**	8	0	0	**8**	2	0	0	**2**
15:30 to 16:30	66	2	0	**68**	11	0	0	**11**	17	2	0	**19**	0	0	0	**0**	15	0	0	**15**	101	3	0	**104**	11	0	0	**11**	2	0	0	**2**
15:45 to 16:45	59	1	0	**60**	8	0	0	**8**	14	1	0	**15**	0	0	0	**0**	17	0	0	**17**	92	3	2	**97**	8	0	0	**8**	2	0	0	**2**
16:00 to 17:00	55	1	0	**56**	5	0	0	**5**	14	0	0	**14**	0	0	0	**0**	18	0	0	**18**	97	2	2	**101**	10	0	0	**10**	1	0	0	**1**
16:15 to 17:15	45	1	0	**46**	7	0	0	**7**	15	0	0	**15**	0	0	0	**0**	19	0	0	**19**	95	2	2	**99**	9	0	0	**9**	0	0	0	**0**
16:30 to 17:30	54	1	1	**56**	9	0	0	**9**	12	0	0	**12**	0	0	0	**0**	17	0	0	**17**	97	1	3	**101**	5	0	0	**5**	0	0	0	**0**
16:45 to 17:45	51	1	1	**53**	8	0	0	**8**	17	0	0	**17**	0	0	0	**0**	15	0	0	**15**	100	1	2	**103**	6	0	0	**6**	0	0	0	**0**
17:00 to 18:00	56	0	1	**57**	4	0	0	**4**	22	0	0	**22**	0	0	0	**0**	16	0	0	**16**	104	2	3	**109**	4	0	0	**4**	1	0	0	**1**
PM Totals	**167**	**3**	**1**	**171**	**25**	**0**	**0**	**25**	**53**	**2**	**0**	**55**	**0**	**0**	**0**	**0**	**56**	**1**	**0**	**57**	**290**	**6**	**5**	**301**	**21**	**0**	**0**	**21**	**3**	**0**	**0**	**3**



Approach	Un-named Rd																Oberon St																Crossing Pedestrians								
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)												
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	A	B	C	D	E	F	G	H	Total
6:00 to 7:00	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	2	0	0	**2**	12	2	1	**15**	19	0	0	**19**	1	0	0	**1**	0	0	1	0	1	0	0	0	**2**
6:15 to 7:15	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	4	0	0	**4**	18	2	1	**21**	16	1	0	**17**	0	0	0	**0**	1	0	2	0	1	0	0	0	**4**
6:30 to 7:30	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	5	0	0	**5**	23	3	2	**28**	17	5	1	**23**	1	0	0	**1**	1	0	2	0	2	0	0	0	**5**
6:45 to 7:45	1	0	0	**1**	2	0	0	**2**	1	0	0	**1**	0	0	0	**0**	6	1	0	**7**	34	3	2	**39**	24	7	1	**32**	2	0	0	**2**	1	0	2	0	4	1	0	0	**8**
7:00 to 8:00	1	0	0	**1**	5	0	0	**5**	3	0	0	**3**	0	0	0	**0**	7	1	0	**8**	41	2	1	**44**	28	8	1	**37**	2	0	0	**2**	1	0	3	0	5	2	0	0	**11**
7:15 to 8:15	1	0	0	**1**	5	0	0	**5**	4	0	0	**4**	0	0	0	**0**	10	1	0	**11**	44	1	1	**46**	30	8	1	**39**	2	0	0	**2**	0	2	1	0	5	3	0	2	**13**
7:30 to 8:30	2	0	0	**2**	6	0	0	**6**	4	0	0	**4**	0	0	0	**0**	19	1	0	**20**	47	0	0	**47**	23	5	0	**28**	1	0	0	**1**	0	2	1	0	5	9	0	2	**19**
7:45 to 8:45	4	0	0	**4**	5	0	0	**5**	7	0	0	**7**	0	0	0	**0**	21	0	0	**21**	53	2	0	**55**	26	4	0	**30**	2	0	0	**2**	1	2	1	2	7	8	0	2	**23**
8:00 to 9:00	10	0	0	**10**	6	0	0	**6**	8	0	0	**8**	0	0	0	**0**	27	1	0	**28**	66	2	0	**68**	21	3	0	**24**	2	0	0	**2**	1	2	0	5	7	8	2	3	**28**
AM Totals	**11**	**0**	**0**	**11**	**11**	**0**	**0**	**11**	**12**	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**36**	**2**	**0**	**38**	**119**	**6**	**2**	**127**	**68**	**11**	**1**	**80**	**5**	**0**	**0**	**5**	**2**	**2**	**4**	**5**	**13**	**10**	**2**	**3**	**41**
15:00 to 16:00	13	1	0	**14**	10	1	0	**11**	20	0	0	**20**	0	0	0	**0**	21	1	0	**22**	127	1	0	**128**	50	0	2	**52**	3	0	0	**3**	6	7	8	7	8	6	2	5	**49**
15:15 to 16:15	13	1	0	**14**	9	1	0	**10**	21	0	0	**21**	0	0	0	**0**	30	0	0	**30**	137	0	1	**138**	56	0	2	**58**	4	0	0	**4**	5	6	8	8	8	6	1	4	**46**
15:30 to 16:30	13	0	0	**13**	13	0	0	**13**	17	0	0	**17**	0	0	0	**0**	35	0	0	**35**	137	0	1	**138**	64	0	2	**66**	7	0	0	**7**	4	4	8	6	9	10	2	5	**48**
15:45 to 16:45	9	0	0	**9**	12	0	0	**12**	21	0	0	**21**	0	0	0	**0**	46	0	0	**46**	140	2	2	**144**	68	0	0	**68**	13	0	0	**13**	4	3	6	4	13	7	4	4	**45**
16:00 to 17:00	13	0	0	**13**	11	0	0	**11**	23	0	0	**23**	0	0	0	**0**	45	1	0	**46**	140	2	2	**144**	69	0	0	**69**	13	0	0	**13**	2	3	3	3	16	10	4	4	**45**
16:15 to 17:15	12	0	0	**12**	12	0	0	**12**	26	1	0	**27**	0	0	0	**0**	43	1	0	**44**	132	3	1	**136**	71	0	0	**71**	14	0	0	**14**	2	6	3	4	14	11	4	8	**52**
16:30 to 17:30	11	0	0	**11**	9	0	0	**9**	28	1	0	**29**	0	0	0	**0**	32	1	0	**33**	142	4	1	**147**	61	0	0	**61**	12	0	0	**12**	6	9	4	4	15	12	5	7	**62**
16:45 to 17:45	15	0	0	**15**	7	0	0	**7**	20	1	0	**21**	0	0	0	**0**	21	1	0	**22**	142	3	0	**145**	60	0	0	**60**	8	0	0	**8**	9	8	3	5	13	12	3	9	**62**
17:00 to 18:00	13	0	0	**13**	9	0	0	**9**	14	1	0	**15**	0	0	0	**0**	18	1	0	**19**	130	4	1	**135**	62	0	0	**62**	7	0	0	**7**	9	7	6	4	10	9	3	7	**55**
PM Totals	**39**	**1**	**0**	**40**	**30**	**1**	**0**	**31**	**57**	**1**	**0**	**58**	**0**	**0**	**0**	**0**	**84**	**3**	**0**	**87**	**397**	**7**	**3**	**407**	**181**	**0**	**2**	**183**	**23**	**0**	**0**	**23**	**17**	**17**	**17**	**14**	**34**	**25**	**9**	**16**	**149**

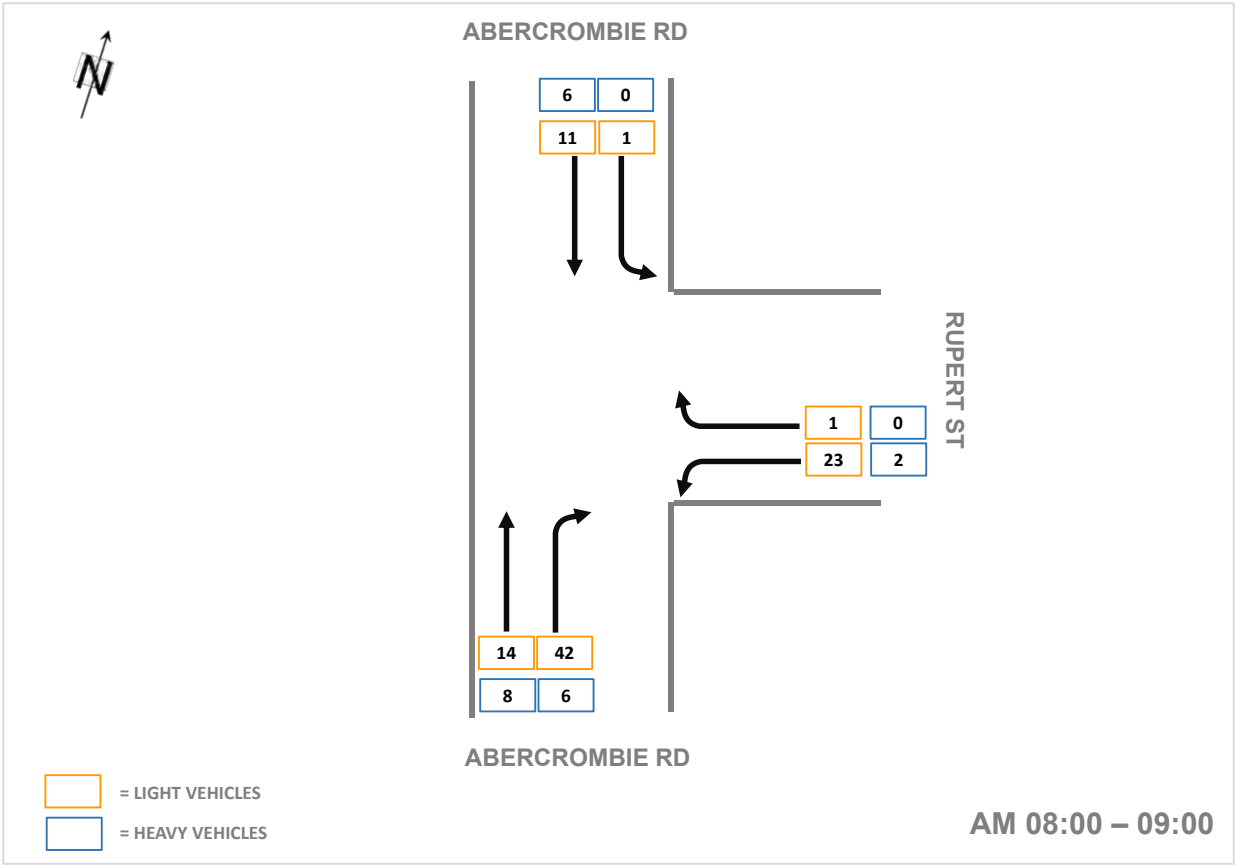
Suburb : Oberon
Location : 8. Duckmaloi Rd / Albion St
Day/Date : Tuesday, 25th August 2015
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary

Approach	Duckmaloi Rd											
Direction	Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00 to 7:00	6	0	0	**6**	7	3	0	**10**	0	0	0	**0**
6:15 to 7:15	10	0	0	**10**	11	3	0	**14**	0	0	0	**0**
6:30 to 7:30	15	0	0	**15**	13	4	0	**17**	0	0	0	**0**
6:45 to 7:45	18	0	0	**18**	13	4	0	**17**	0	0	0	**0**
7:00 to 8:00	25	0	0	**25**	10	5	0	**15**	0	0	0	**0**
7:15 to 8:15	30	1	0	**31**	11	8	0	**19**	0	0	0	**0**
7:30 to 8:30	37	1	1	**39**	12	10	0	**22**	0	0	0	**0**
7:45 to 8:45	45	2	1	**48**	13	12	0	**25**	0	0	0	**0**
8:00 to 9:00	46	3	1	**50**	15	11	0	**26**	0	0	0	**0**
AM Totals	**77**	**3**	**1**	**81**	**32**	**19**	**0**	**51**	**0**	**0**	**0**	**0**
15:00 to 16:00	24	2	1	**27**	7	11	0	**18**	0	0	0	**0**
15:15 to 16:15	32	1	1	**34**	9	10	0	**19**	0	0	0	**0**
15:30 to 16:30	35	1	3	**39**	10	11	1	**22**	0	0	0	**0**
15:45 to 16:45	30	1	3	**34**	14	7	1	**22**	0	0	0	**0**
16:00 to 17:00	29	1	2	**32**	14	7	1	**22**	0	0	0	**0**
16:15 to 17:15	26	1	2	**29**	12	4	1	**17**	0	0	0	**0**
16:30 to 17:30	24	0	2	**26**	13	2	0	**15**	0	0	0	**0**
16:45 to 17:45	26	0	2	**28**	8	2	0	**10**	0	0	0	**0**
17:00 to 18:00	28	0	2	**30**	10	0	0	**10**	0	0	0	**0**
PM Totals	**81**	**3**	**5**	**89**	**31**	**18**	**1**	**50**	**0**	**0**	**0**	**0**

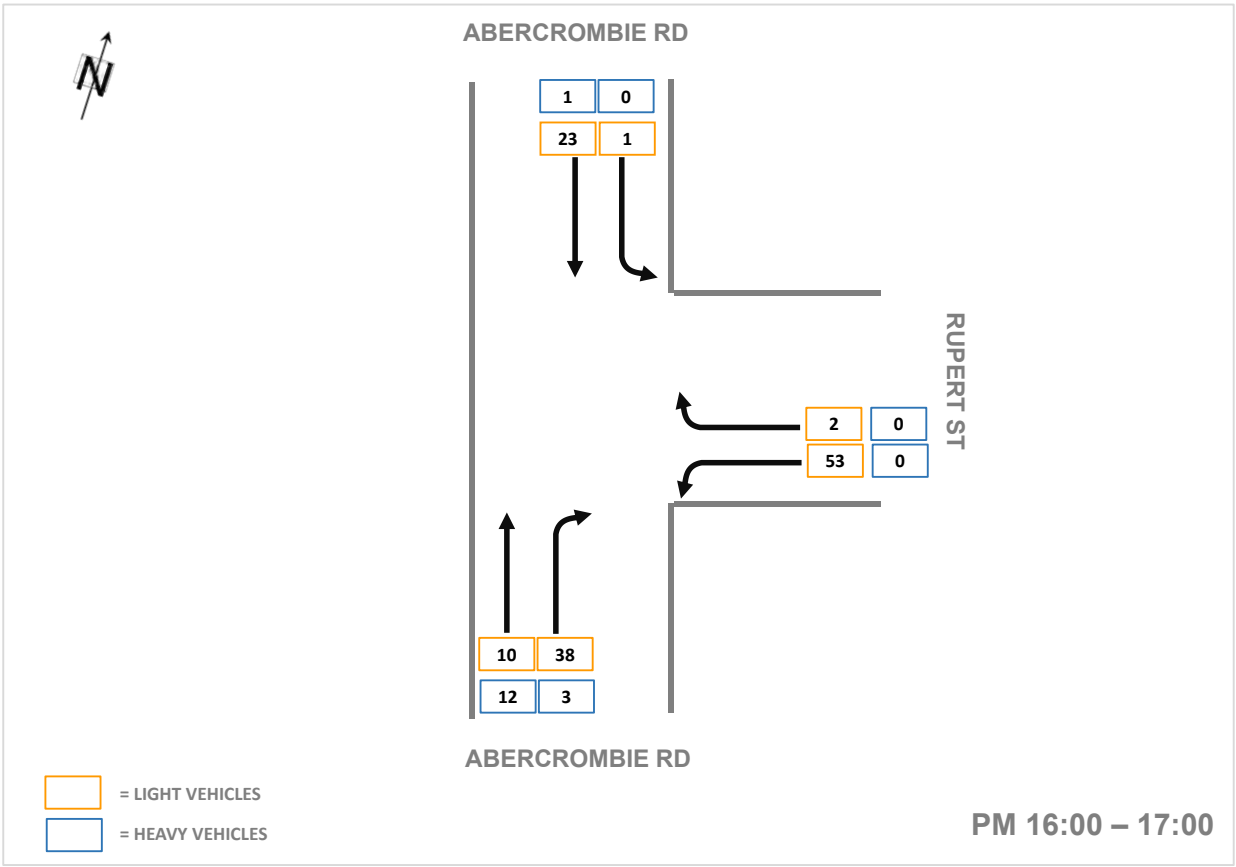


Approach	Albion St												Duckmaloi Rd												Crossing Pedestrians						
Direction	Direction 7 (Left Turn)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12U (U Turn)										
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	C	D	E	F	G	H	Total
6:00 to 7:00	1	6	0	**7**	0	0	0	**0**	0	0	0	**0**	2	0	0	**2**	6	0	1	**7**	0	0	0	**0**	0	0	0	0	0	0	**0**
6:15 to 7:15	1	6	0	**7**	0	1	0	**1**	0	0	0	**0**	2	0	0	**2**	9	1	1	**11**	0	0	0	**0**	0	0	0	0	0	0	**0**
6:30 to 7:30	2	6	0	**8**	0	1	0	**1**	0	0	0	**0**	4	1	0	**5**	10	1	2	**13**	0	0	0	**0**	0	0	0	0	0	0	**0**
6:45 to 7:45	4	8	0	**12**	3	1	0	**4**	0	0	0	**0**	6	1	0	**7**	13	1	2	**16**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:00 to 8:00	6	7	0	**13**	4	1	0	**5**	0	0	0	**0**	4	1	0	**5**	15	1	1	**17**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:15 to 8:15	6	10	0	**16**	5	0	0	**5**	0	0	0	**0**	4	1	0	**5**	16	0	1	**17**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:30 to 8:30	6	11	0	**17**	7	0	1	**8**	0	0	0	**0**	2	0	0	**2**	18	0	0	**18**	0	0	0	**0**	0	0	0	0	0	0	**0**
7:45 to 8:45	5	10	0	**15**	6	0	1	**7**	0	0	0	**0**	2	0	0	**2**	23	0	0	**23**	0	0	0	**0**	0	0	0	0	0	0	**0**
8:00 to 9:00	6	9	0	**15**	5	0	1	**6**	0	0	0	**0**	3	0	0	**3**	22	0	0	**22**	0	0	0	**0**	0	0	0	0	0	0	**0**
AM Totals	**13**	**22**	**0**	**35**	**9**	**1**	**1**	**11**	**0**	**0**	**0**	**0**	**9**	**1**	**0**	**10**	**43**	**1**	**2**	**46**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
15:00 to 16:00	13	2	0	**15**	3	0	0	**3**	0	0	0	**0**	11	1	1	**13**	40	0	1	**41**	0	0	0	**0**	1	0	0	0	0	0	**1**
15:15 to 16:15	13	3	0	**16**	8	0	0	**8**	0	0	0	**0**	9	1	1	**11**	40	0	1	**41**	0	0	0	**0**	0	0	0	0	0	0	**0**
15:30 to 16:30	13	3	0	**16**	9	0	0	**9**	0	0	0	**0**	8	1	0	**9**	41	0	1	**42**	0	0	0	**0**	0	0	0	0	0	0	**0**
15:45 to 16:45	14	3	0	**17**	6	0	0	**6**	0	0	0	**0**	10	0	0	**10**	40	1	0	**41**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:00 to 17:00	16	5	0	**21**	6	1	0	**7**	0	0	0	**0**	10	0	0	**10**	43	1	0	**44**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:15 to 17:15	14	3	0	**17**	1	1	0	**2**	0	0	0	**0**	10	0	0	**10**	42	1	0	**43**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:30 to 17:30	11	4	0	**15**	0	1	0	**1**	0	0	0	**0**	13	0	0	**13**	41	1	0	**42**	0	0	0	**0**	0	0	0	0	0	0	**0**
16:45 to 17:45	13	4	0	**17**	2	1	0	**3**	0	0	0	**0**	12	0	0	**12**	37	1	0	**38**	0	0	0	**0**	0	0	0	0	0	0	**0**
17:00 to 18:00	11	2	0	**13**	2	0	0	**2**	0	0	0	**0**	11	0	0	**11**	32	2	1	**35**	0	0	0	**0**	0	0	0	0	0	0	**0**
PM Totals	**40**	**9**	**0**	**49**	**11**	**1**	**0**	**12**	**0**	**0**	**0**	**0**	**32**	**1**	**1**	**34**	**115**	**3**	**2**	**120**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**

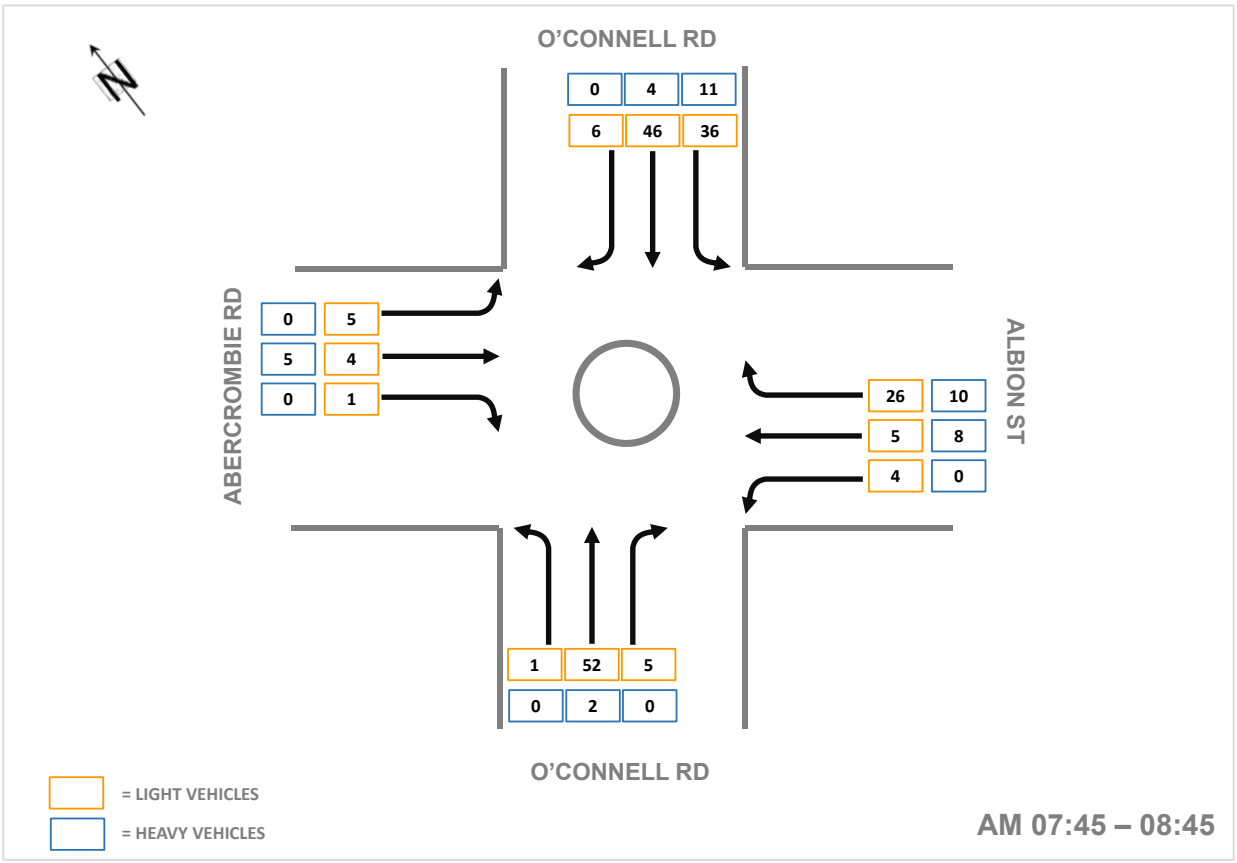
APPENDIX C: VEHICLE TURNING MOVEMENTS (EXISTING CONDITIONS)



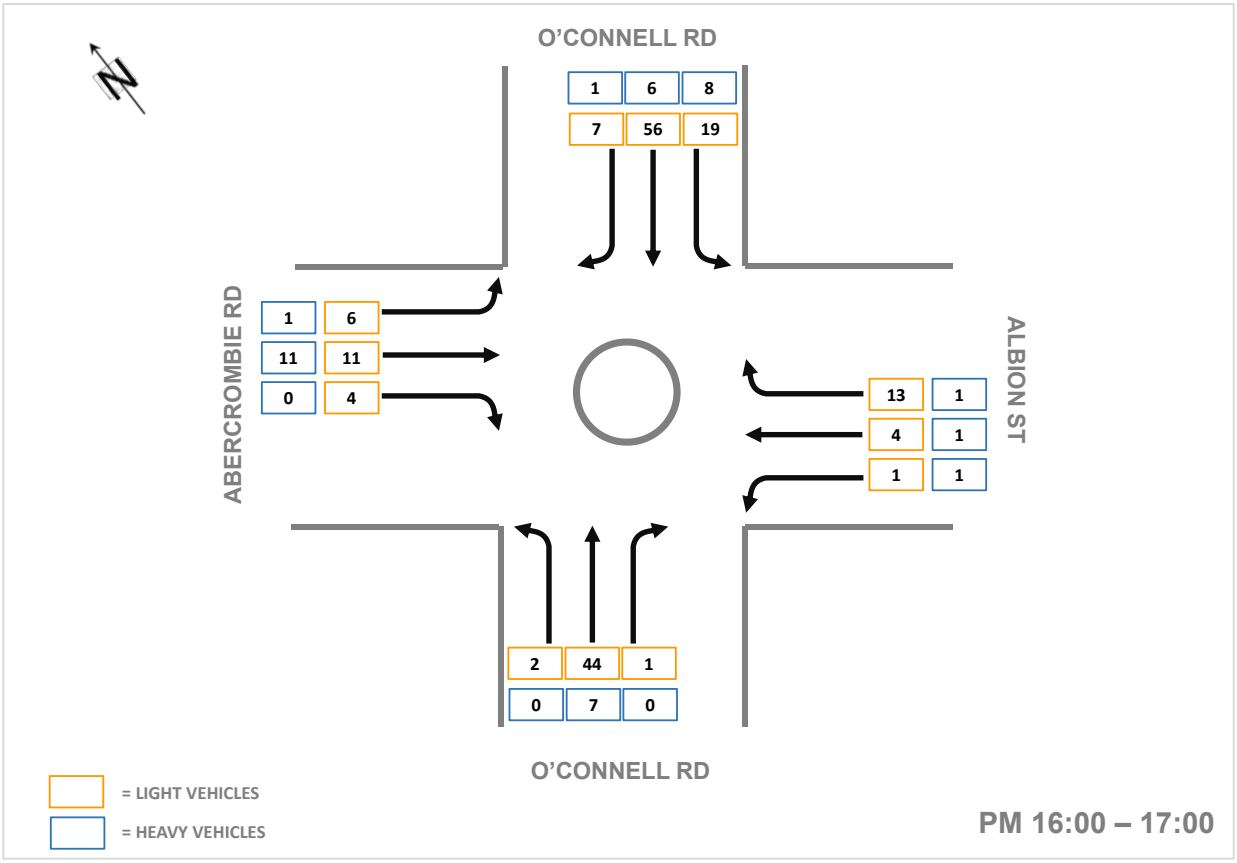
Site 1 – Abercrombie Road and Rupert Street, AM peak hour



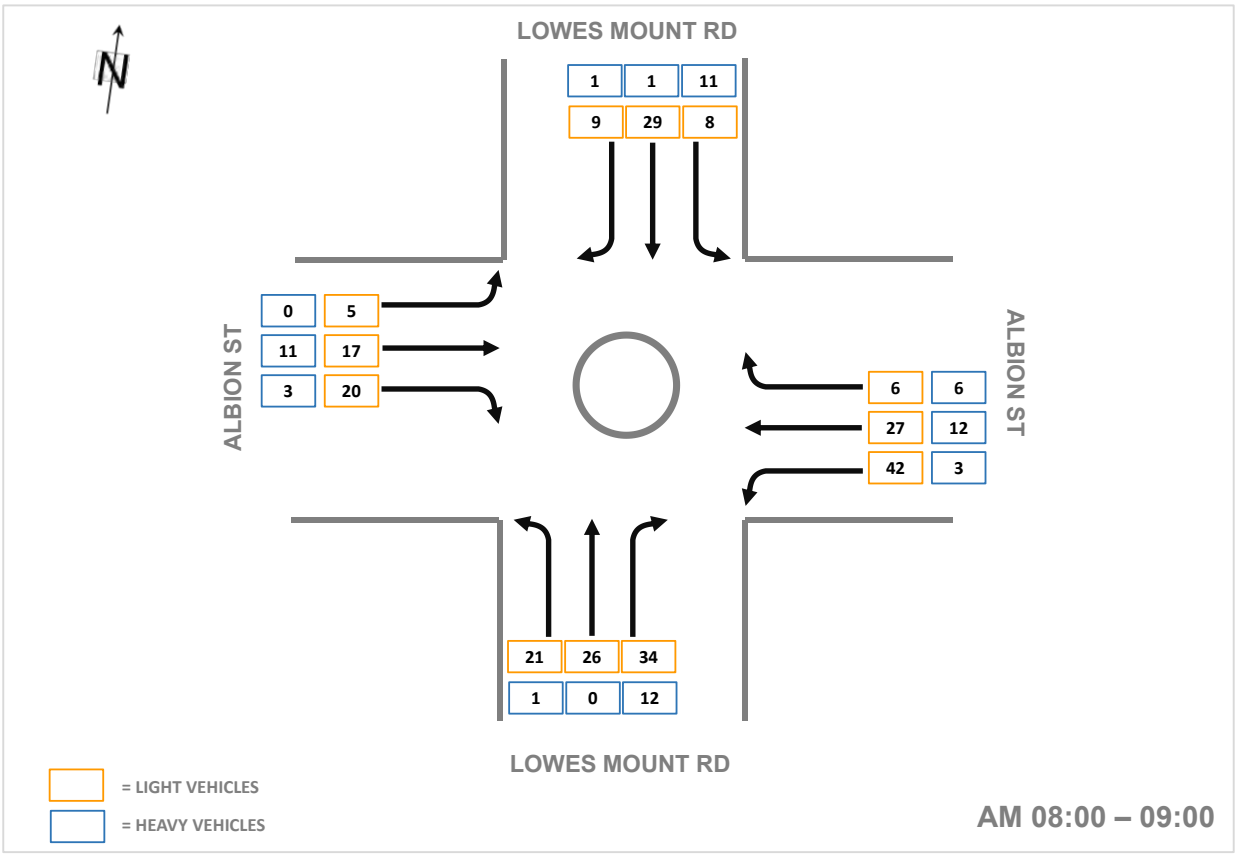
Site 1 – Abercrombie Road and Rupert Street, PM peak hour



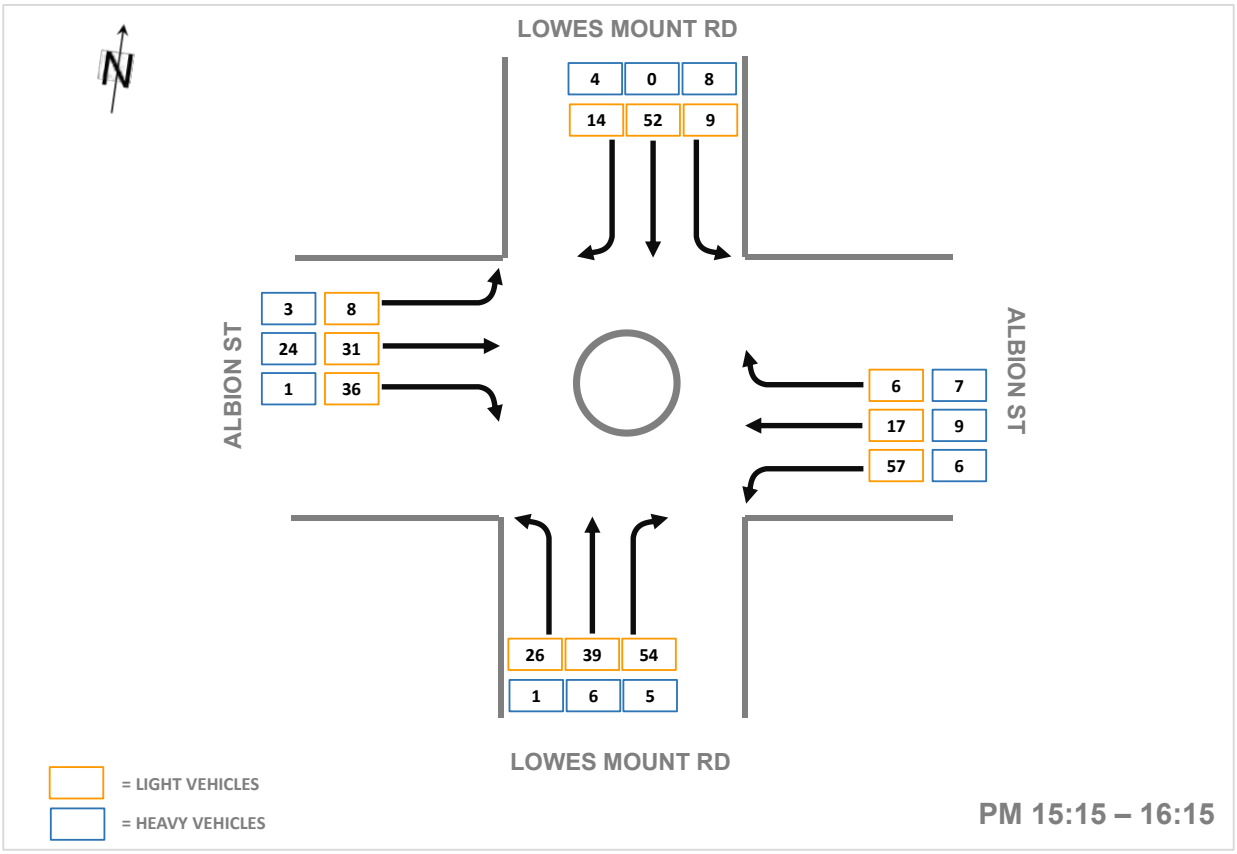
Site 2 – O'Connell Road and Albion Street, AM peak hour



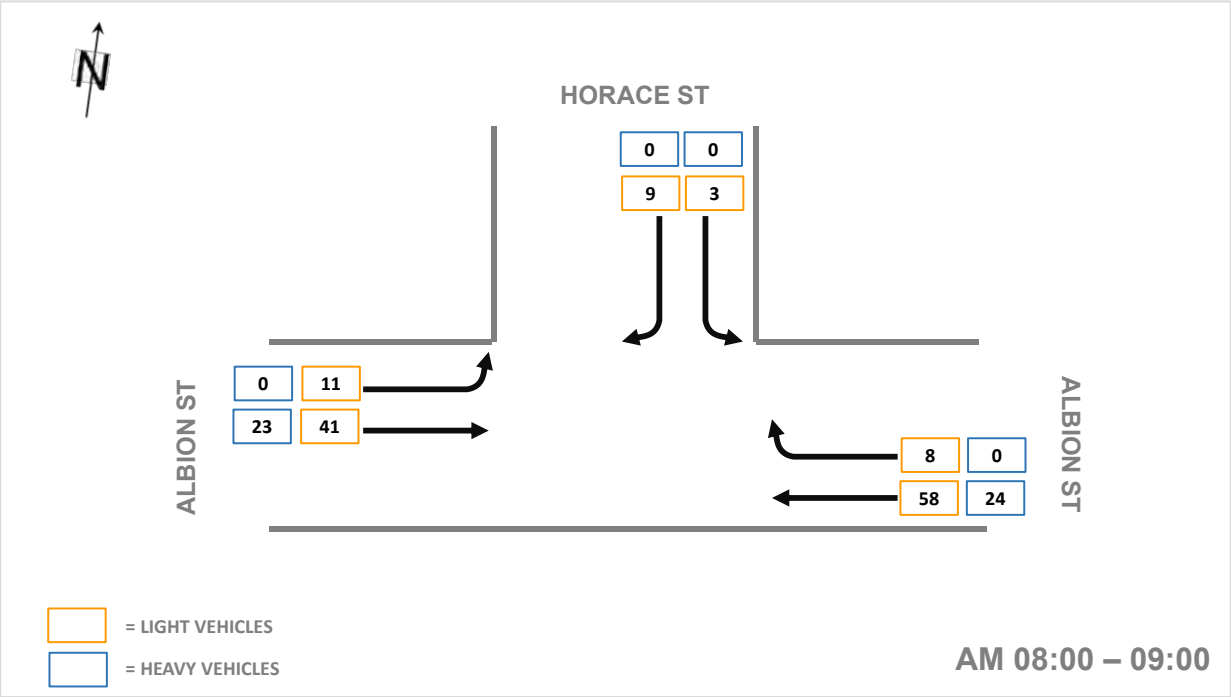
Site 2 – O'Connell Road and Albion Street, PM peak hour



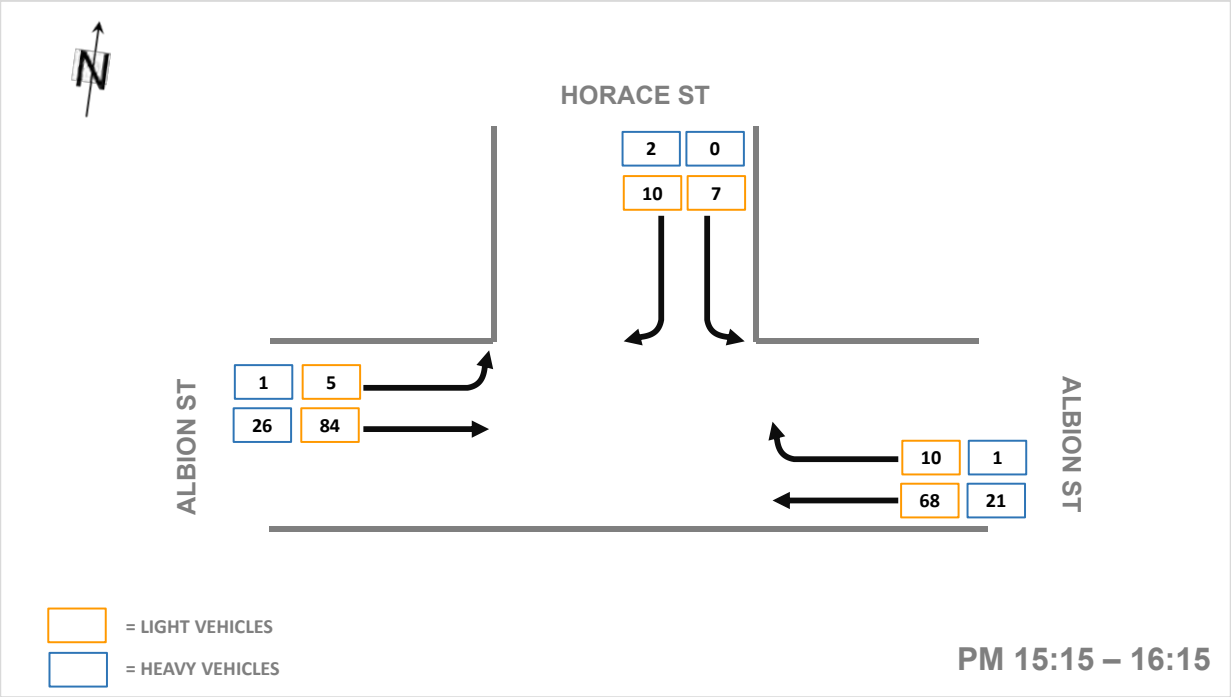
Site 3 – Lowes Mount Road and Albion Street, AM peak hour



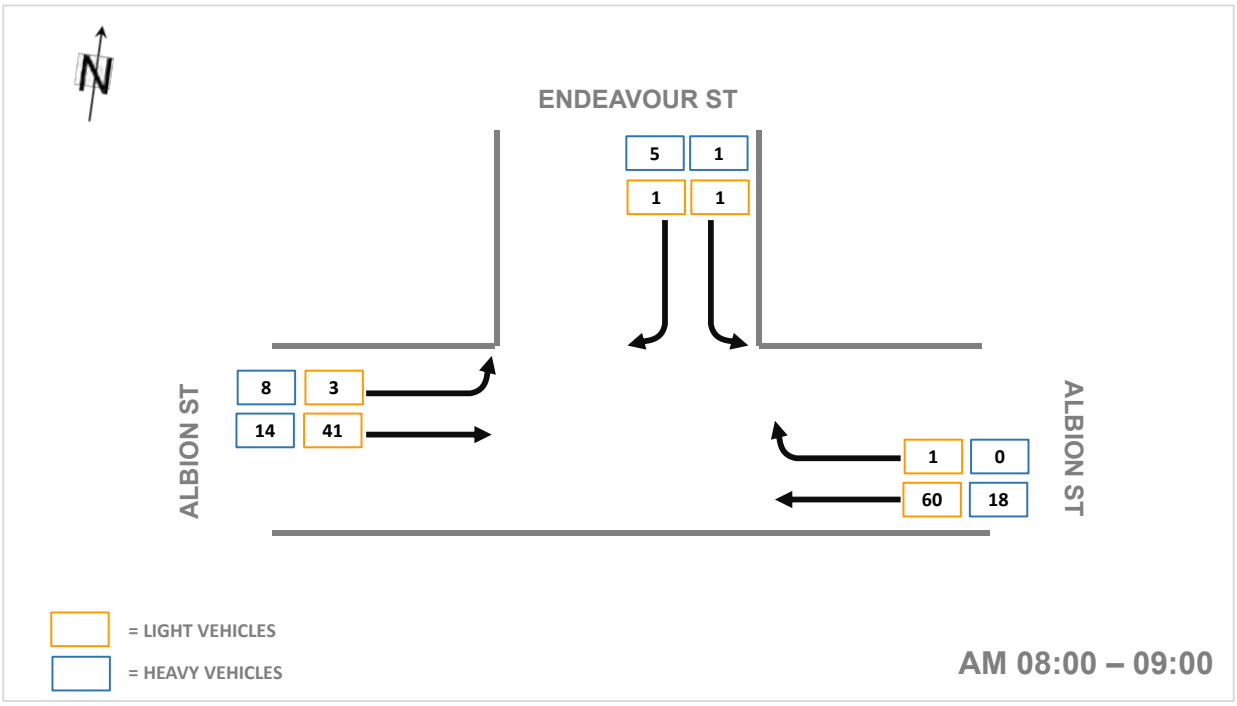
Site 3 – Lowes Mount Road and Albion Street, PM peak hour



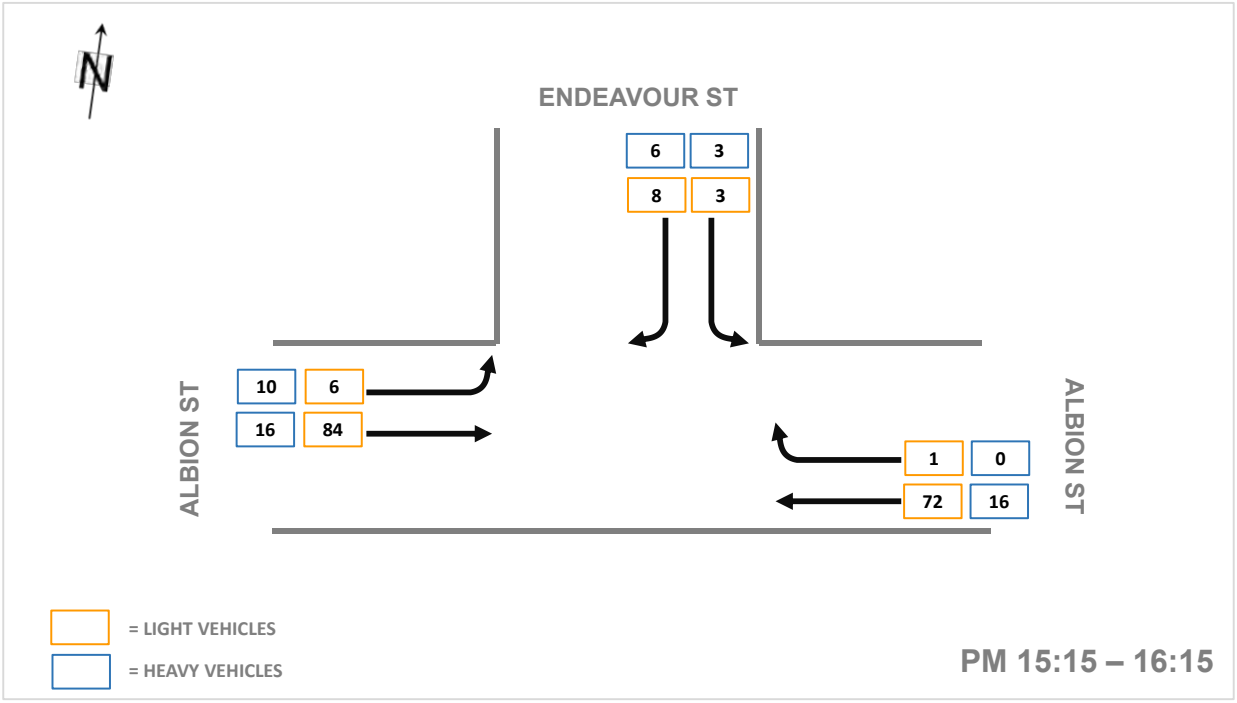
Site 4 – Albion Street and Horace Street, AM peak hour



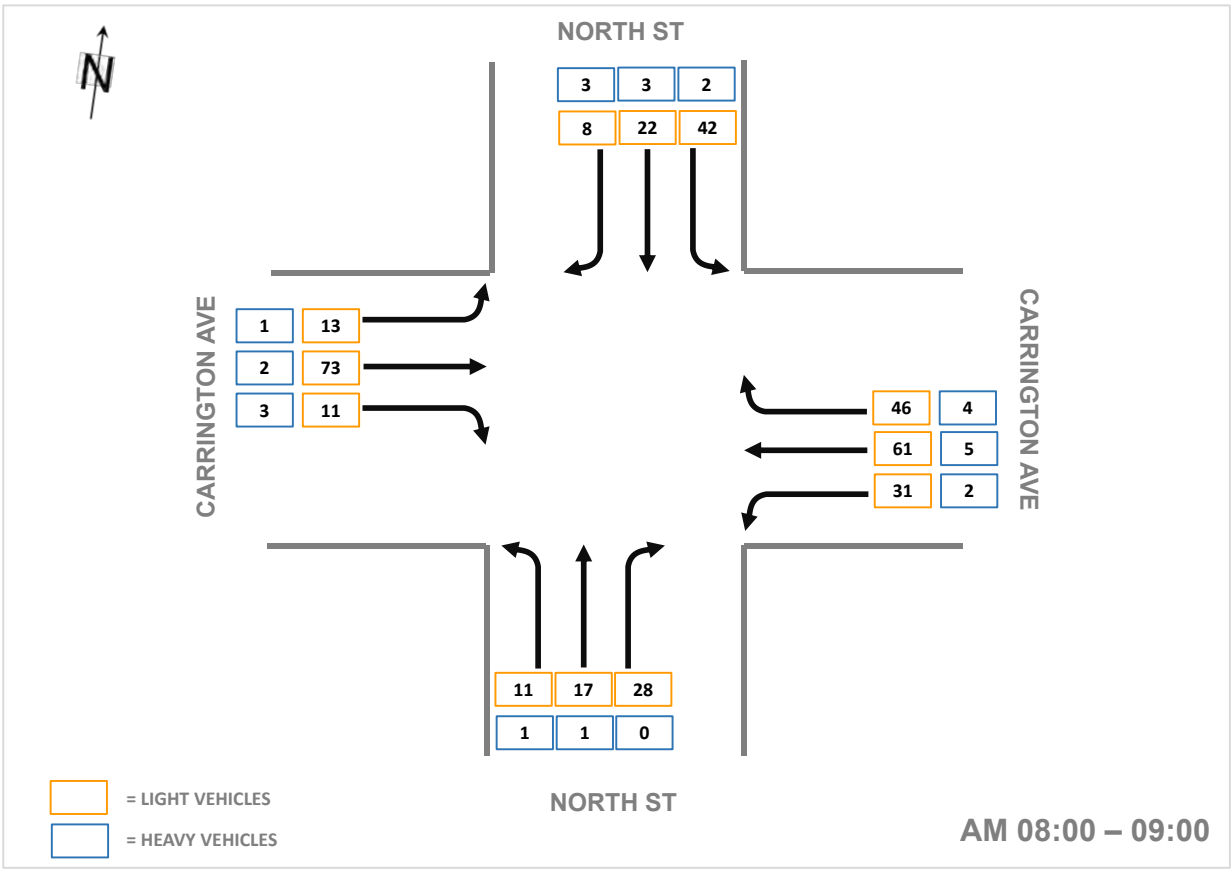
Site 4 – Albion Street and Horace Street, PM peak hour



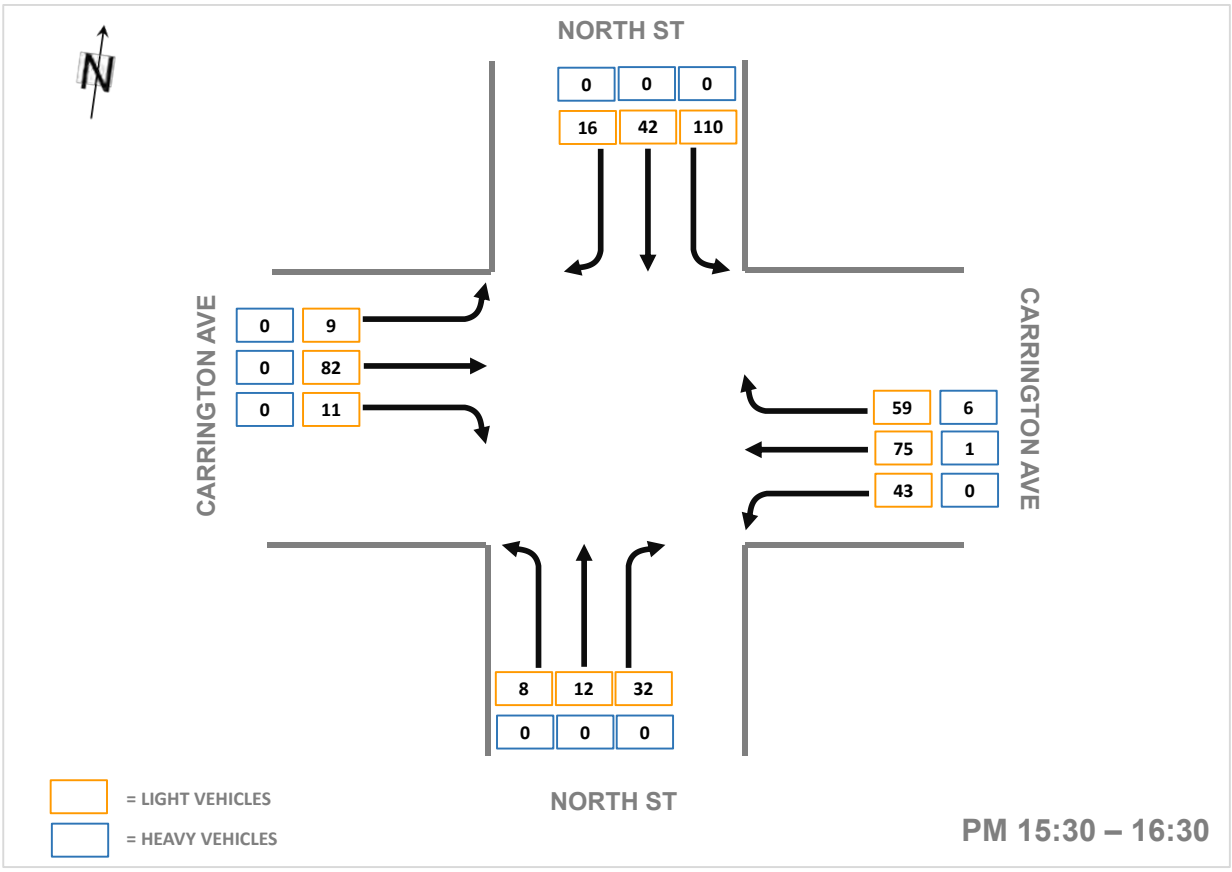
Site 5 – Albion Street and Endeavour Street, AM peak hour



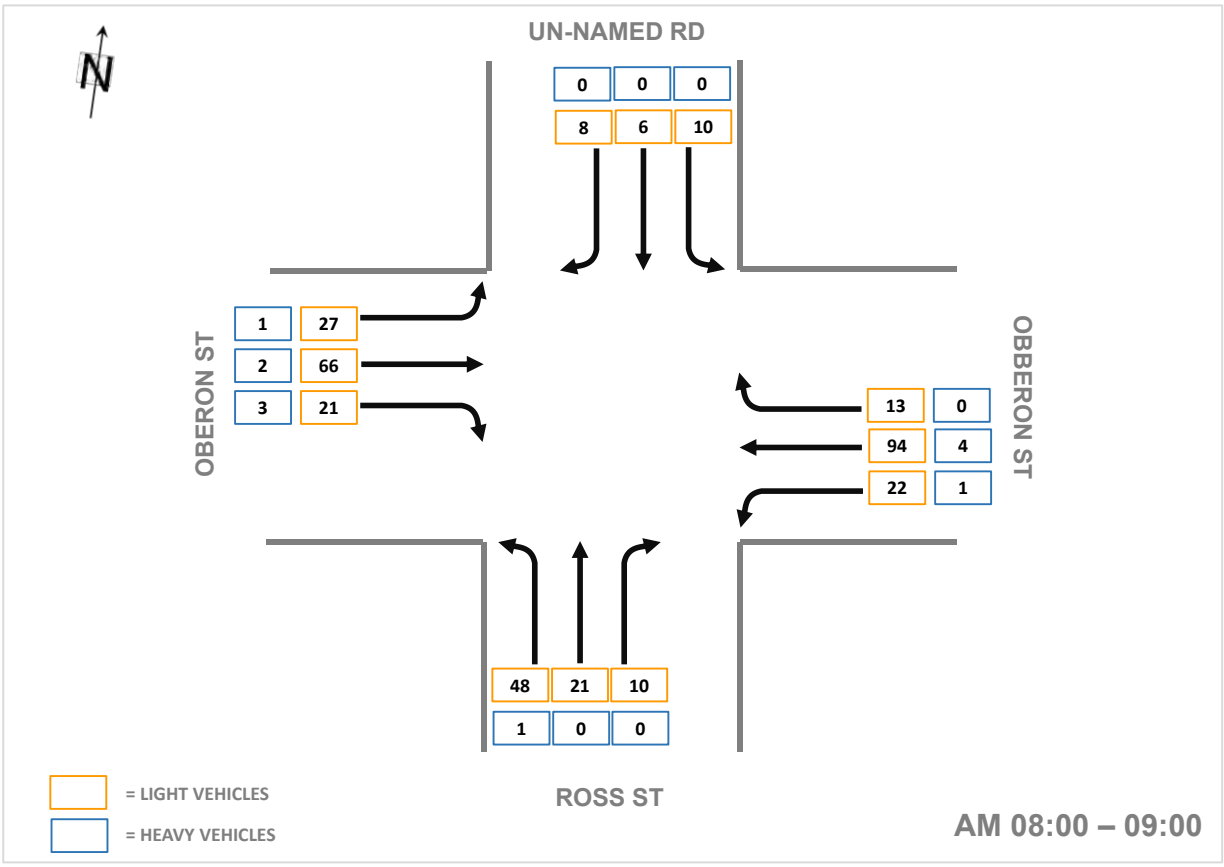
Site 5 – Albion Street and Endeavour Street, PM peak hour



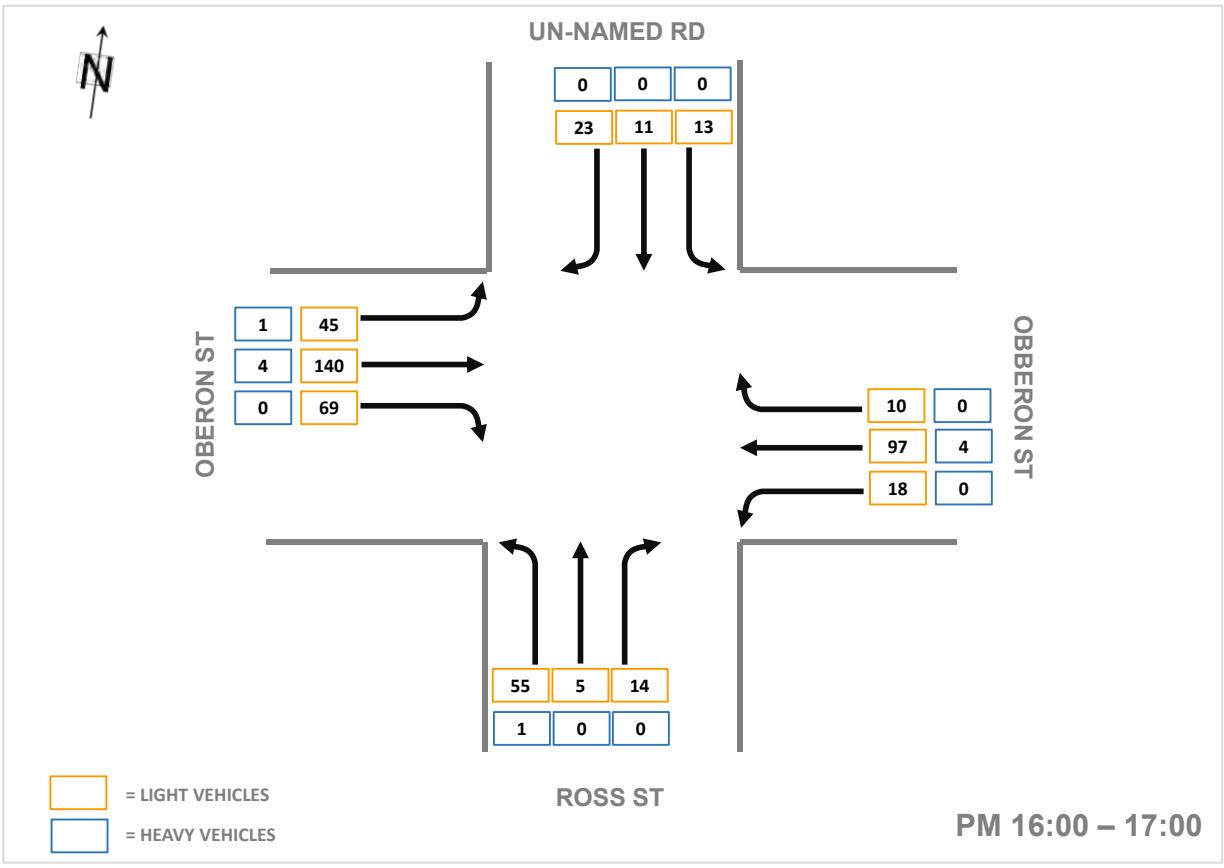
Site 6 – North Street and Carrington Avenue, AM peak hour



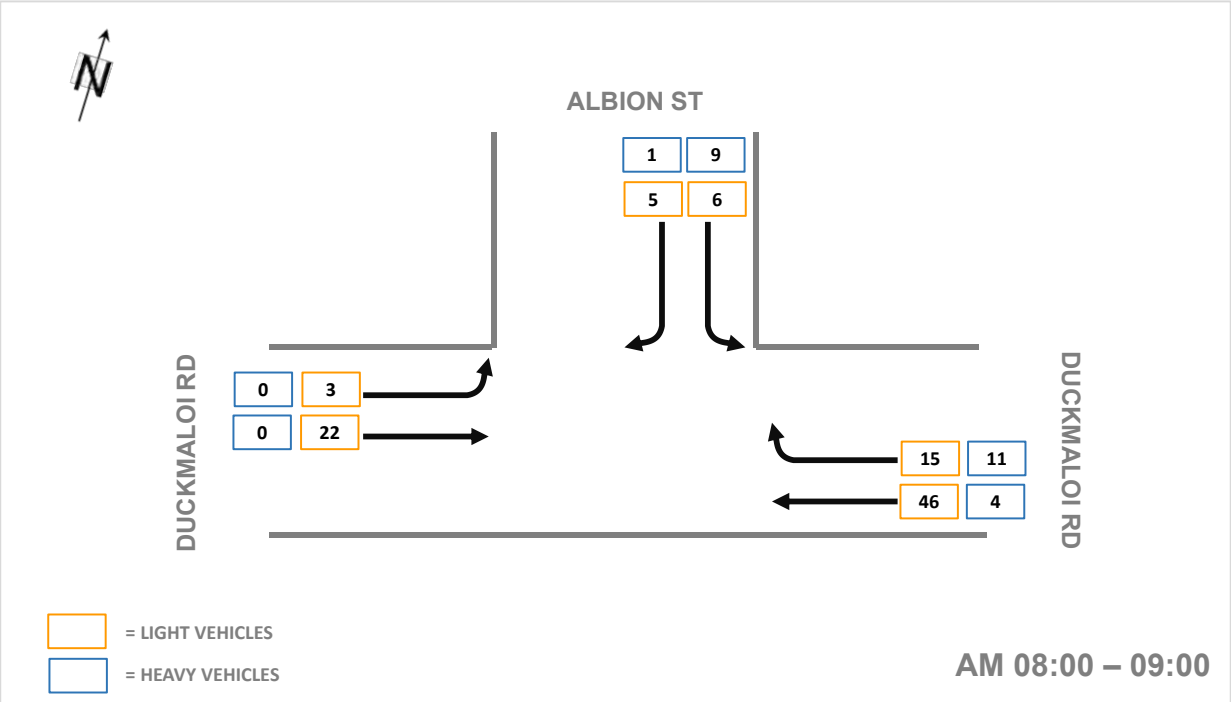
Site 6 – North Street and Carrington Avenue, PM peak hour



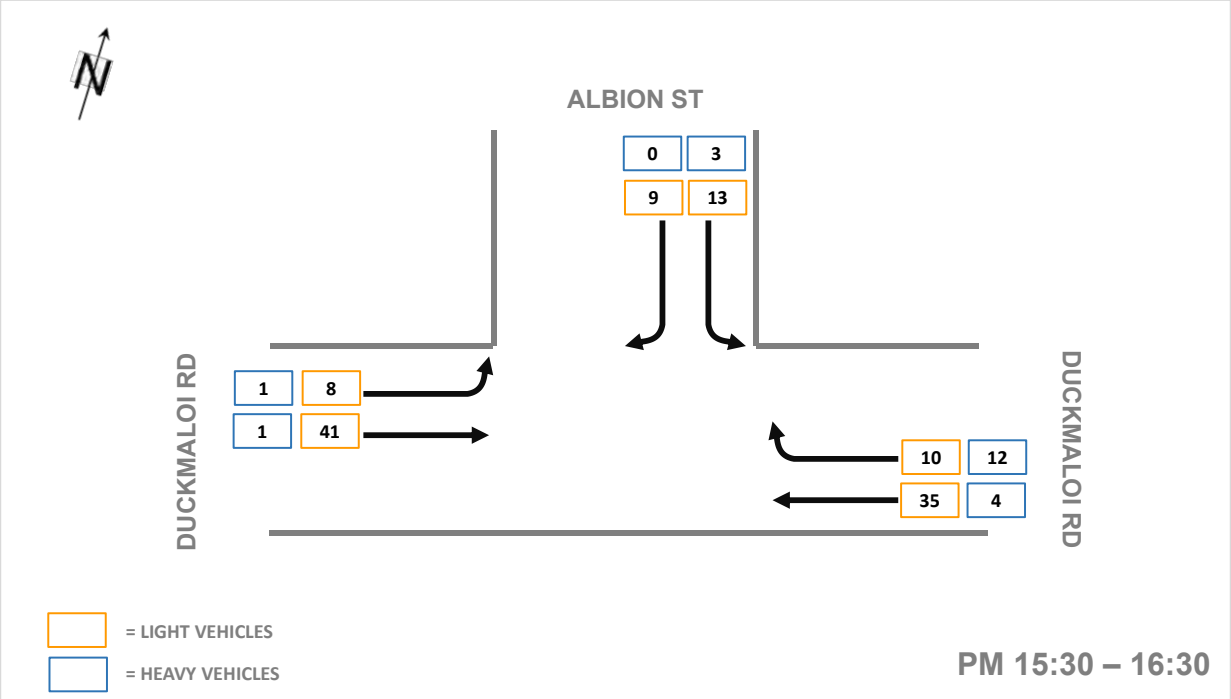
Site 7 – Oberon Street, Ross Street and unnamed road, AM peak hour



Site 7 – Oberon Street, Ross Street and unnamed road, PM peak hour



Site 8 – Duckmaloi Road and Albion Road, AM peak hour



Site 8 – Duckmaloi Road and Albion Road, PM peak hour

APPENDIX D: SIDRA INTERSECTION RESULTS (EXISTING CONDITIONS)

MOVEMENT SUMMARY

Site: Site 1: Abercrombie Rd - Rupert St (AM) Peak - Existing

Site 1: Abercrombie Rd - Rupert St (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abercrombie Rd - southern leg											
2	T1	23	36.4	0.040	0.0	LOS A	0.2	1.3	0.01	0.09	59.1
3	R2	51	12.5	0.040	5.7	LOS A	0.2	1.3	0.09	0.53	52.6
Approach		74	20.0	0.040	3.9	NA	0.2	1.3	0.06	0.39	54.5
East: Rupert St - eastern leg											
4	L2	26	8.0	0.022	5.7	LOS A	0.1	0.6	0.07	0.55	53.1
6	R2	1	0.0	0.022	6.1	LOS A	0.1	0.6	0.07	0.55	53.2
Approach		27	7.7	0.022	5.7	LOS A	0.1	0.6	0.07	0.55	53.1
North: Abercrombie Rd - northern leg											
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
8	T1	18	35.3	0.011	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		19	33.3	0.011	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		120	19.3	0.040	3.7	NA	0.2	1.3	0.06	0.37	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 1: Abercrombie Rd - Rupert St (PM) Peak - Existing

Site 1: Abercrombie Rd - Rupert St (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abercrombie Rd - southern leg											
2	T1	23	54.5	0.036	0.0	LOS A	0.1	1.2	0.03	0.16	58.3
3	R2	43	7.3	0.036	5.6	LOS A	0.1	1.2	0.09	0.49	52.9
Approach		66	23.8	0.036	3.7	NA	0.1	1.2	0.07	0.37	54.7
East: Rupert St - eastern leg											
4	L2	56	0.0	0.045	5.6	LOS A	0.2	1.1	0.08	0.55	53.4
6	R2	2	0.0	0.045	6.1	LOS A	0.2	1.1	0.08	0.55	53.1
Approach		58	0.0	0.045	5.6	LOS A	0.2	1.1	0.08	0.55	53.3
North: Abercrombie Rd - northern leg											
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
8	T1	25	4.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	4.0	0.013	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		151	11.2	0.045	3.8	NA	0.2	1.2	0.06	0.38	55.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 2: O'Connell Rd - Abercrombie Rd - Albion St (AM) Peak - Existing

Site 2: O'Connell Rd - Abercrombie Rd - Albion St (AM) Peak - Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Rd - southern leg											
1	L2	1	0.0	0.049	4.1	LOS A	0.2	1.7	0.20	0.43	54.3
2	T1	57	3.7	0.049	4.4	LOS A	0.2	1.7	0.20	0.43	55.6
3	R2	5	0.0	0.049	9.0	LOS A	0.2	1.7	0.20	0.43	55.6
Approach		63	3.3	0.049	4.8	LOS A	0.2	1.7	0.20	0.43	55.6
East: Albion St - eastern leg											
4	L2	4	0.0	0.050	4.1	LOS A	0.2	2.1	0.20	0.55	52.3
5	T1	14	61.5	0.050	5.0	LOS A	0.2	2.1	0.20	0.55	52.2
6	R2	38	27.8	0.050	9.4	LOS A	0.2	2.1	0.20	0.55	52.5
Approach		56	34.0	0.050	7.9	LOS A	0.2	2.1	0.20	0.55	52.4
North: O'Connell Rd - northern leg											
7	L2	49	23.4	0.078	4.2	LOS A	0.4	3.0	0.10	0.44	54.2
8	T1	53	8.0	0.078	4.2	LOS A	0.4	3.0	0.10	0.44	56.1
9	R2	6	0.0	0.078	8.8	LOS A	0.4	3.0	0.10	0.44	56.3
Approach		108	14.6	0.078	4.5	LOS A	0.4	3.0	0.10	0.44	55.2
West: Abercrombie Rd - western leg											
10	L2	5	0.0	0.015	4.3	LOS A	0.1	0.6	0.26	0.44	54.2
11	T1	9	55.6	0.015	5.2	LOS A	0.1	0.6	0.26	0.44	54.2
12	R2	1	0.0	0.015	9.1	LOS A	0.1	0.6	0.26	0.44	55.5
Approach		16	33.3	0.015	5.2	LOS A	0.1	0.6	0.26	0.44	54.3
All Vehicles		243	17.3	0.078	5.4	LOS A	0.4	3.0	0.16	0.46	54.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 2: O'Connell Rd - Abercrombie Rd - Albion St (PM) Peak - Existing

Site 2: O'Connell Rd - Abercrombie Rd - Albion St (PM) Peak - Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Rd - southern leg											
1	L2	2	0.0	0.043	4.0	LOS A	0.2	1.6	0.12	0.40	54.9
2	T1	54	13.7	0.043	4.3	LOS A	0.2	1.6	0.12	0.40	55.9
3	R2	1	0.0	0.043	8.8	LOS A	0.2	1.6	0.12	0.40	56.2
Approach		57	13.0	0.043	4.4	LOS A	0.2	1.6	0.12	0.40	55.9
East: Albion St - eastern leg											
4	L2	2	50.0	0.019	4.8	LOS A	0.1	0.6	0.22	0.56	50.9
5	T1	5	20.0	0.019	4.6	LOS A	0.1	0.6	0.22	0.56	53.1
6	R2	15	7.1	0.019	9.1	LOS A	0.1	0.6	0.22	0.56	53.2
Approach		22	14.3	0.019	7.7	LOS A	0.1	0.6	0.22	0.56	53.0
North: O'Connell Rd - northern leg											
7	L2	28	29.6	0.077	4.3	LOS A	0.4	3.0	0.14	0.43	53.7
8	T1	65	9.7	0.077	4.3	LOS A	0.4	3.0	0.14	0.43	55.8
9	R2	8	12.5	0.077	9.0	LOS A	0.4	3.0	0.14	0.43	55.4
Approach		102	15.5	0.077	4.7	LOS A	0.4	3.0	0.14	0.43	55.2
West: Abercrombie Rd - western leg											
10	L2	7	14.3	0.032	4.3	LOS A	0.1	1.3	0.22	0.45	53.6
11	T1	23	50.0	0.032	5.0	LOS A	0.1	1.3	0.22	0.45	54.2
12	R2	4	0.0	0.032	9.0	LOS A	0.1	1.3	0.22	0.45	55.3
Approach		35	36.4	0.032	5.3	LOS A	0.1	1.3	0.22	0.45	54.2
All Vehicles		216	18.0	0.077	5.0	LOS A	0.4	3.0	0.16	0.44	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 3: Lowes Mount Rd - Albion St - North St (AM) Peak - Existing

Site 3: Lowes Mount Rd - Albion St - North St (AM) Peak - Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	23	4.5	0.081	4.2	LOS A	0.4	3.1	0.22	0.53	53.2
2	T1	27	0.0	0.081	4.4	LOS A	0.4	3.1	0.22	0.53	54.6
3	R2	48	26.1	0.081	9.4	LOS A	0.4	3.1	0.22	0.53	53.5
Approach		99	13.8	0.081	6.8	LOS A	0.4	3.1	0.22	0.53	53.7
East: Albion St - eastern leg											
4	L2	47	6.7	0.085	4.2	LOS A	0.4	3.4	0.21	0.46	54.3
5	T1	41	30.8	0.085	4.7	LOS A	0.4	3.4	0.21	0.46	55.1
6	R2	13	50.0	0.085	9.7	LOS A	0.4	3.4	0.21	0.46	53.7
Approach		101	21.9	0.085	5.1	LOS A	0.4	3.4	0.21	0.46	54.5
North: Lowes Mount Rd - northern leg											
7	L2	20	57.9	0.056	5.2	LOS A	0.3	2.1	0.27	0.49	52.0
8	T1	32	3.3	0.056	4.6	LOS A	0.3	2.1	0.27	0.49	55.0
9	R2	11	10.0	0.056	9.4	LOS A	0.3	2.1	0.27	0.49	54.6
Approach		62	22.0	0.056	5.6	LOS A	0.3	2.1	0.27	0.49	53.9
West: Albion St - western leg											
10	L2	5	0.0	0.053	4.3	LOS A	0.2	2.1	0.26	0.52	53.0
11	T1	29	39.3	0.053	5.0	LOS A	0.2	2.1	0.26	0.52	53.3
12	R2	24	13.0	0.053	9.3	LOS A	0.2	2.1	0.26	0.52	53.7
Approach		59	25.0	0.053	6.7	LOS A	0.2	2.1	0.26	0.52	53.4
All Vehicles		321	20.0	0.085	6.0	LOS A	0.4	3.4	0.23	0.50	54.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Site 3: Lowes Mount Rd - Albion St - North St (PM) Peak - Existing

Site 3: Lowes Mount Rd - Albion St -North St (PM) Peak - Existing
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	28	3.7	0.108	4.2	LOS A	0.5	4.1	0.22	0.53	53.1
2	T1	47	13.3	0.108	4.5	LOS A	0.5	4.1	0.22	0.53	54.2
3	R2	62	8.5	0.108	9.1	LOS A	0.5	4.1	0.22	0.53	54.1
Approach		138	9.2	0.108	6.5	LOS A	0.5	4.1	0.22	0.53	53.9
East: Albion St - eastern leg											
4	L2	66	9.5	0.097	4.5	LOS A	0.5	3.9	0.29	0.49	54.0
5	T1	27	34.6	0.097	5.1	LOS A	0.5	3.9	0.29	0.49	54.8
6	R2	14	53.8	0.097	10.1	LOS A	0.5	3.9	0.29	0.49	53.4
Approach		107	21.6	0.097	5.4	LOS A	0.5	3.9	0.29	0.49	54.1
North: Lowes Mount Rd - northern leg											
7	L2	18	47.1	0.085	5.5	LOS A	0.4	3.0	0.34	0.52	52.1
8	T1	55	0.0	0.085	4.9	LOS A	0.4	3.0	0.34	0.52	54.8
9	R2	19	22.2	0.085	9.9	LOS A	0.4	3.0	0.34	0.52	53.8
Approach		92	13.8	0.085	6.0	LOS A	0.4	3.0	0.34	0.52	54.0
West: Albion St - western leg											
10	L2	12	27.3	0.103	4.9	LOS A	0.5	4.2	0.31	0.54	52.0
11	T1	58	43.6	0.103	5.3	LOS A	0.5	4.2	0.31	0.54	53.0
12	R2	39	2.7	0.103	9.3	LOS A	0.5	4.2	0.31	0.54	53.9
Approach		108	27.2	0.103	6.7	LOS A	0.5	4.2	0.31	0.54	53.2
All Vehicles		445	17.5	0.108	6.2	LOS A	0.5	4.2	0.28	0.52	53.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 4: Horace St - Albion St (AM) Peak - Existing

Site 4: Horace St - Albion St (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - western leg											
5	T1	86	29.3	0.057	0.0	LOS A	0.1	0.4	0.04	0.05	59.2
6	R2	8	0.0	0.057	5.7	LOS A	0.1	0.4	0.04	0.05	57.0
Approach		95	26.7	0.057	0.5	NA	0.1	0.4	0.04	0.05	59.0
North: Horace St - northern leg											
7	L2	3	0.0	0.011	5.7	LOS A	0.0	0.2	0.20	0.56	53.1
9	R2	9	0.0	0.011	6.0	LOS A	0.0	0.2	0.20	0.56	52.6
Approach		13	0.0	0.011	5.9	LOS A	0.0	0.2	0.20	0.56	52.7
West: Albion St - western leg											
10	L2	12	0.0	0.049	5.5	LOS A	0.0	0.0	0.00	0.09	57.3
11	T1	67	35.9	0.049	0.0	LOS A	0.0	0.0	0.00	0.09	58.9
Approach		79	30.7	0.049	0.8	NA	0.0	0.0	0.00	0.09	58.6
All Vehicles		186	26.6	0.057	1.0	NA	0.1	0.4	0.03	0.10	58.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 4: Horace St - Albion St (PM) Peak - Existing

Site 4: Horace St - Albion St (PM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - western leg											
5	T1	94	23.6	0.063	0.1	LOS A	0.1	0.7	0.06	0.07	59.1
6	R2	12	9.1	0.063	6.0	LOS A	0.1	0.7	0.06	0.07	56.4
Approach		105	22.0	0.063	0.7	NA	0.1	0.7	0.06	0.07	58.8
North: Horace St - northern leg											
7	L2	7	0.0	0.018	5.9	LOS A	0.1	0.5	0.24	0.57	52.9
9	R2	13	16.7	0.018	6.5	LOS A	0.1	0.5	0.24	0.57	51.7
Approach		20	10.5	0.018	6.3	LOS A	0.1	0.5	0.24	0.57	52.1
West: Albion St - western leg											
10	L2	6	16.7	0.072	5.7	LOS A	0.0	0.0	0.00	0.03	57.2
11	T1	116	23.6	0.072	0.0	LOS A	0.0	0.0	0.00	0.03	59.7
Approach		122	23.3	0.072	0.3	NA	0.0	0.0	0.00	0.03	59.5
All Vehicles		247	21.7	0.072	1.0	NA	0.1	0.7	0.05	0.09	58.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 5: Endeavour St - Albion St (AM) Peak - Existing

Site 5: Endeavour St - Albion St (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - eastern leg											
5	T1	82	23.1	0.050	0.0	LOS A	0.0	0.1	0.01	0.02	59.9
6	R2	1	100.0	0.050	6.6	LOS A	0.0	0.1	0.01	0.02	55.0
Approach		83	24.1	0.050	0.2	NA	0.0	0.1	0.01	0.02	59.8
North: Endeavour St - northern leg											
7	L2	2	50.0	0.010	6.4	LOS A	0.0	0.4	0.21	0.56	51.0
9	R2	6	83.3	0.010	7.4	LOS A	0.0	0.4	0.21	0.56	49.0
Approach		8	75.0	0.010	7.2	LOS A	0.0	0.4	0.21	0.56	49.5
West: Albion St - western leg											
10	L2	12	72.7	0.044	6.4	LOS A	0.0	0.0	0.00	0.10	54.5
11	T1	58	25.5	0.044	0.0	LOS A	0.0	0.0	0.00	0.10	59.6
Approach		69	33.3	0.044	1.1	NA	0.0	0.0	0.00	0.10	58.7
All Vehicles		161	30.7	0.050	0.9	NA	0.0	0.4	0.02	0.08	58.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 5: Endeavour St - Albion St (PM) Peak - Existing

Site 5: Endeavour St - Albion St (PM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - eastern leg											
5	T1	93	18.2	0.054	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
6	R2	1	0.0	0.054	5.8	LOS A	0.0	0.1	0.01	0.01	57.6
Approach		94	18.0	0.054	0.1	NA	0.0	0.1	0.01	0.01	59.9
North: Endeavour St - northern leg											
7	L2	6	50.0	0.023	6.6	LOS A	0.1	0.7	0.26	0.58	50.9
9	R2	15	42.9	0.023	7.0	LOS A	0.1	0.7	0.26	0.58	50.6
Approach		21	45.0	0.023	6.9	LOS A	0.1	0.7	0.26	0.58	50.7
West: Albion St - western leg											
10	L2	17	62.5	0.073	6.3	LOS A	0.0	0.0	0.00	0.08	55.0
11	T1	105	16.0	0.073	0.0	LOS A	0.0	0.0	0.00	0.08	59.6
Approach		122	22.4	0.073	0.9	NA	0.0	0.0	0.00	0.08	58.9
All Vehicles		237	22.7	0.073	1.1	NA	0.1	0.7	0.03	0.10	58.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 6: North St - Carrington Ave (AM) Peak - Existing

Site 6: North St - Carrington Ave (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	13	8.3	0.027	5.8	LOS A	0.1	0.7	0.19	0.54	53.3
2	T1	19	5.6	0.027	5.1	LOS A	0.1	0.7	0.19	0.54	53.7
3	R2	29	0.0	0.035	6.9	LOS A	0.1	0.8	0.35	0.62	52.3
Approach		61	3.4	0.035	6.1	LOS A	0.1	0.8	0.27	0.58	52.9
East: Carrington Ave - eastern leg											
4	L2	35	6.1	0.091	5.8	LOS A	0.4	2.7	0.16	0.30	54.8
5	T1	69	7.6	0.091	0.2	LOS A	0.4	2.7	0.16	0.30	56.5
6	R2	53	8.0	0.091	5.9	LOS A	0.4	2.7	0.16	0.30	54.4
Approach		157	7.4	0.091	3.3	NA	0.4	2.7	0.16	0.30	55.4
North: North St - northern leg											
7	L2	46	4.5	0.031	5.8	LOS A	0.1	0.9	0.17	0.54	52.9
8	T1	26	12.0	0.042	5.3	LOS A	0.1	1.2	0.34	0.58	53.2
9	R2	12	27.3	0.042	7.3	LOS A	0.1	1.2	0.34	0.58	52.0
Approach		84	10.0	0.042	5.9	LOS A	0.1	1.2	0.24	0.56	52.9
West: Carrington Ave - western leg											
10	L2	15	7.1	0.061	5.8	LOS A	0.1	1.0	0.09	0.15	56.4
11	T1	79	2.7	0.061	0.1	LOS A	0.1	1.0	0.09	0.15	58.3
12	R2	15	21.4	0.061	6.1	LOS A	0.1	1.0	0.09	0.15	55.5
Approach		108	5.8	0.061	1.7	NA	0.1	1.0	0.09	0.15	57.7
All Vehicles		411	6.9	0.091	3.8	NA	0.4	2.7	0.17	0.35	55.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 6: North St - Carrington Ave (PM) Peak - Existing

Site 6: North St - Carrington Ave (PM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	8	0.0	0.018	5.7	LOS A	0.1	0.4	0.20	0.53	53.7
2	T1	13	0.0	0.018	5.1	LOS A	0.1	0.4	0.20	0.53	53.8
3	R2	34	0.0	0.045	7.5	LOS A	0.1	1.0	0.41	0.66	51.9
Approach		55	0.0	0.045	6.6	LOS A	0.1	1.0	0.33	0.61	52.6
East: Carrington Ave - eastern leg											
4	L2	45	0.0	0.104	5.7	LOS A	0.4	3.0	0.16	0.31	55.0
5	T1	80	1.3	0.104	0.2	LOS A	0.4	3.0	0.16	0.31	56.4
6	R2	62	0.0	0.104	5.8	LOS A	0.4	3.0	0.16	0.31	54.7
Approach		187	0.6	0.104	3.4	NA	0.4	3.0	0.16	0.31	55.5
North: North St - northern leg											
7	L2	116	0.0	0.076	5.8	LOS A	0.3	2.2	0.18	0.54	53.1
8	T1	44	0.0	0.062	5.2	LOS A	0.2	1.5	0.34	0.58	53.6
9	R2	17	0.0	0.062	6.7	LOS A	0.2	1.5	0.34	0.58	53.2
Approach		177	0.0	0.076	5.7	LOS A	0.3	2.2	0.23	0.56	53.2
West: Carrington Ave - western leg											
10	L2	9	0.0	0.057	5.8	LOS A	0.1	0.6	0.07	0.11	57.1
11	T1	86	0.0	0.057	0.1	LOS A	0.1	0.6	0.07	0.11	58.7
12	R2	12	0.0	0.057	5.9	LOS A	0.1	0.6	0.07	0.11	56.8
Approach		107	0.0	0.057	1.2	NA	0.1	0.6	0.07	0.11	58.3
All Vehicles		526	0.2	0.104	4.1	NA	0.4	3.0	0.18	0.38	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 7: Oberon St - Un-named Rd - Ross St (AM) Peak - Existing

Site 7: Oberon St - Un-named Rd - Ross St (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Ross St - southern leg											
1	L2	52	2.0	0.067	5.9	LOS A	0.3	1.8	0.22	0.55	53.2
2	T1	22	0.0	0.067	5.1	LOS A	0.3	1.8	0.22	0.55	53.4
3	R2	11	0.0	0.067	6.6	LOS A	0.3	1.8	0.22	0.55	52.7
Approach		84	1.3	0.067	5.7	LOS A	0.3	1.8	0.22	0.55	53.2
East: Oberon St - eastern leg											
4	L2	24	4.3	0.076	5.7	LOS A	0.1	0.8	0.06	0.15	56.6
5	T1	103	4.1	0.076	0.0	LOS A	0.1	0.8	0.06	0.15	58.3
6	R2	14	0.0	0.076	5.7	LOS A	0.1	0.8	0.06	0.15	56.2
Approach		141	3.7	0.076	1.6	NA	0.1	0.8	0.06	0.15	57.8
North: Un-named Rd - northern leg											
7	L2	11	0.0	0.023	5.7	LOS A	0.1	0.6	0.19	0.56	53.3
8	T1	6	0.0	0.023	5.0	LOS A	0.1	0.6	0.19	0.56	53.5
9	R2	8	0.0	0.023	6.8	LOS A	0.1	0.6	0.19	0.56	52.8
Approach		25	0.0	0.023	5.9	LOS A	0.1	0.6	0.19	0.56	53.2
West: Oberon St - western leg											
10	L2	29	3.6	0.072	5.8	LOS A	0.2	1.6	0.13	0.24	55.6
11	T1	72	2.9	0.072	0.2	LOS A	0.2	1.6	0.13	0.24	57.3
12	R2	25	12.5	0.072	6.0	LOS A	0.2	1.6	0.13	0.24	54.6
Approach		126	5.0	0.072	2.6	NA	0.2	1.6	0.13	0.24	56.3
All Vehicles		377	3.4	0.076	3.2	NA	0.3	1.8	0.13	0.30	55.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 7: Oberon St - Un-named Rd - Ross St (PM) Peak - Existing

Site 7: Oberon St - Un-named Rd - Ross St (PM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Ross St - southern leg											
1	L2	59	1.8	0.064	5.9	LOS A	0.2	1.7	0.21	0.56	53.0
2	T1	5	0.0	0.064	5.7	LOS A	0.2	1.7	0.21	0.56	53.2
3	R2	15	0.0	0.064	7.2	LOS A	0.2	1.7	0.21	0.56	52.6
Approach		79	1.3	0.064	6.1	LOS A	0.2	1.7	0.21	0.56	52.9
East: Oberon St - eastern leg											
4	L2	19	0.0	0.073	5.8	LOS A	0.1	0.7	0.07	0.12	57.0
5	T1	106	4.0	0.073	0.1	LOS A	0.1	0.7	0.07	0.12	58.5
6	R2	11	0.0	0.073	6.0	LOS A	0.1	0.7	0.07	0.12	56.4
Approach		136	3.1	0.073	1.3	NA	0.1	0.7	0.07	0.12	58.1
North: Un-named Rd - northern leg											
7	L2	14	0.0	0.054	6.0	LOS A	0.2	1.3	0.33	0.61	52.8
8	T1	12	0.0	0.054	5.6	LOS A	0.2	1.3	0.33	0.61	52.9
9	R2	24	0.0	0.054	7.5	LOS A	0.2	1.3	0.33	0.61	52.3
Approach		49	0.0	0.054	6.6	LOS A	0.2	1.3	0.33	0.61	52.5
West: Oberon St - western leg											
10	L2	48	2.2	0.151	5.9	LOS A	0.6	4.0	0.17	0.24	55.5
11	T1	152	2.8	0.151	0.2	LOS A	0.6	4.0	0.17	0.24	57.0
12	R2	73	0.0	0.151	5.8	LOS A	0.6	4.0	0.17	0.24	55.0
Approach		273	1.9	0.151	2.7	NA	0.6	4.0	0.17	0.24	56.2
All Vehicles		537	2.0	0.151	3.2	NA	0.6	4.0	0.16	0.29	55.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 8: Albion St - Duckmaloi Rd (AM) Peak - Existing

Site 8: Albion St - Duckmaloi Rd (AM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Duckmaloi Rd - eastern leg											
5	T1	53	8.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	27	42.3	0.024	6.1	LOS A	0.1	0.9	0.10	0.57	51.0
Approach		80	19.7	0.028	2.1	NA	0.1	0.9	0.03	0.19	56.6
North: Albion St - northern leg											
7	L2	16	60.0	0.023	6.4	LOS A	0.1	0.8	0.09	0.55	50.9
9	R2	6	16.7	0.023	6.4	LOS A	0.1	0.8	0.09	0.55	52.4
Approach		22	47.6	0.023	6.4	LOS A	0.1	0.8	0.09	0.55	51.3
West: Duckmaloi Rd - western leg											
10	L2	3	0.0	0.002	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	23	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	0.0	0.012	0.7	NA	0.0	0.0	0.00	0.07	59.2
All Vehicles		128	20.5	0.028	2.5	NA	0.1	0.9	0.04	0.23	56.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 8: Albion St - Duckmaloi Rd (PM) Peak - Existing

Site 8: Albion St - Duckmaloi Rd (PM) Peak - Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

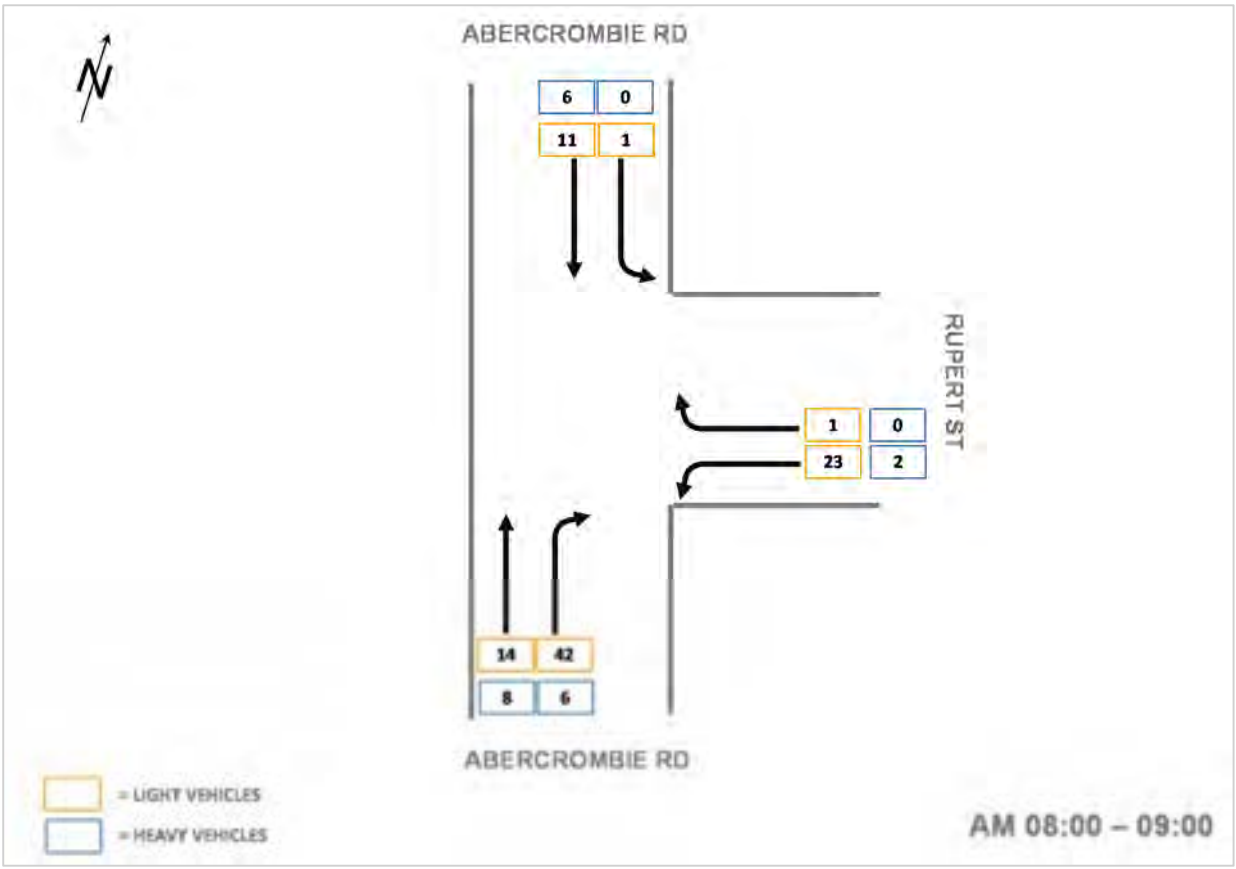
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Duckmaloi Rd - eastern leg											
5	T1	41	10.3	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	23	54.5	0.022	6.4	LOS A	0.1	0.9	0.16	0.56	50.3
Approach		64	26.2	0.022	2.3	NA	0.1	0.9	0.06	0.20	56.1
North: Albion St - northern leg											
7	L2	17	18.8	0.024	5.9	LOS A	0.1	0.7	0.14	0.55	52.4
9	R2	9	0.0	0.024	6.2	LOS A	0.1	0.7	0.14	0.55	53.0
Approach		26	12.0	0.024	6.0	LOS A	0.1	0.7	0.14	0.55	52.6
West: Duckmaloi Rd - western leg											
10	L2	9	11.1	0.006	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	44	2.4	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		54	3.9	0.023	1.0	NA	0.0	0.0	0.00	0.10	58.7
All Vehicles		144	15.3	0.024	2.5	NA	0.1	0.9	0.05	0.23	56.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

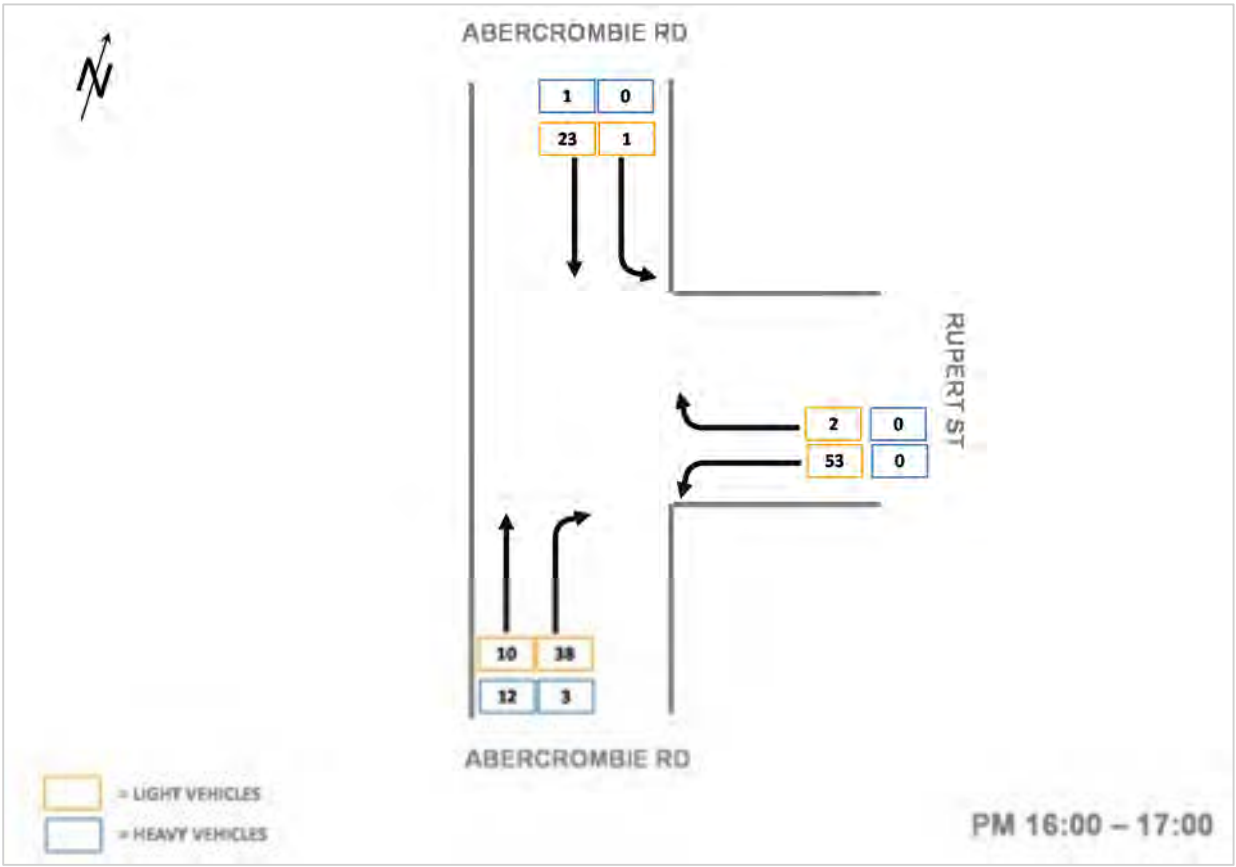
APPENDIX E: VEHICLE TURNING MOVEMENTS (OPERATIONAL CONDITIONS)

E.1: 2019 FORECAST YEAR

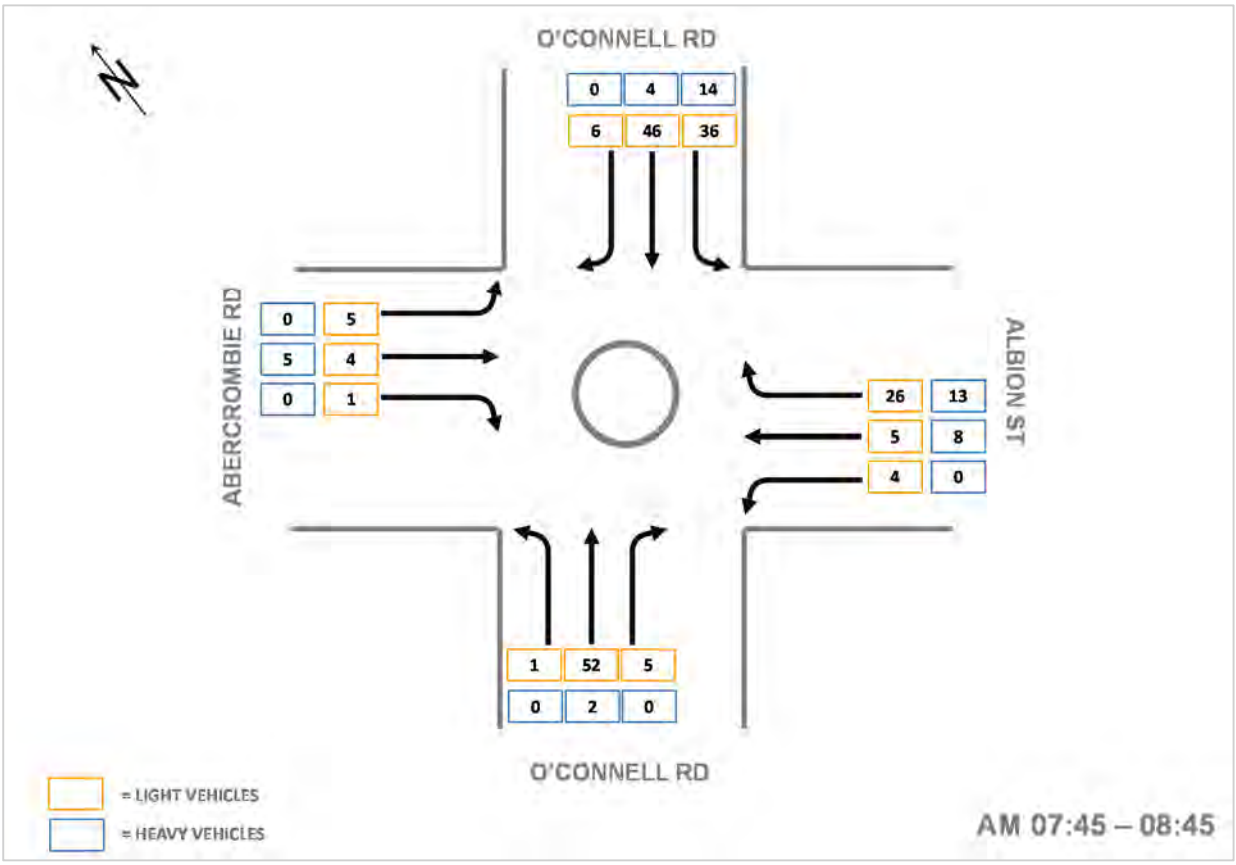
E.2: 2029 FORECAST YEAR



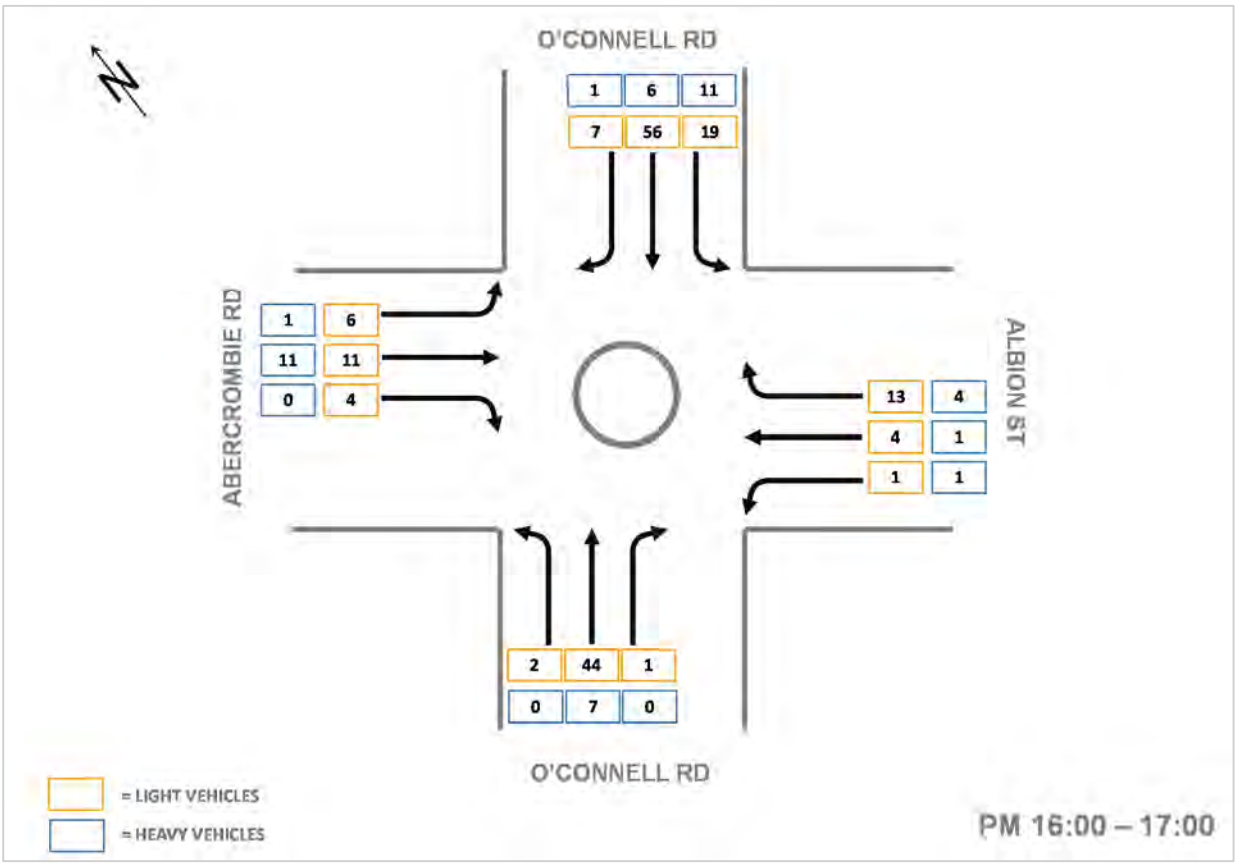
Site 1 – Abercrombie Road and Rupert Street, AM peak hour (Operational, 2019)



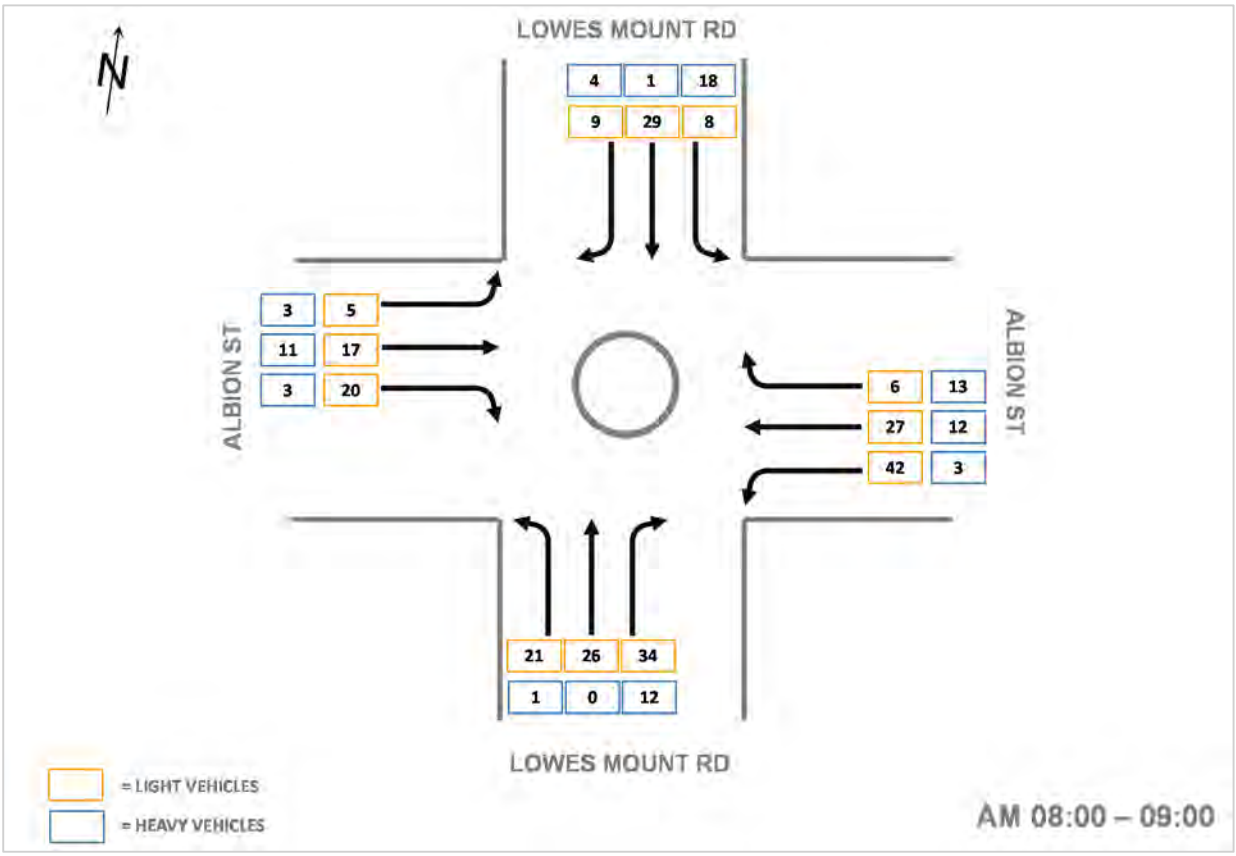
Site 1 – Abercrombie Road and Rupert Street, PM peak hour (Operational, 2019)



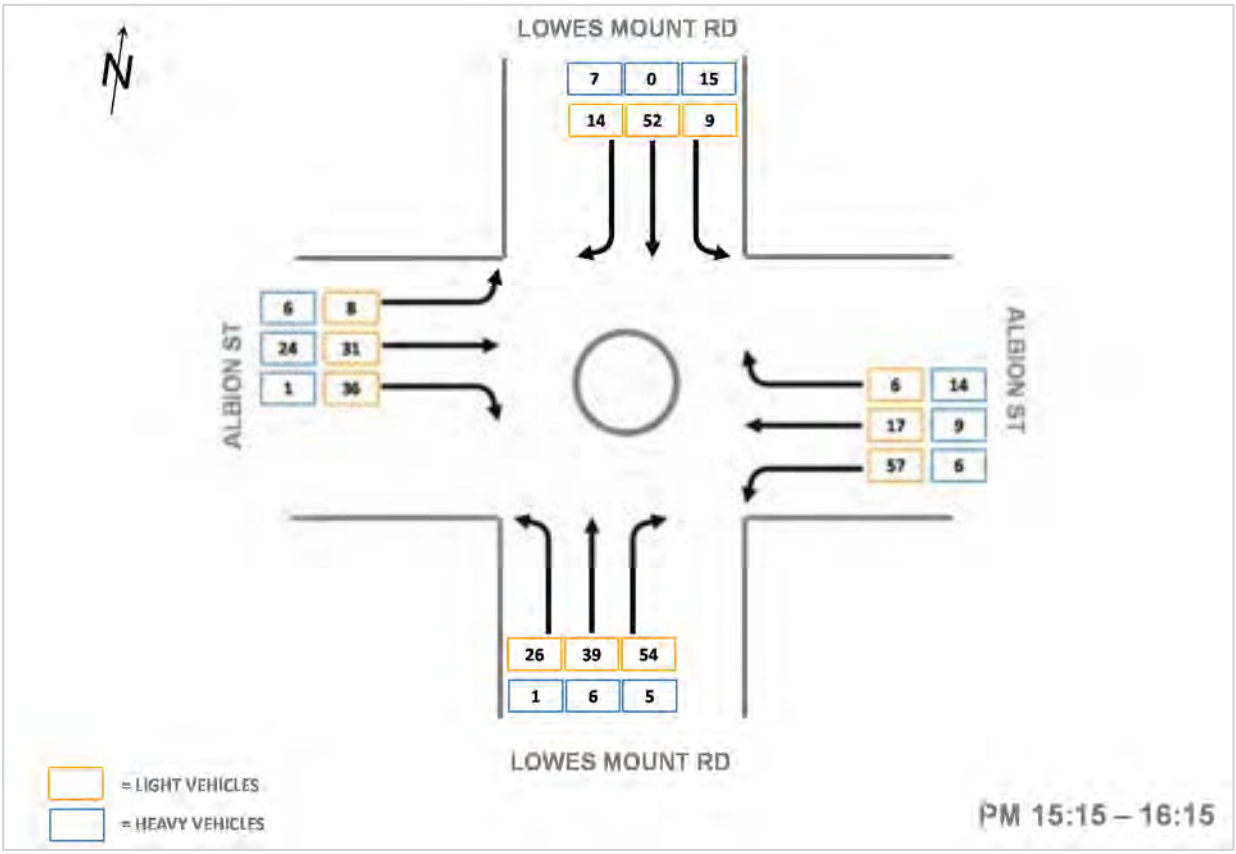
Site 2 – O'Connell Road and Albion Street, AM peak hour (Operational, 2019)



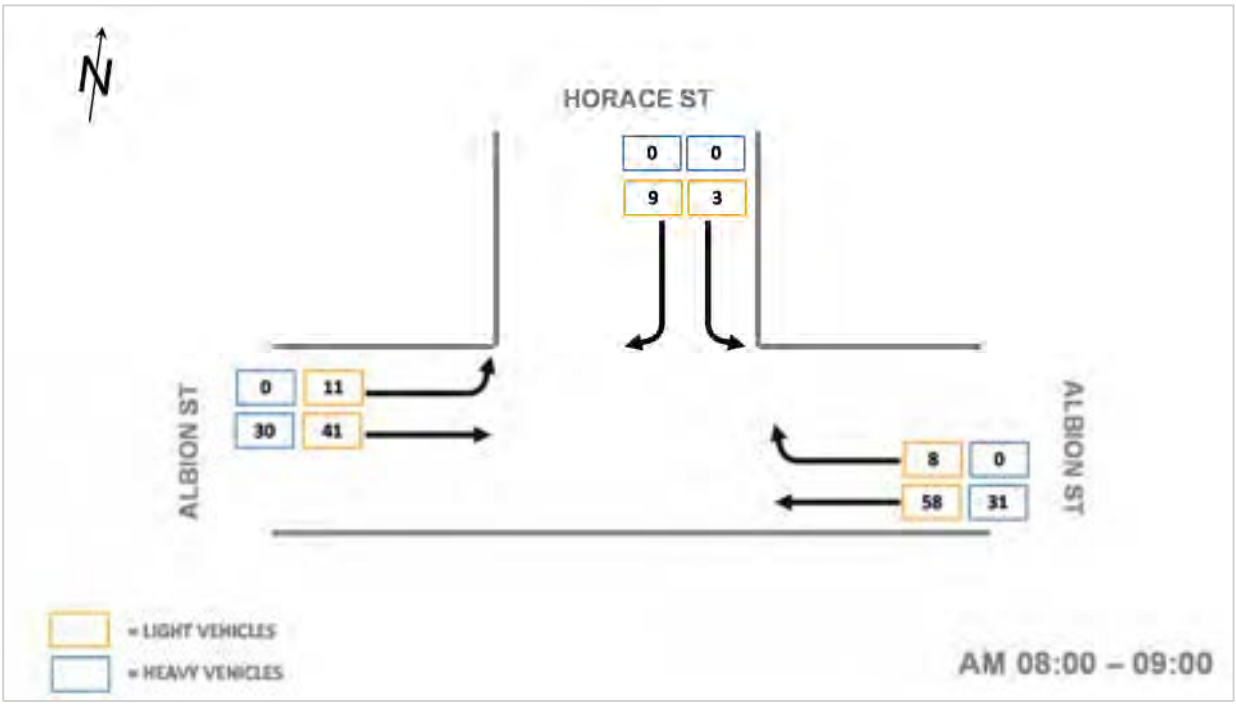
Site 2 – O'Connell Road and Albion Street, PM peak hour (Operational, 2019)



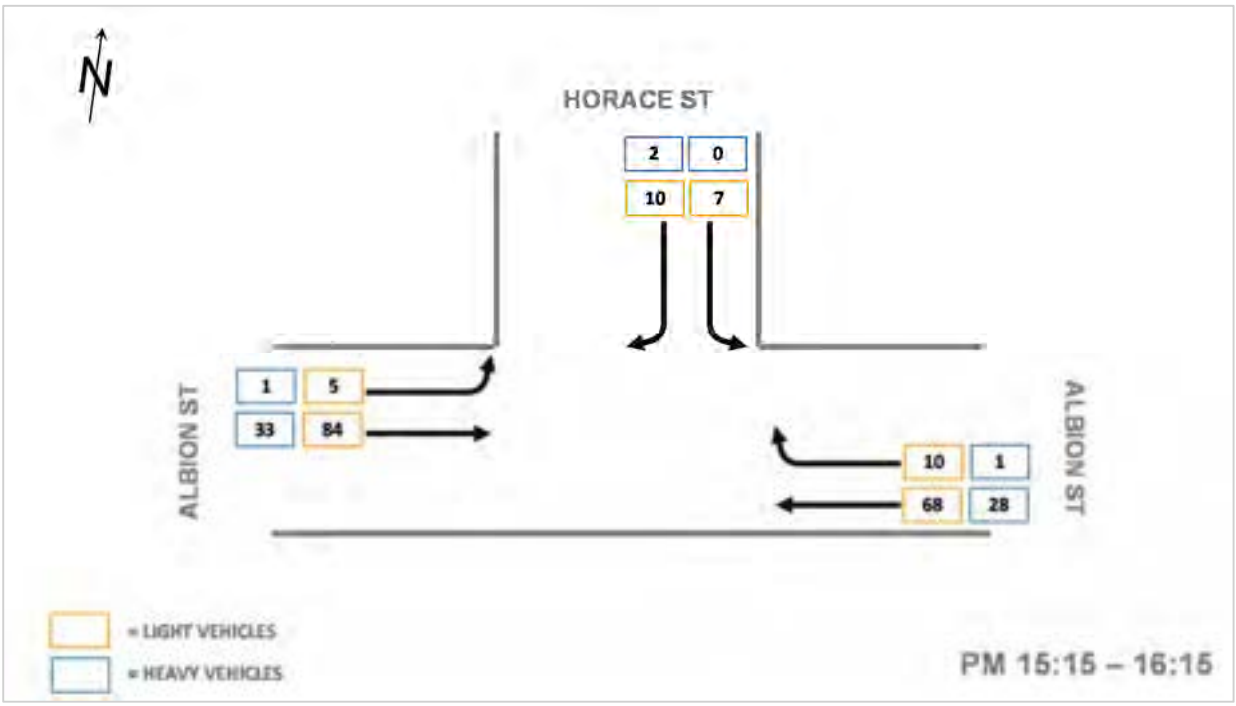
Site 3 – Lowes Mount Road and Albion Street, AM peak hour (Operational, 2019)



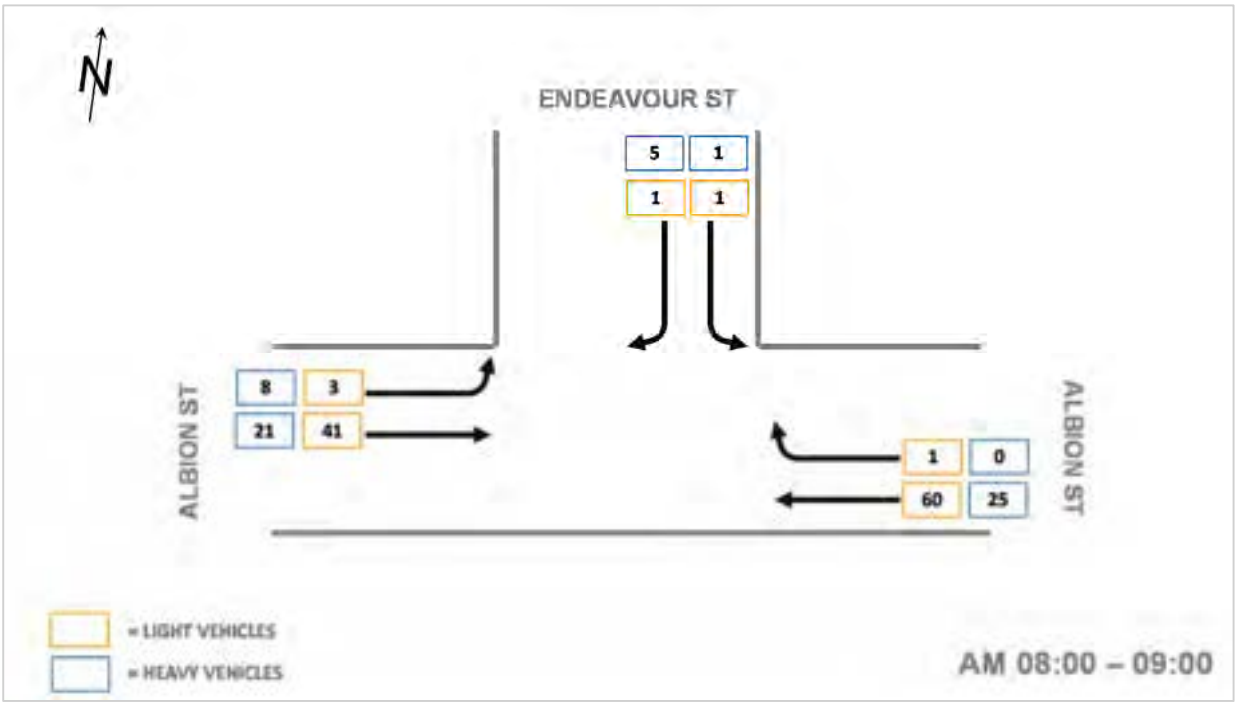
Site 3 – Lowes Mount Road and Albion Street, PM peak hour (Operational, 2019)



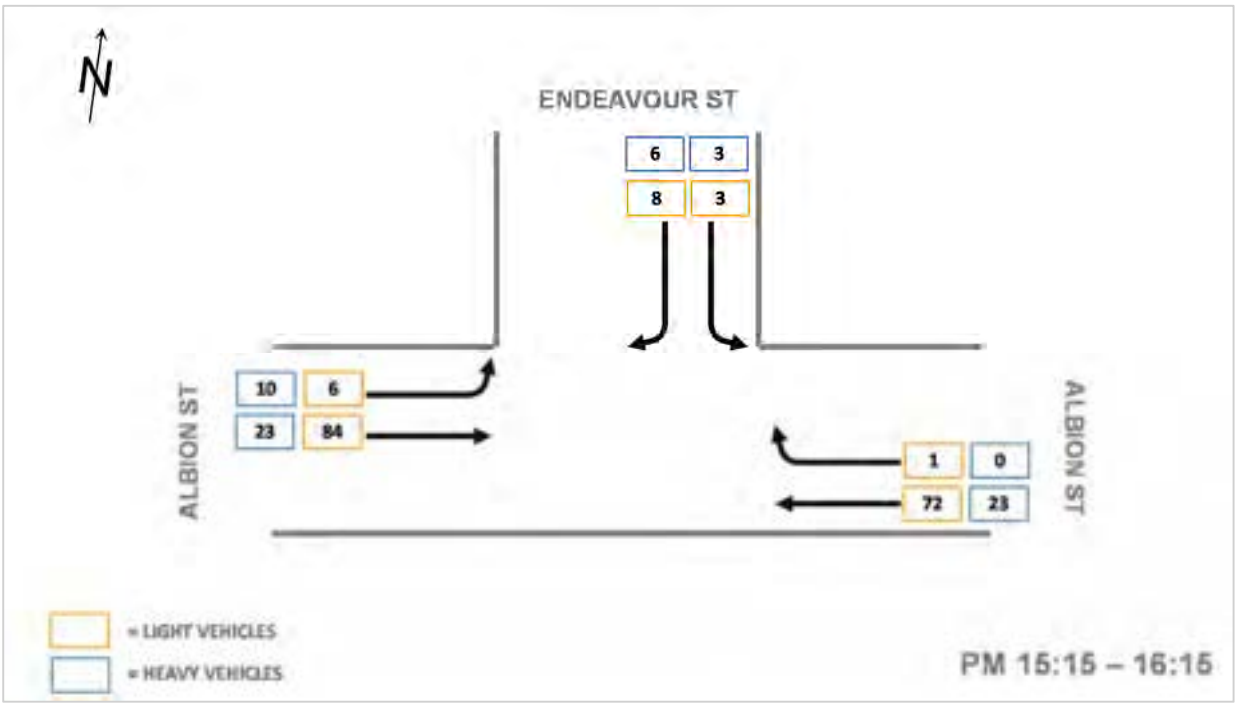
Site 4 – Albion Street and Horace Street, AM peak hour (Operational, 2019)



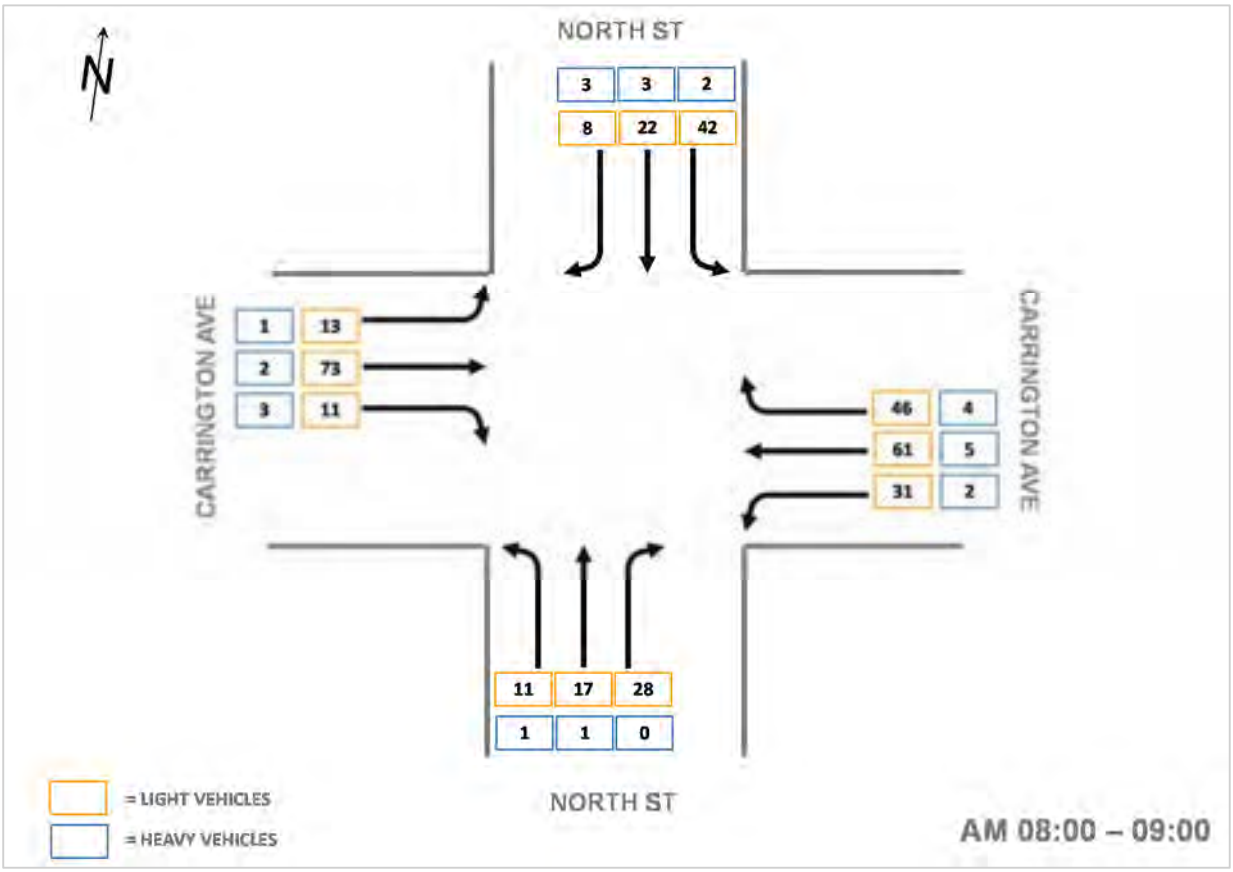
Site 4 – Albion Street and Horace Street, PM peak hour (Operational, 2019)



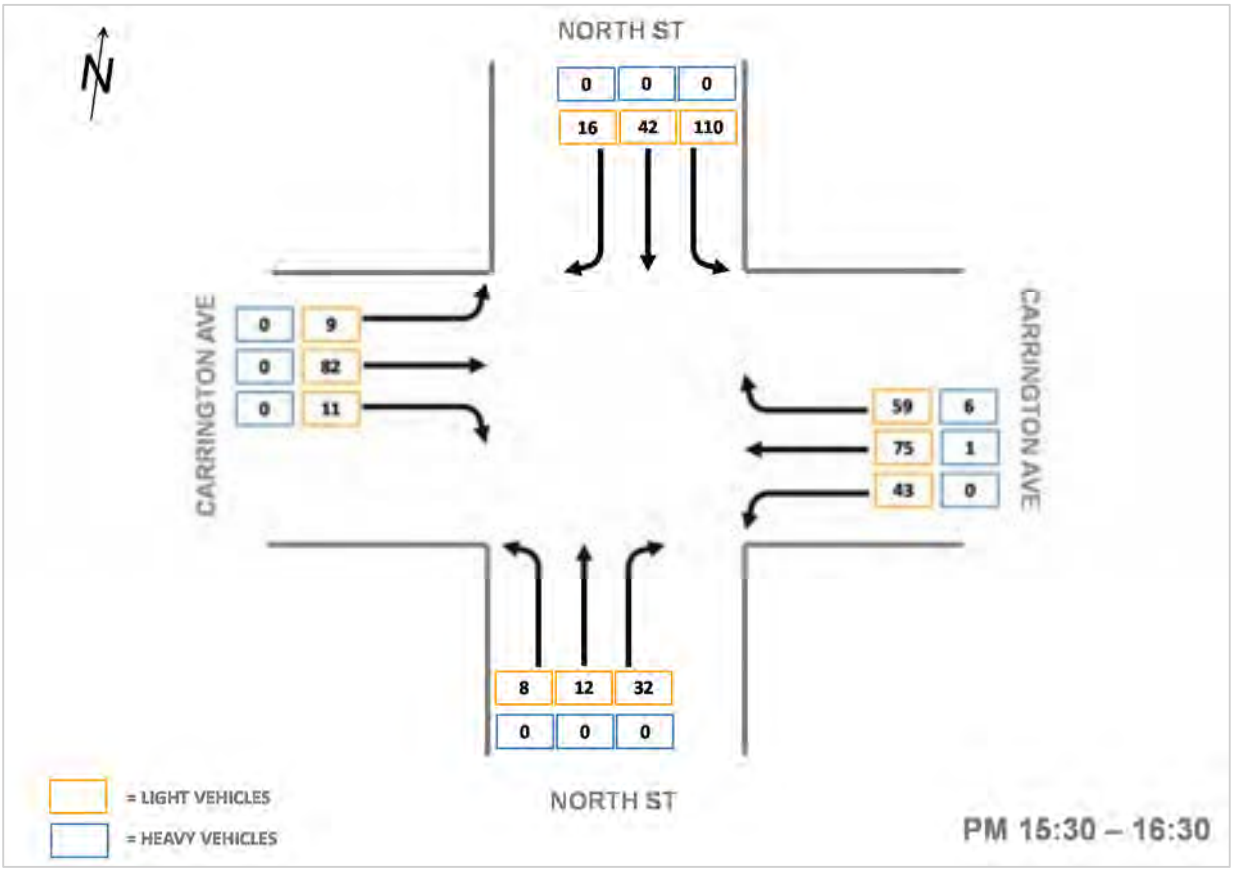
Site 5 – Albion Street and Endeavour Street, AM peak hour (Operational, 2019)



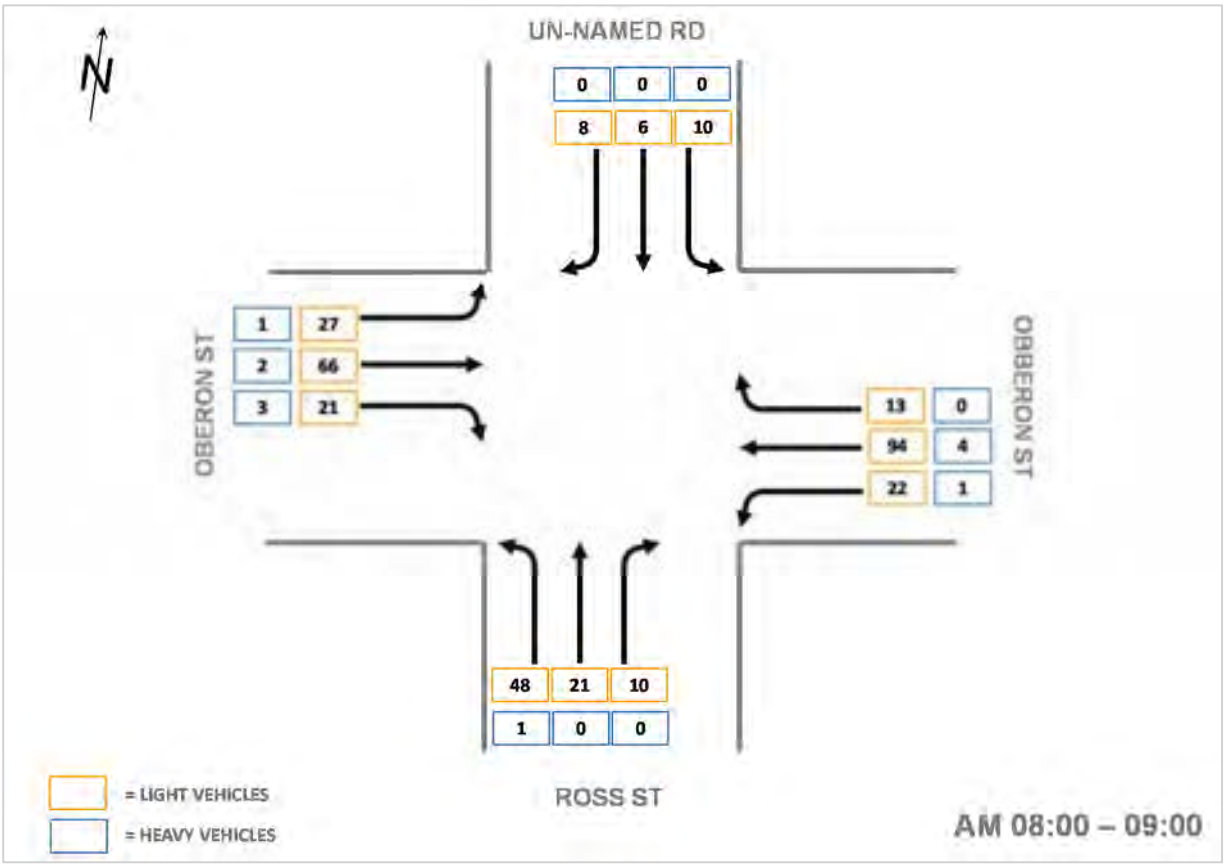
Site 5 – Albion Street and Endeavour Street, PM peak hour (Operational, 2019)



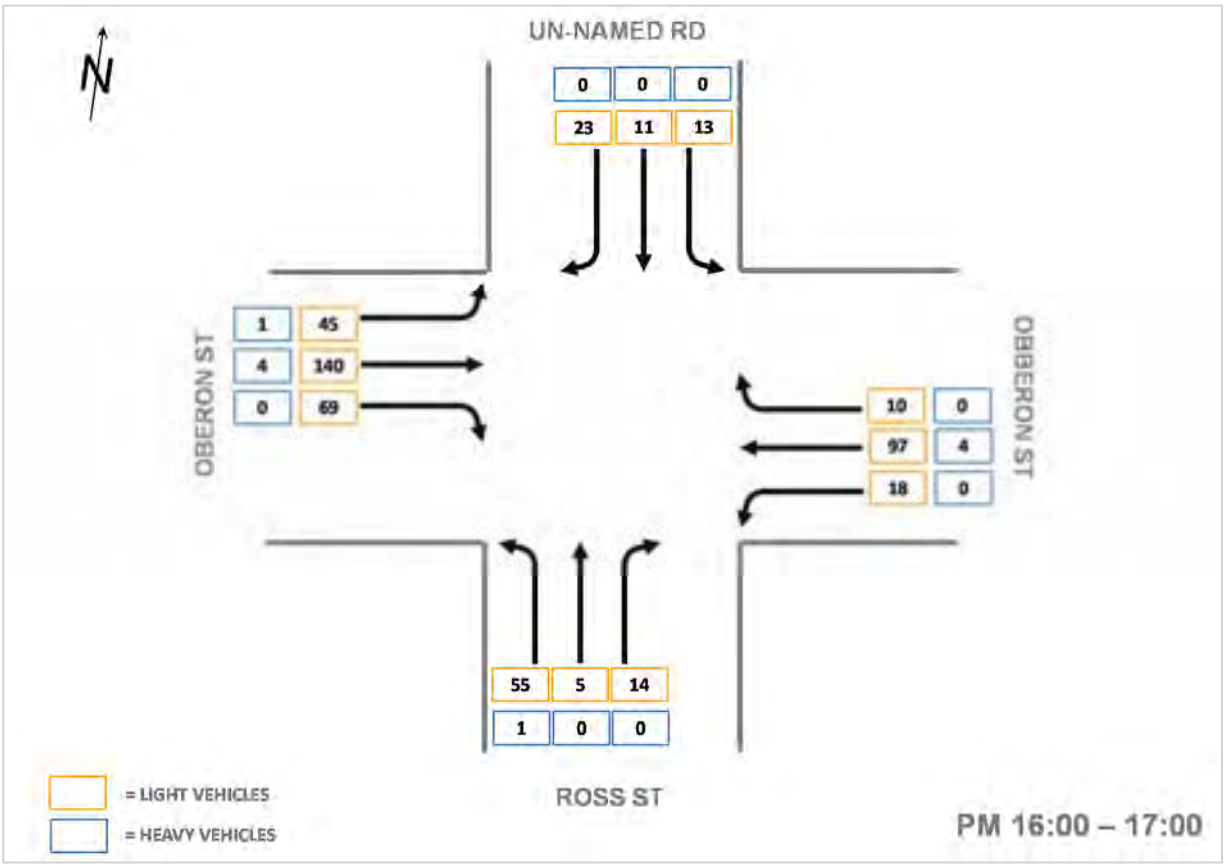
Site 6 – North Street and Carrington Avenue, AM peak hour (Operational, 2019)



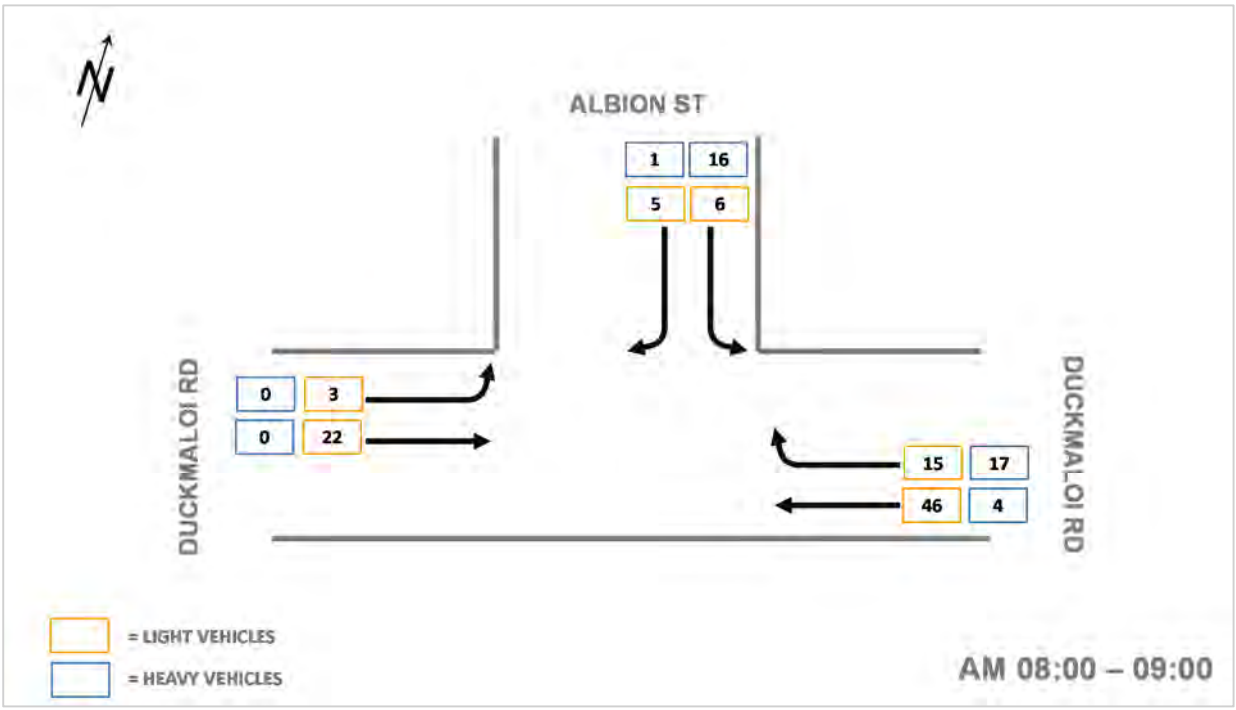
Site 6 – North Street and Carrington Avenue, PM peak hour (Operational, 2019)



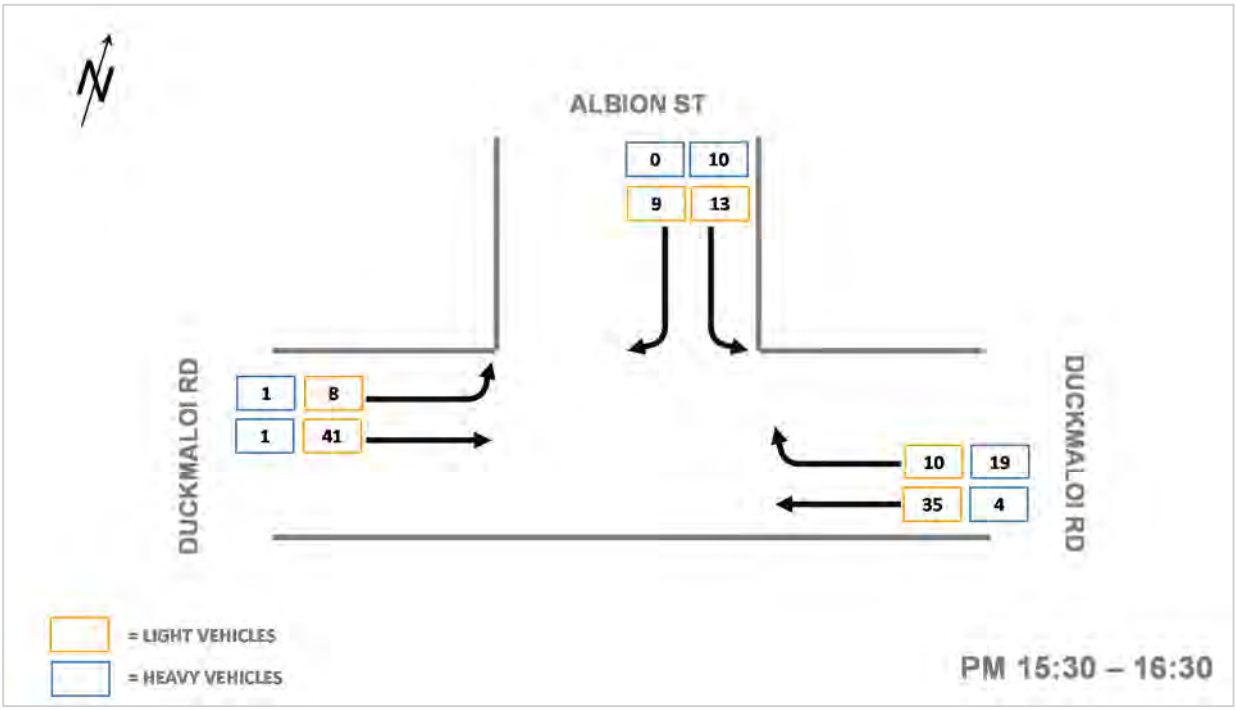
Site 7 – Oberon Street, Ross Street and unnamed road, AM peak hour (Operational, 2019)



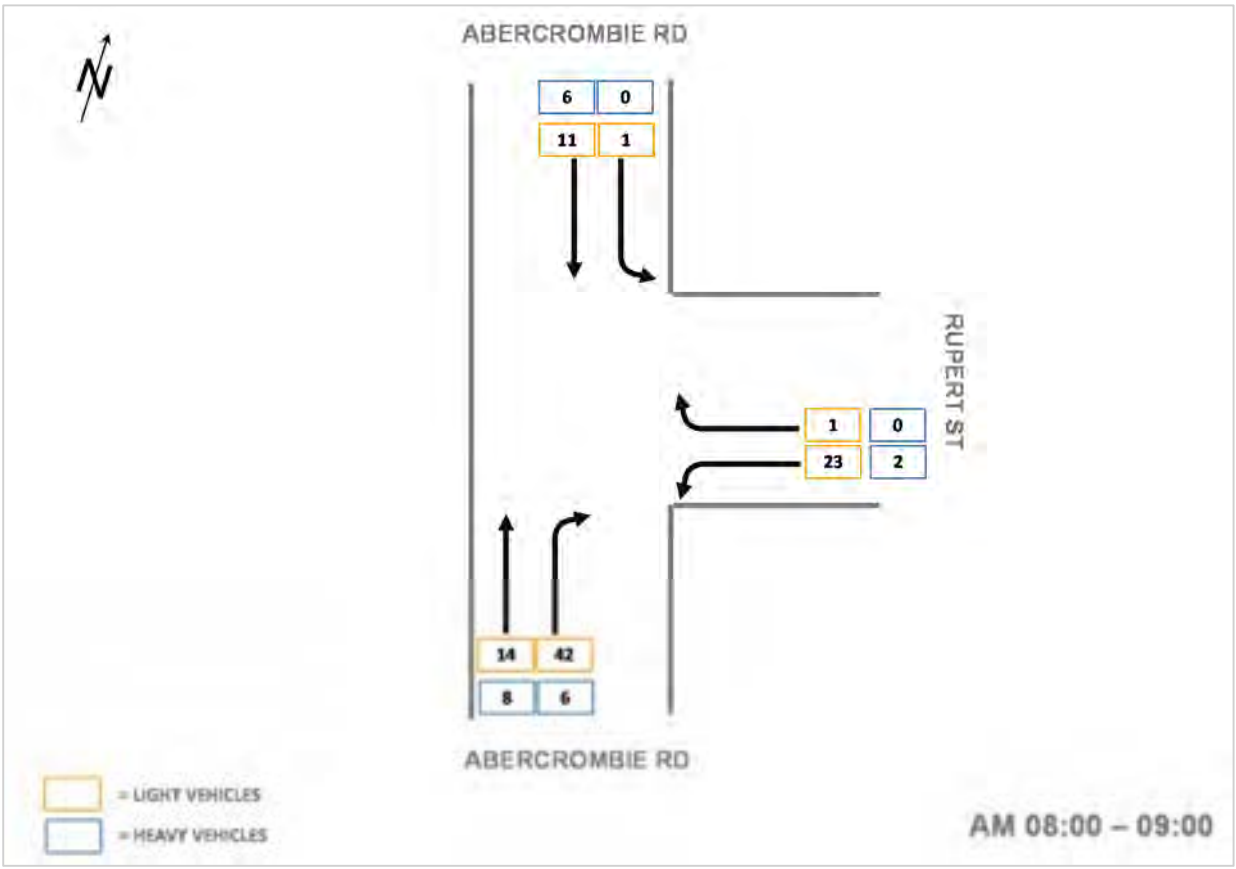
Site 7 – Oberon Street, Ross Street and unnamed road, PM peak hour (Operational, 2019)



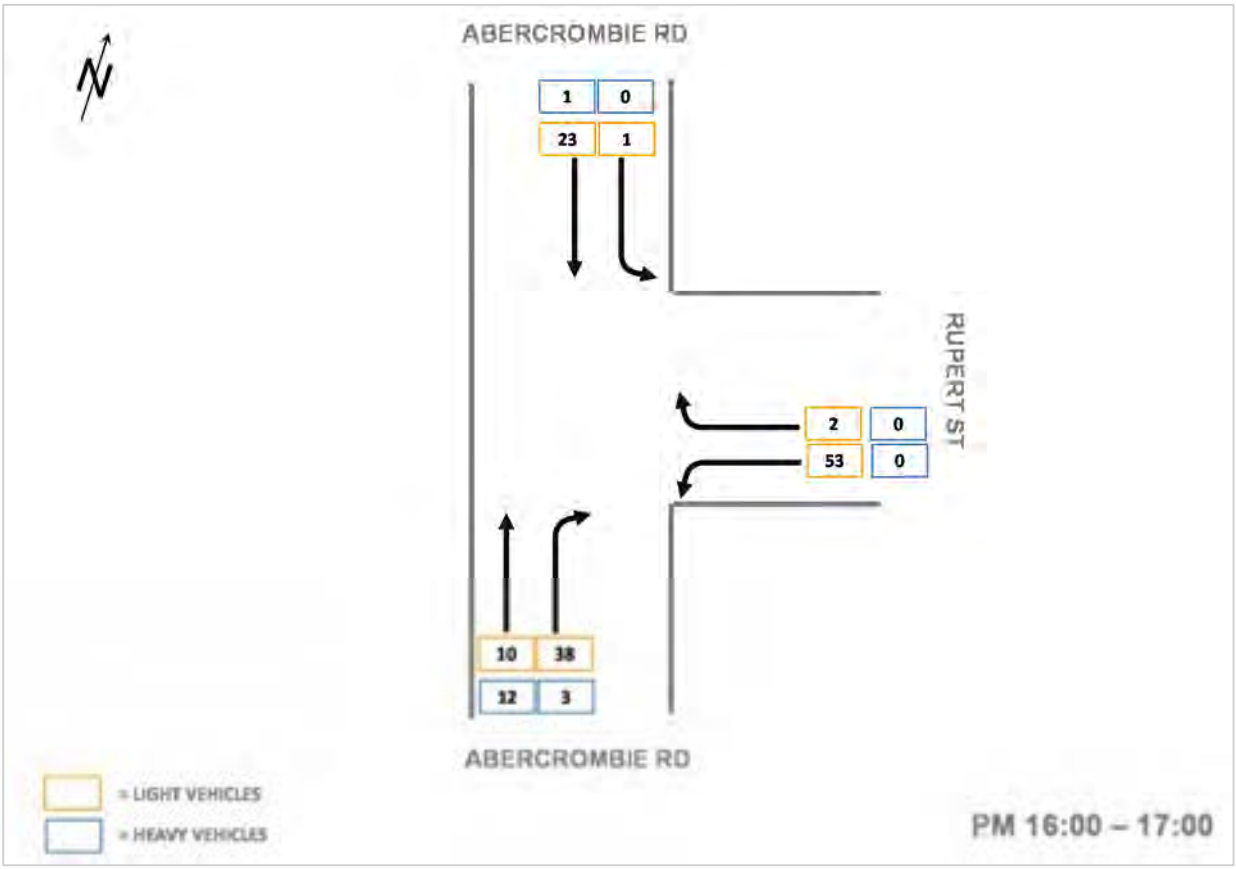
Site 8 – Duckmaloi Road and Albion Road, AM peak hour (Operational, 2019)



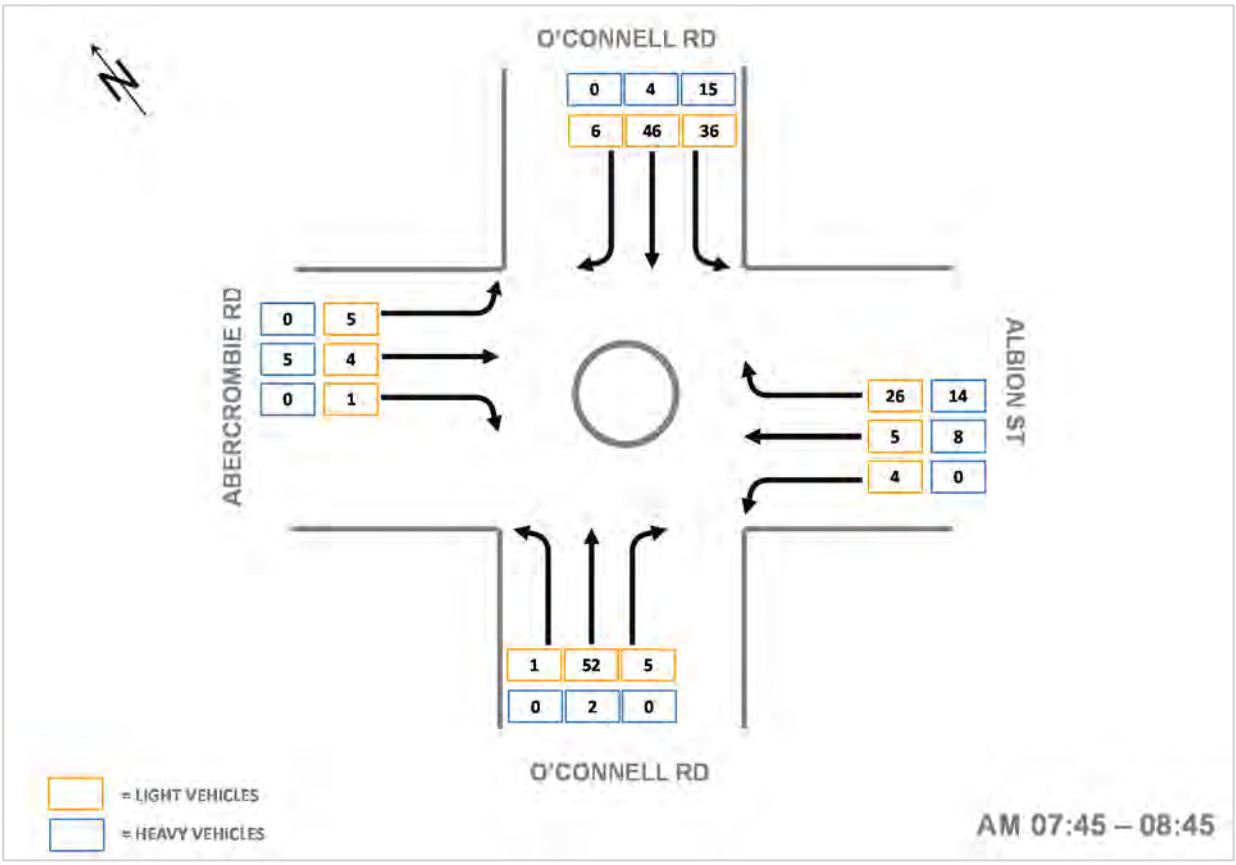
Site 8 – Duckmaloi Road and Albion Road, PM peak hour (Operational, 2019)



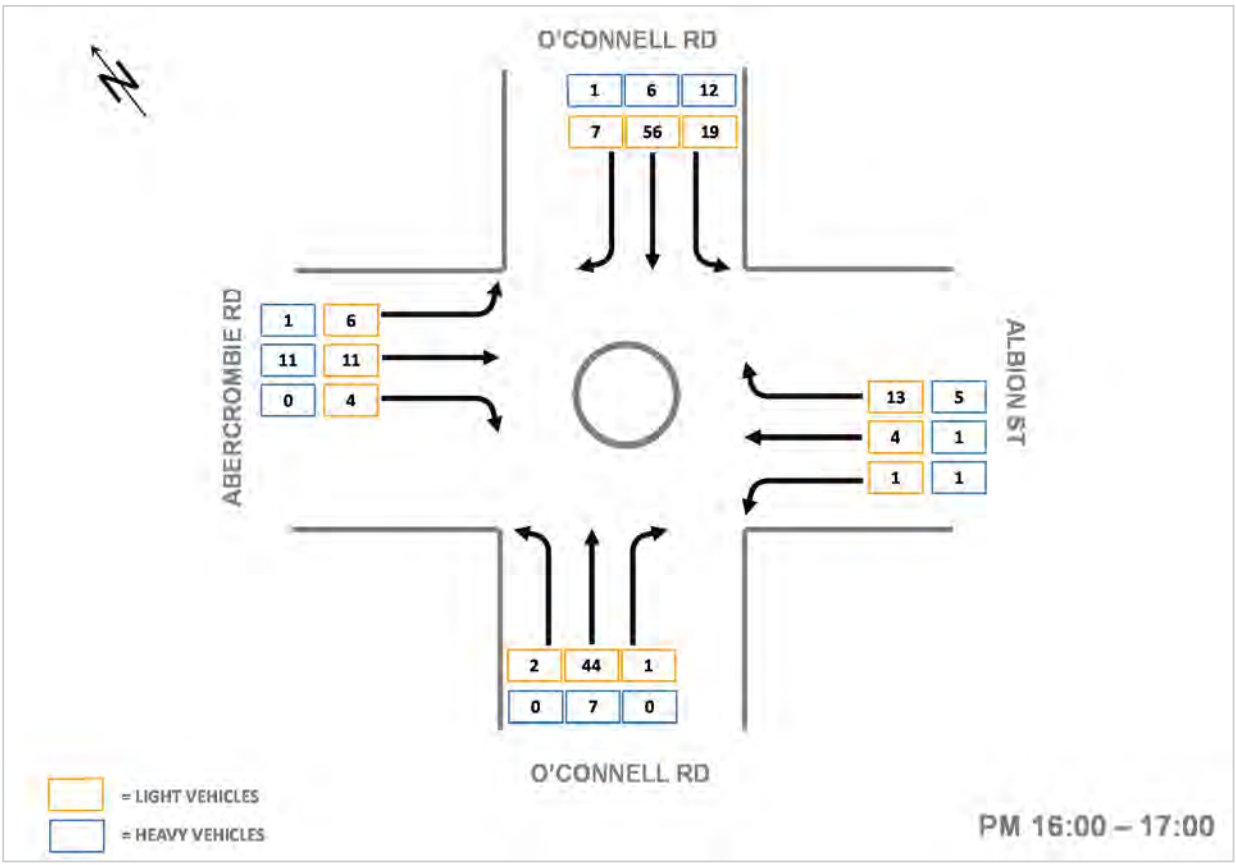
Site 1 – Abercrombie Road and Rupert Street, AM peak hour (Operational, 2029)



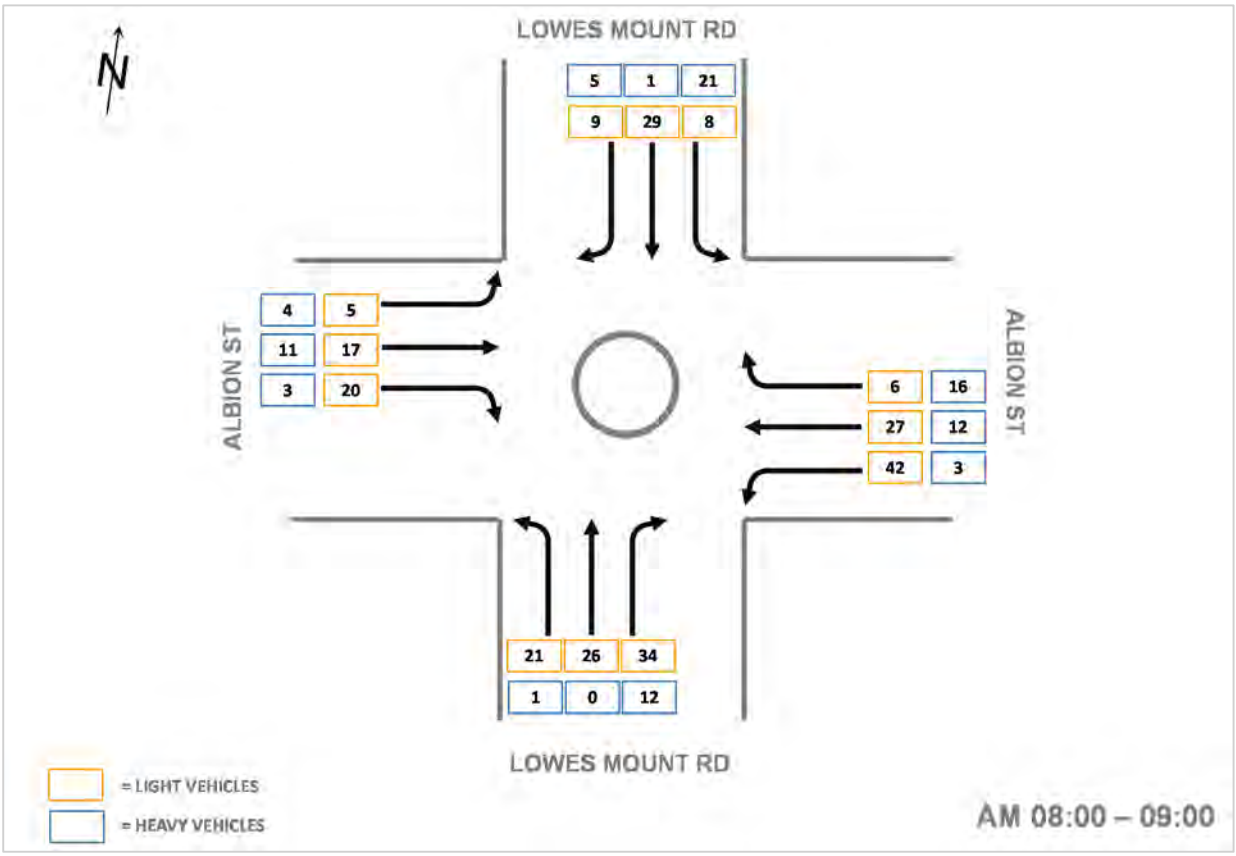
Site 1 – Abercrombie Road and Rupert Street, PM peak hour (Operational, 2029)



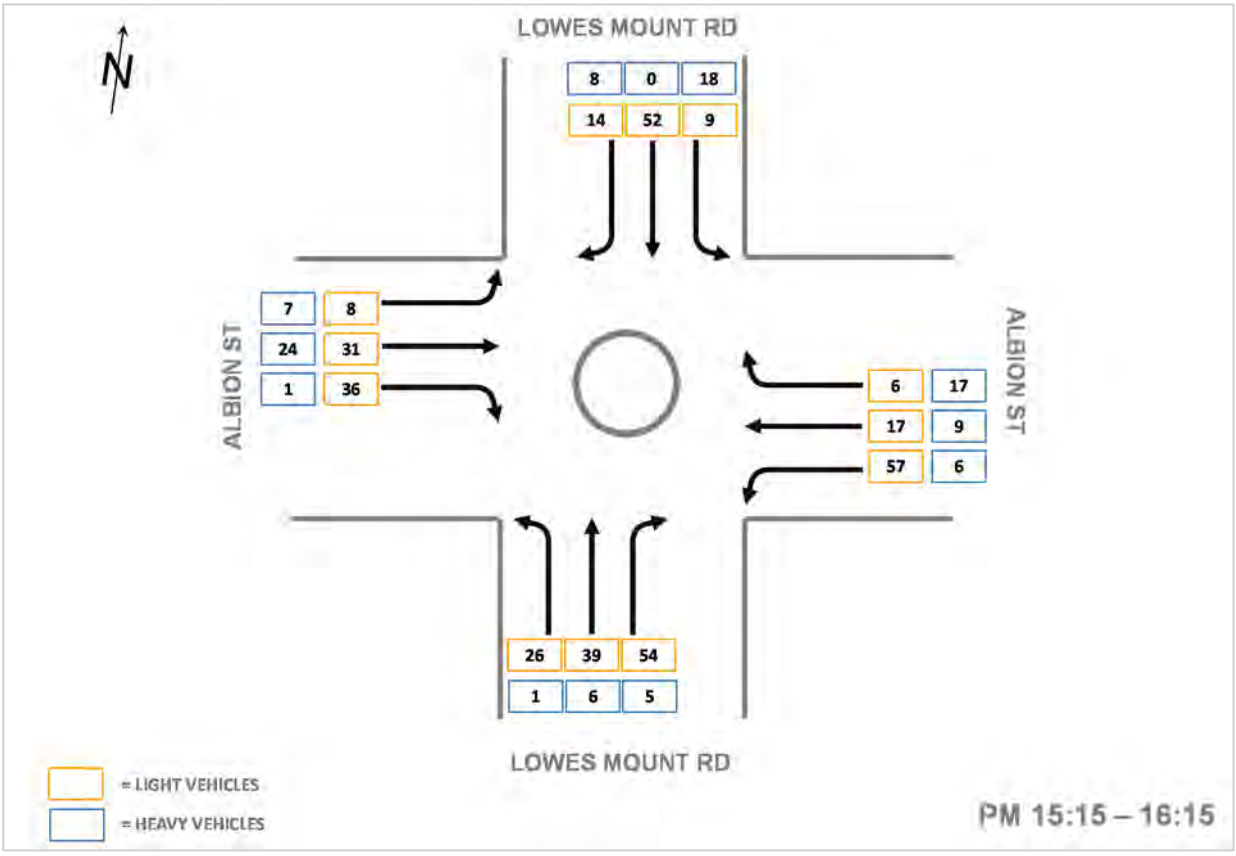
Site 2 – O'Connell Road and Albion Street, AM peak hour (Operational, 2029)



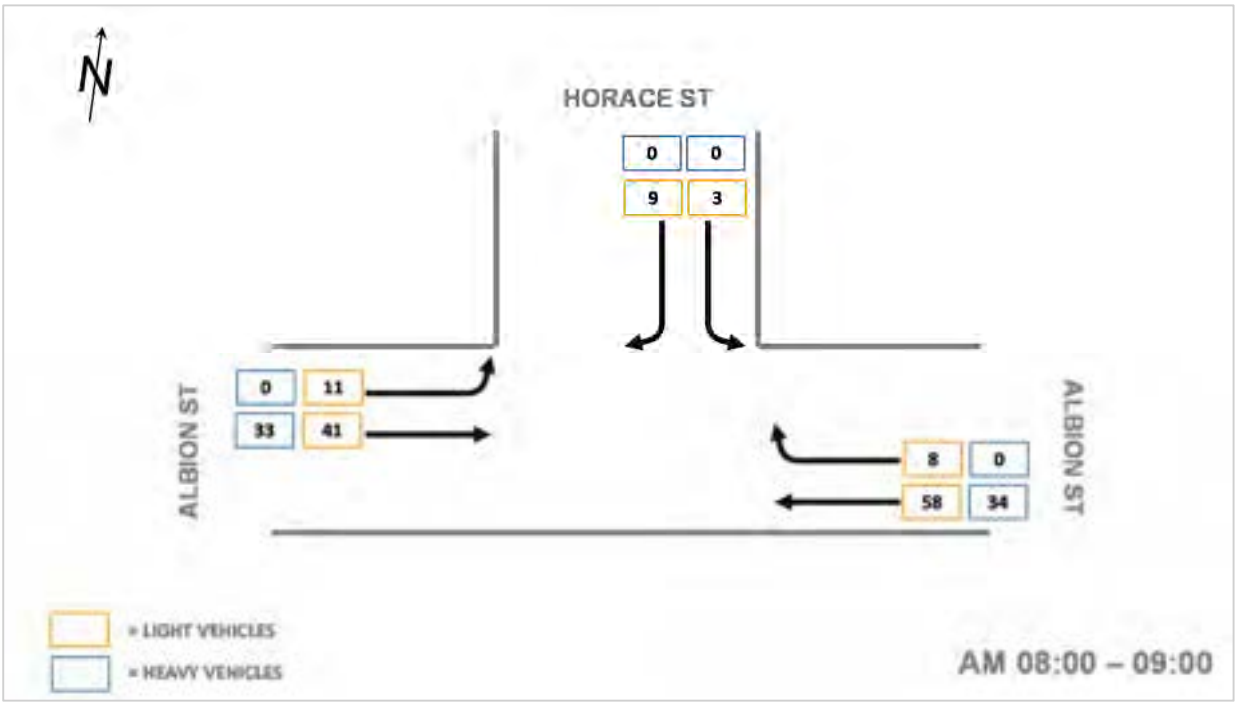
Site 2 – O'Connell Road and Albion Street, PM peak hour (Operational, 2029)



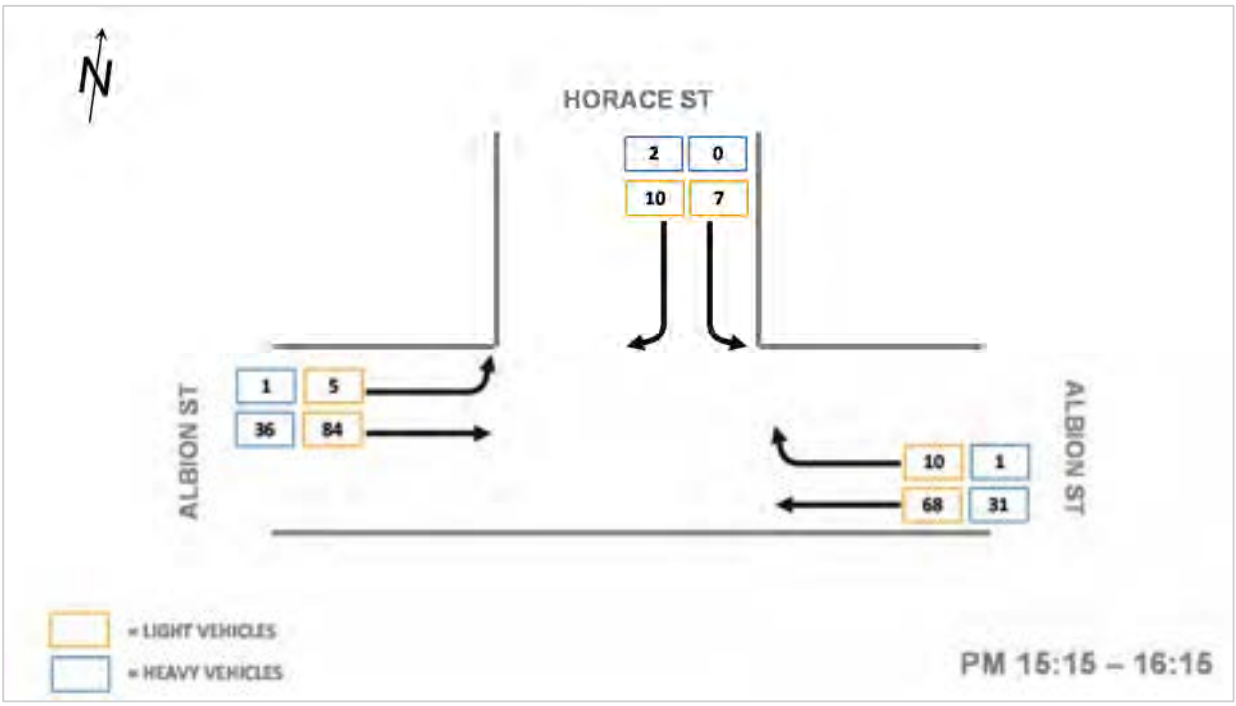
Site 3 – Lowes Mount Road and Albion Street, AM peak hour (Operational, 2029)



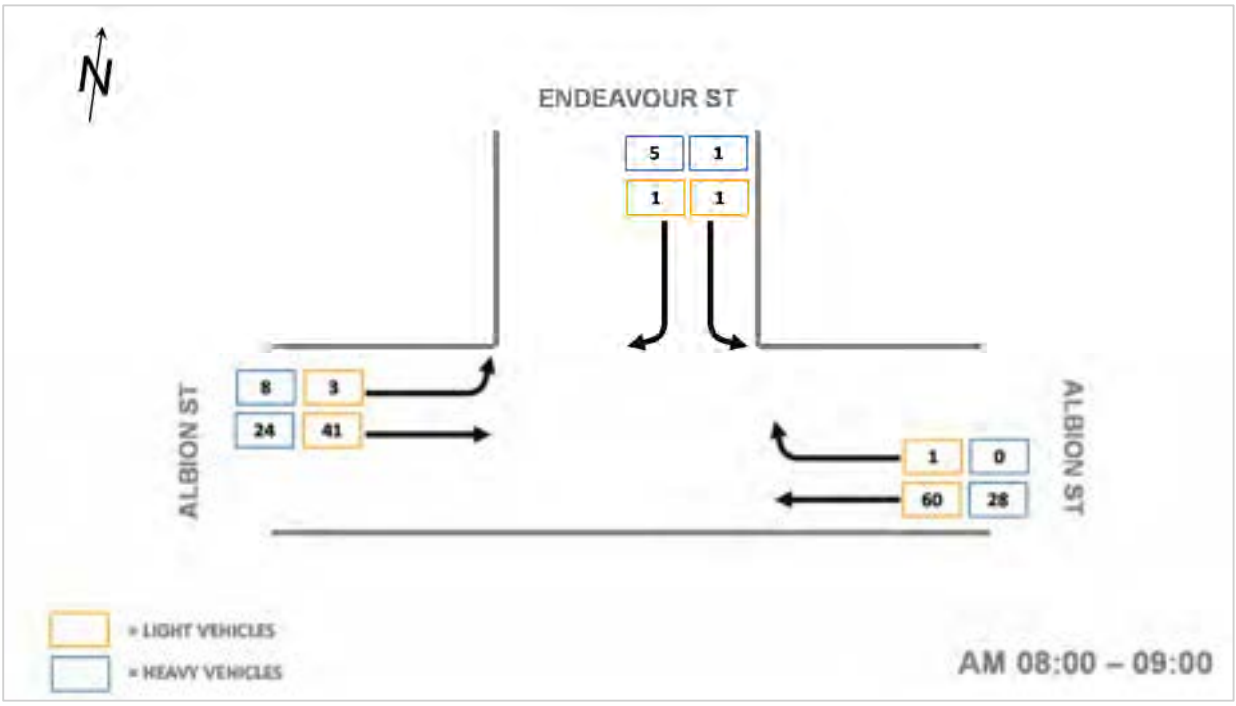
Site 3 – Lowes Mount Road and Albion Street, PM peak hour (Operational, 2029)



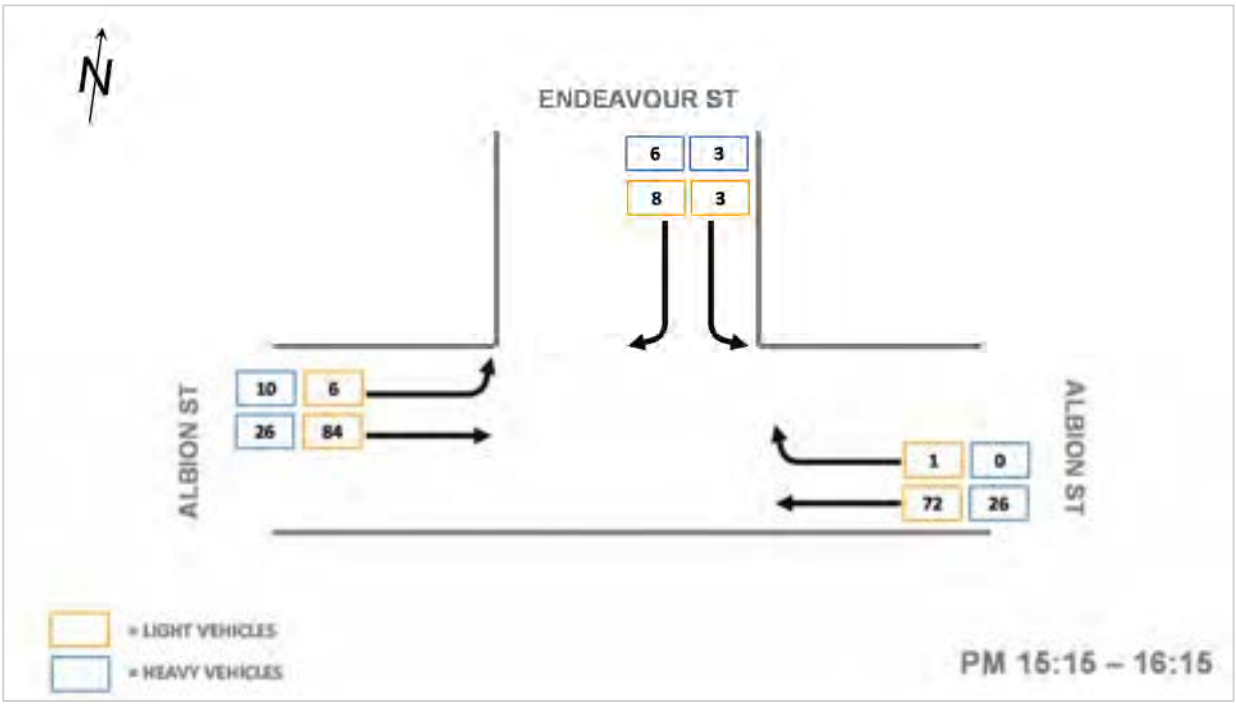
Site 4 – Albion Street and Horace Street, AM peak hour (Operational, 2029)



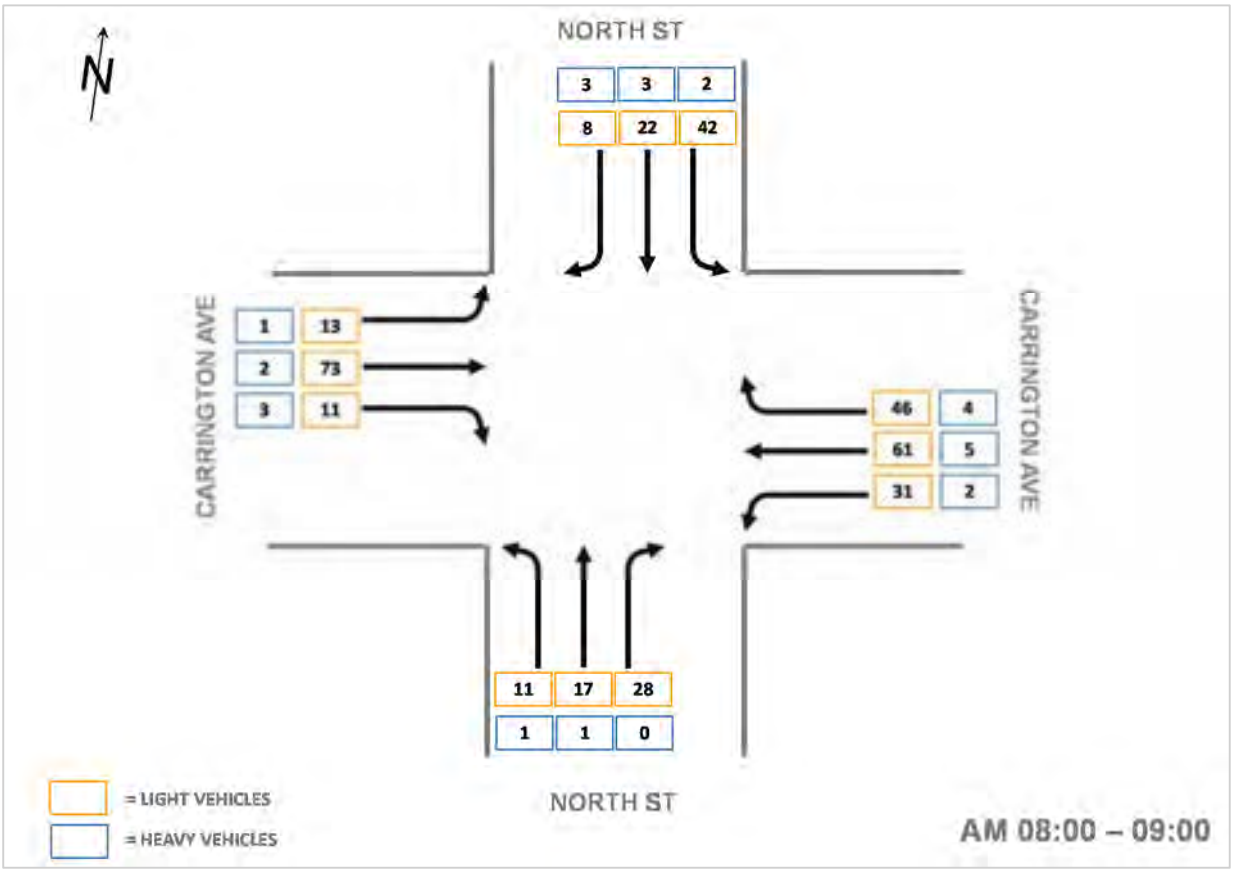
Site 4 – Albion Street and Horace Street, PM peak hour (Operational, 2029)



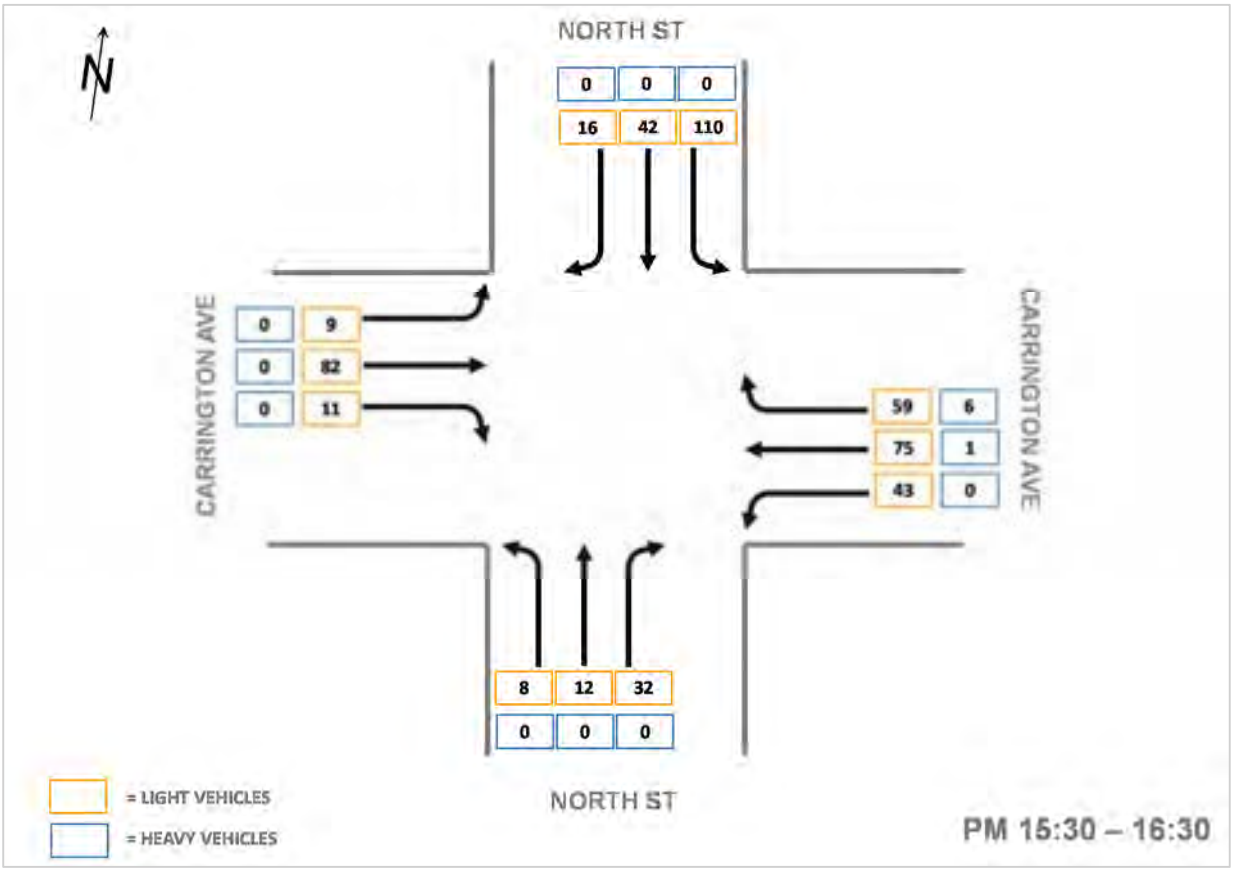
Site 5 – Albion Street and Endeavour Street, AM peak hour (Operational, 2029)



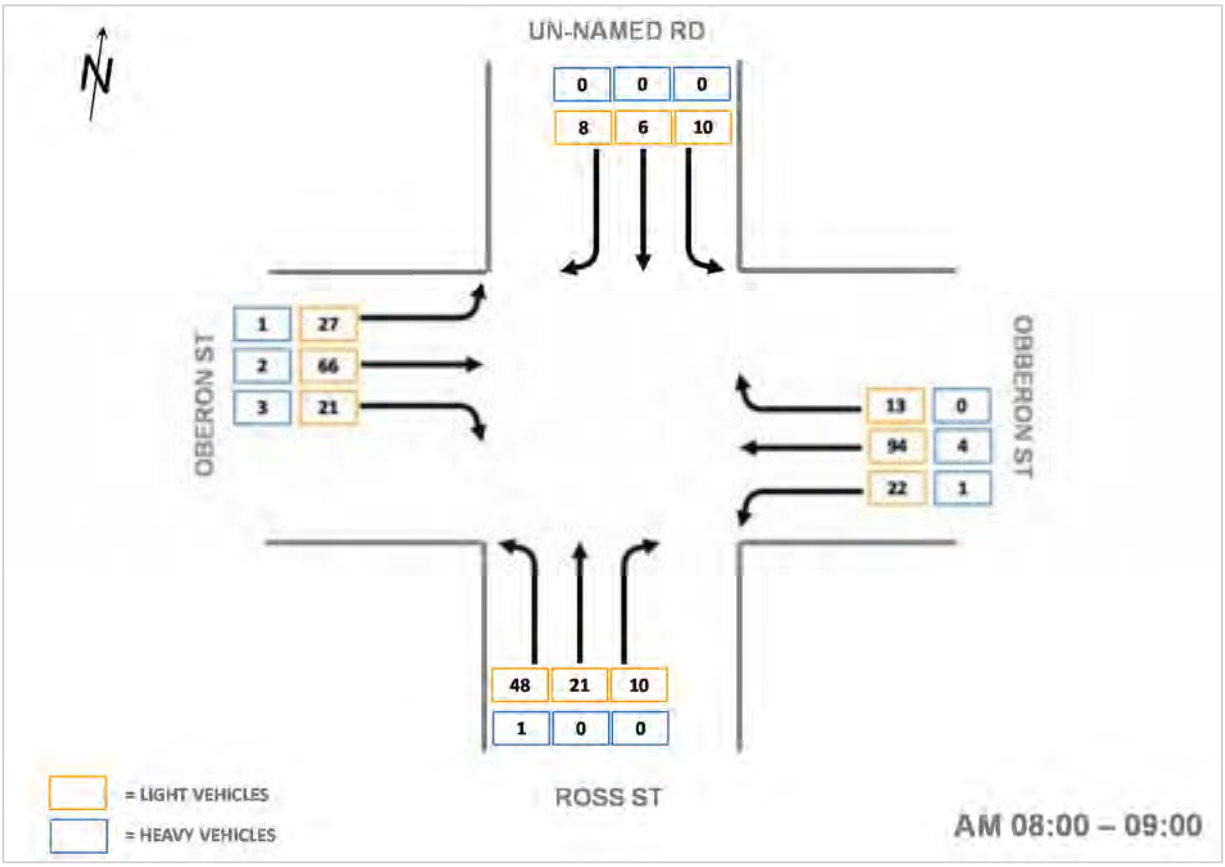
Site 5 – Albion Street and Endeavour Street, AM peak hour (Operational, 2029)



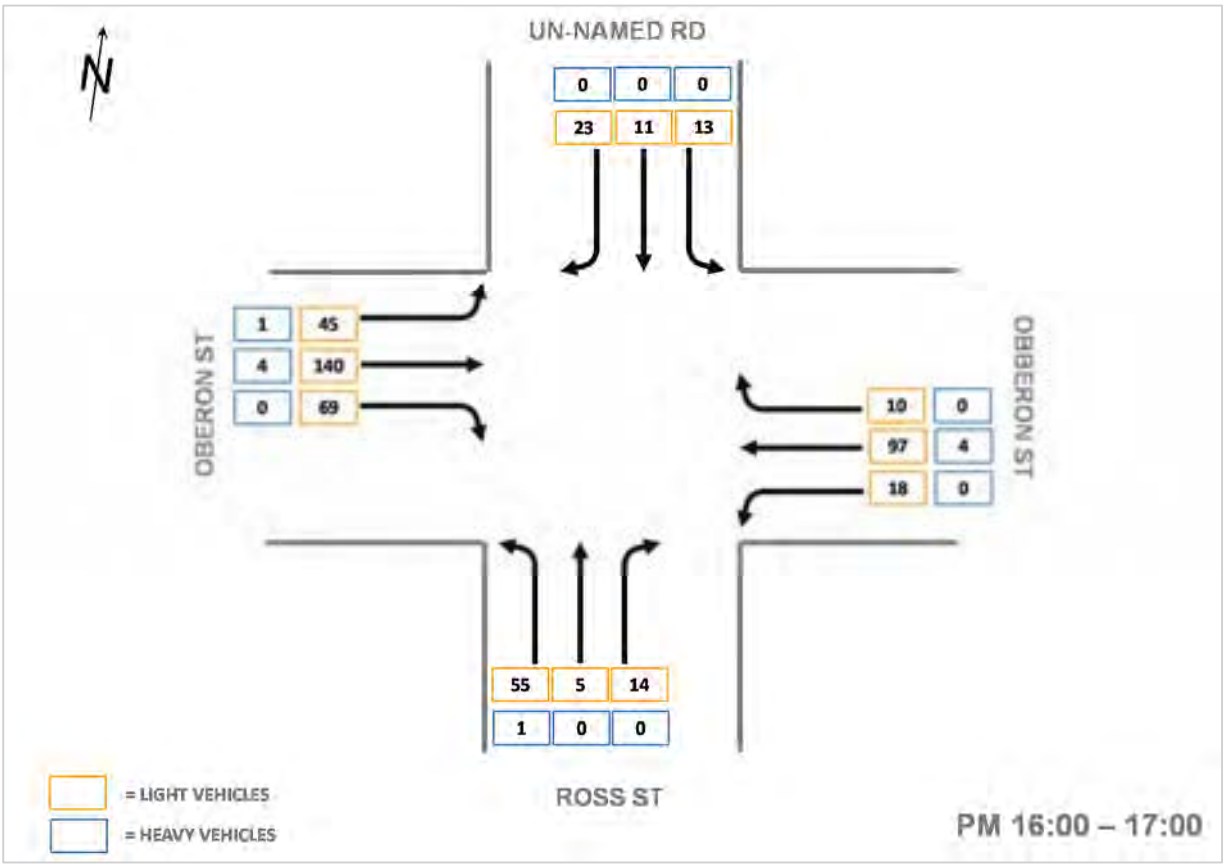
Site 6 – North Street and Carrington Avenue, AM peak hour (Operational, 2029)



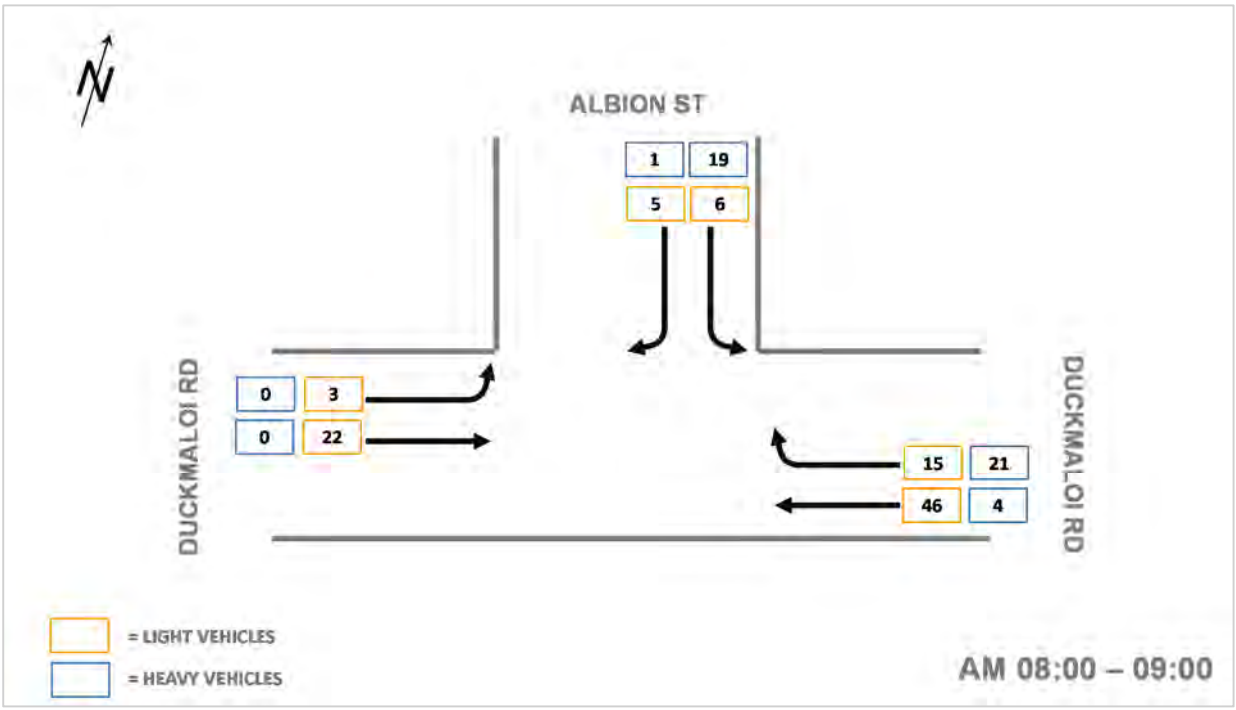
Site 6 – North Street and Carrington Avenue, PM peak hour (Operational, 2029)



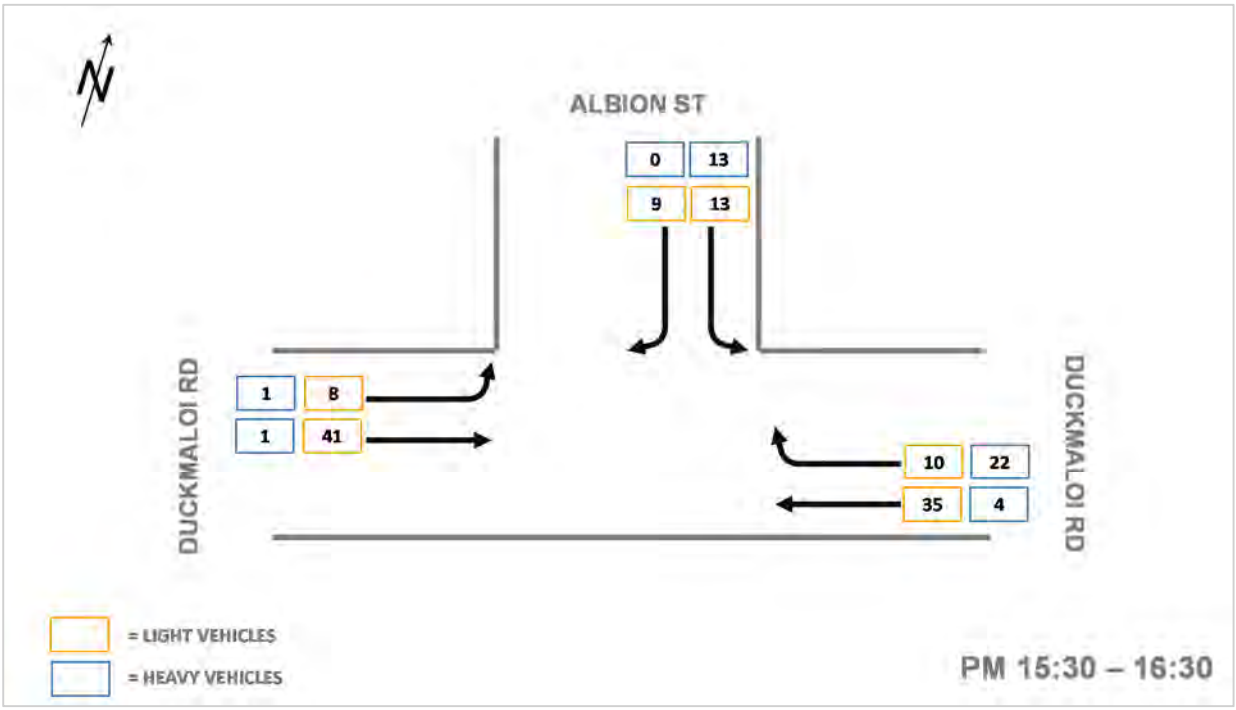
Site 7 – Oberon Street, Ross Street and unnamed road, AM peak hour (Operational, 2029)



Site 7 – Oberon Street, Ross Street and unnamed road, PM peak hour (Operational, 2029)



Site 8 – Duckmaloi Road and Albion Road, AM peak hour (Operational, 2029)



Site 8 – Duckmaloi Road and Albion Road, PM peak hour (Operational, 2029)

APPENDIX F: SIDRA INTERSECTION RESULTS (OPERATIONAL CONDITIONS)

F.1: 2019 FORECAST YEAR

F.2: 2029 FORECAST YEAR

MOVEMENT SUMMARY

Site: Site 1: Abercrombie Rd - Rupert St (AM) Peak - Operational (2019)

Site 1: Abercrombie Rd - Rupert St (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abercrombie Rd - southern leg											
2	T1	23	36.4	0.040	0.0	LOS A	0.2	1.3	0.01	0.09	59.1
3	R2	51	12.5	0.040	5.7	LOS A	0.2	1.3	0.09	0.53	52.6
Approach		74	20.0	0.040	3.9	NA	0.2	1.3	0.06	0.39	54.5
East: Rupert St - eastern leg											
4	L2	26	8.0	0.022	5.7	LOS A	0.1	0.6	0.07	0.55	53.1
6	R2	1	0.0	0.022	6.1	LOS A	0.1	0.6	0.07	0.55	53.2
Approach		27	7.7	0.022	5.7	LOS A	0.1	0.6	0.07	0.55	53.1
North: Abercrombie Rd - northern leg											
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
8	T1	18	35.3	0.011	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		19	33.3	0.011	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		120	19.3	0.040	3.7	NA	0.2	1.3	0.06	0.37	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Site 1: Abercrombie Rd - Rupert St (PM) Peak - Operational (2019)

Site 1: Abercrombie Rd - Rupert St (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abercrombie Rd - southern leg											
2	T1	23	54.5	0.036	0.0	LOS A	0.1	1.2	0.03	0.16	58.3
3	R2	43	7.3	0.036	5.6	LOS A	0.1	1.2	0.09	0.49	52.9
Approach		66	23.8	0.036	3.7	NA	0.1	1.2	0.07	0.37	54.7
East: Rupert St - eastern leg											
4	L2	56	0.0	0.045	5.6	LOS A	0.2	1.1	0.08	0.55	53.4
6	R2	2	0.0	0.045	6.1	LOS A	0.2	1.1	0.08	0.55	53.1
Approach		58	0.0	0.045	5.6	LOS A	0.2	1.1	0.08	0.55	53.3
North: Abercrombie Rd - northern leg											
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
8	T1	25	4.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	4.0	0.013	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		151	11.2	0.045	3.8	NA	0.2	1.2	0.06	0.38	55.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 2: O'Connell Rd - Abercrombie Rd - Albion St (AM) Peak - Operational (2019)

Site 2: O'Connell Rd - Abercrombie Rd - Albion St (AM) Peak - Operational (2019)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Rd - southern leg											
1	L2	1	0.0	0.050	4.2	LOS A	0.2	1.7	0.20	0.43	54.3
2	T1	57	3.7	0.050	4.4	LOS A	0.2	1.7	0.20	0.43	55.5
3	R2	5	0.0	0.050	9.0	LOS A	0.2	1.7	0.20	0.43	55.6
Approach		63	3.3	0.050	4.8	LOS A	0.2	1.7	0.20	0.43	55.5
East: Albion St - eastern leg											
4	L2	4	0.0	0.054	4.1	LOS A	0.2	2.3	0.20	0.55	52.3
5	T1	14	61.5	0.054	5.0	LOS A	0.2	2.3	0.20	0.55	52.2
6	R2	41	33.3	0.054	9.4	LOS A	0.2	2.3	0.20	0.55	52.2
Approach		59	37.5	0.054	8.0	LOS A	0.2	2.3	0.20	0.55	52.2
North: O'Connell Rd - northern leg											
7	L2	53	28.0	0.081	4.2	LOS A	0.4	3.2	0.10	0.44	54.1
8	T1	53	8.0	0.081	4.2	LOS A	0.4	3.2	0.10	0.44	56.1
9	R2	6	0.0	0.081	8.8	LOS A	0.4	3.2	0.10	0.44	56.3
Approach		112	17.0	0.081	4.5	LOS A	0.4	3.2	0.10	0.44	55.1
West: Abercrombie Rd - western leg											
10	L2	5	0.0	0.015	4.3	LOS A	0.1	0.6	0.26	0.44	54.2
11	T1	9	55.6	0.015	5.3	LOS A	0.1	0.6	0.26	0.44	54.2
12	R2	1	0.0	0.015	9.1	LOS A	0.1	0.6	0.26	0.44	55.5
Approach		16	33.3	0.015	5.2	LOS A	0.1	0.6	0.26	0.44	54.3
All Vehicles		249	19.4	0.081	5.5	LOS A	0.4	3.2	0.16	0.46	54.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 2: O'Connell Rd - Abercrombie Rd - Albion St (PM) Peak - Operational (2019)

Site 2: O'Connell Rd - Abercrombie Rd - Albion St (PM) Peak - Operational (2019)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Rd - southern leg											
1	L2	2	0.0	0.044	4.0	LOS A	0.2	1.6	0.14	0.40	54.8
2	T1	54	13.7	0.044	4.4	LOS A	0.2	1.6	0.14	0.40	55.8
3	R2	1	0.0	0.044	8.9	LOS A	0.2	1.6	0.14	0.40	56.1
Approach		57	13.0	0.044	4.4	LOS A	0.2	1.6	0.14	0.40	55.8
East: Albion St - eastern leg											
4	L2	2	50.0	0.022	4.9	LOS A	0.1	0.8	0.22	0.56	50.9
5	T1	5	20.0	0.022	4.6	LOS A	0.1	0.8	0.22	0.56	53.1
6	R2	18	23.5	0.022	9.4	LOS A	0.1	0.8	0.22	0.56	52.6
Approach		25	25.0	0.022	8.0	LOS A	0.1	0.8	0.22	0.56	52.5
North: O'Connell Rd - northern leg											
7	L2	32	36.7	0.081	4.4	LOS A	0.4	3.2	0.14	0.43	53.5
8	T1	65	9.7	0.081	4.3	LOS A	0.4	3.2	0.14	0.43	55.8
9	R2	8	12.5	0.081	9.0	LOS A	0.4	3.2	0.14	0.43	55.4
Approach		105	18.0	0.081	4.7	LOS A	0.4	3.2	0.14	0.43	55.0
West: Abercrombie Rd - western leg											
10	L2	7	14.3	0.032	4.4	LOS A	0.1	1.3	0.22	0.45	53.6
11	T1	23	50.0	0.032	5.0	LOS A	0.1	1.3	0.22	0.45	54.1
12	R2	4	0.0	0.032	9.0	LOS A	0.1	1.3	0.22	0.45	55.3
Approach		35	36.4	0.032	5.3	LOS A	0.1	1.3	0.22	0.45	54.1
All Vehicles		222	20.4	0.081	5.1	LOS A	0.4	3.2	0.16	0.44	54.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 3: Lowes Mount Rd - Albion St - North St (AM) Peak - Operational (2019)

Site 3: Lowes Mount Rd - Albion St - North St (AM) Peak - Operational (2019)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	23	4.5	0.083	4.3	LOS A	0.4	3.1	0.24	0.54	53.1
2	T1	27	0.0	0.083	4.5	LOS A	0.4	3.1	0.24	0.54	54.5
3	R2	48	26.1	0.083	9.5	LOS A	0.4	3.1	0.24	0.54	53.4
Approach		99	13.8	0.083	6.9	LOS A	0.4	3.1	0.24	0.54	53.6
East: Albion St - eastern leg											
4	L2	47	6.7	0.094	4.3	LOS A	0.5	3.9	0.23	0.47	54.2
5	T1	41	30.8	0.094	4.8	LOS A	0.5	3.9	0.23	0.47	55.0
6	R2	20	68.4	0.094	10.0	LOS A	0.5	3.9	0.23	0.47	52.9
Approach		108	27.2	0.094	5.5	LOS A	0.5	3.9	0.23	0.47	54.3
North: Lowes Mount Rd - northern leg											
7	L2	27	69.2	0.070	5.4	LOS A	0.3	2.9	0.29	0.49	51.7
8	T1	32	3.3	0.070	4.6	LOS A	0.3	2.9	0.29	0.49	54.9
9	R2	14	30.8	0.070	9.7	LOS A	0.3	2.9	0.29	0.49	53.7
Approach		73	33.3	0.070	5.9	LOS A	0.3	2.9	0.29	0.49	53.4
West: Albion St - western leg											
10	L2	8	37.5	0.058	4.9	LOS A	0.3	2.3	0.27	0.52	51.8
11	T1	29	39.3	0.058	5.1	LOS A	0.3	2.3	0.27	0.52	53.3
12	R2	24	13.0	0.058	9.4	LOS A	0.3	2.3	0.27	0.52	53.6
Approach		62	28.8	0.058	6.7	LOS A	0.3	2.3	0.27	0.52	53.2
All Vehicles		342	24.9	0.094	6.2	LOS A	0.5	3.9	0.25	0.50	53.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: Site 3: Lowes Mount Rd - Albion St - North St (PM) Peak - Operational (2019)

Site 3: Lowes Mount Rd - Albion St -North St (PM) Peak - Operational (2019)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	28	3.7	0.111	4.3	LOS A	0.6	4.2	0.24	0.53	53.0
2	T1	47	13.3	0.111	4.6	LOS A	0.6	4.2	0.24	0.53	54.1
3	R2	62	8.5	0.111	9.2	LOS A	0.6	4.2	0.24	0.53	54.0
Approach		138	9.2	0.111	6.6	LOS A	0.6	4.2	0.24	0.53	53.8
East: Albion St - eastern leg											
4	L2	66	9.5	0.107	4.5	LOS A	0.5	4.5	0.30	0.51	53.9
5	T1	27	34.6	0.107	5.1	LOS A	0.5	4.5	0.30	0.51	54.7
6	R2	21	70.0	0.107	10.5	LOS A	0.5	4.5	0.30	0.51	52.7
Approach		115	26.6	0.107	5.8	LOS A	0.5	4.5	0.30	0.51	53.9
North: Lowes Mount Rd - northern leg											
7	L2	25	62.5	0.100	5.8	LOS A	0.5	3.9	0.36	0.53	51.6
8	T1	55	0.0	0.100	4.9	LOS A	0.5	3.9	0.36	0.53	54.7
9	R2	22	33.3	0.100	10.1	LOS A	0.5	3.9	0.36	0.53	53.3
Approach		102	22.7	0.100	6.2	LOS A	0.5	3.9	0.36	0.53	53.6
West: Albion St - western leg											
10	L2	15	42.9	0.109	5.2	LOS A	0.5	4.5	0.33	0.54	51.5
11	T1	58	43.6	0.109	5.4	LOS A	0.5	4.5	0.33	0.54	53.0
12	R2	39	2.7	0.109	9.4	LOS A	0.5	4.5	0.33	0.54	53.8
Approach		112	29.2	0.109	6.8	LOS A	0.5	4.5	0.33	0.54	53.1
All Vehicles		466	21.2	0.111	6.4	LOS A	0.6	4.5	0.30	0.53	53.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 4: Horace St - Albion St (AM) Peak - Operational (2019)

Site 4: Horace St - Albion St (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - western leg											
5	T1	94	34.8	0.063	0.0	LOS A	0.1	0.5	0.04	0.05	59.2
6	R2	8	0.0	0.063	5.7	LOS A	0.1	0.5	0.04	0.05	57.0
Approach		102	32.0	0.063	0.5	NA	0.1	0.5	0.04	0.05	59.0
North: Horace St - northern leg											
7	L2	3	0.0	0.011	5.8	LOS A	0.0	0.2	0.21	0.56	53.0
9	R2	9	0.0	0.011	6.1	LOS A	0.0	0.2	0.21	0.56	52.5
Approach		13	0.0	0.011	6.0	LOS A	0.0	0.2	0.21	0.56	52.7
West: Albion St - western leg											
10	L2	12	0.0	0.055	5.5	LOS A	0.0	0.0	0.00	0.08	57.3
11	T1	75	42.3	0.055	0.0	LOS A	0.0	0.0	0.00	0.08	58.9
Approach		86	36.6	0.055	0.7	NA	0.0	0.0	0.00	0.08	58.6
All Vehicles		201	31.9	0.063	0.9	NA	0.1	0.5	0.03	0.10	58.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 4: Horace St - Albion St (PM) Peak - Operational (2019)

Site 4: Horace St - Albion St (PM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - western leg											
5	T1	101	29.2	0.069	0.1	LOS A	0.1	0.7	0.06	0.06	59.1
6	R2	12	9.1	0.069	6.0	LOS A	0.1	0.7	0.06	0.06	56.4
Approach		113	27.1	0.069	0.7	NA	0.1	0.7	0.06	0.06	58.8
North: Horace St - northern leg											
7	L2	7	0.0	0.019	5.9	LOS A	0.1	0.5	0.26	0.57	52.9
9	R2	13	16.7	0.019	6.6	LOS A	0.1	0.5	0.26	0.57	51.6
Approach		20	10.5	0.019	6.4	LOS A	0.1	0.5	0.26	0.57	52.1
West: Albion St - western leg											
10	L2	6	16.7	0.079	5.7	LOS A	0.0	0.0	0.00	0.03	57.2
11	T1	123	28.2	0.079	0.0	LOS A	0.0	0.0	0.00	0.03	59.7
Approach		129	27.6	0.079	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		262	26.1	0.079	0.9	NA	0.1	0.7	0.05	0.08	58.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 5: Endeavour St - Albion St (AM) Peak - Operational (2019)

Site 5: Endeavour St - Albion St (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - eastern leg											
5	T1	89	29.4	0.056	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
6	R2	1	100.0	0.056	6.6	LOS A	0.0	0.1	0.01	0.01	55.0
Approach		91	30.2	0.056	0.2	NA	0.0	0.1	0.01	0.01	59.8
North: Endeavour St - northern leg											
7	L2	2	50.0	0.010	6.4	LOS A	0.0	0.4	0.23	0.56	50.9
9	R2	6	83.3	0.010	7.6	LOS A	0.0	0.4	0.23	0.56	48.9
Approach		8	75.0	0.010	7.3	LOS A	0.0	0.4	0.23	0.56	49.4
West: Albion St - western leg											
10	L2	12	72.7	0.050	6.4	LOS A	0.0	0.0	0.00	0.09	54.5
11	T1	65	33.9	0.050	0.0	LOS A	0.0	0.0	0.00	0.09	59.6
Approach		77	39.7	0.050	1.0	NA	0.0	0.0	0.00	0.09	58.8
All Vehicles		176	36.5	0.056	0.8	NA	0.0	0.4	0.02	0.07	58.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 5: Endeavour St - Albion St (PM) Peak - Operational (2019)

Site 5: Endeavour St - Albion St (PM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - eastern leg											
5	T1	100	24.2	0.060	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
6	R2	1	0.0	0.060	5.9	LOS A	0.0	0.1	0.01	0.01	57.6
Approach		101	24.0	0.060	0.1	NA	0.0	0.1	0.01	0.01	59.9
North: Endeavour St - northern leg											
7	L2	6	50.0	0.023	6.6	LOS A	0.1	0.8	0.27	0.58	50.8
9	R2	15	42.9	0.023	7.1	LOS A	0.1	0.8	0.27	0.58	50.5
Approach		21	45.0	0.023	7.0	LOS A	0.1	0.8	0.27	0.58	50.6
West: Albion St - western leg											
10	L2	17	62.5	0.079	6.3	LOS A	0.0	0.0	0.00	0.07	55.0
11	T1	113	21.5	0.079	0.0	LOS A	0.0	0.0	0.00	0.07	59.6
Approach		129	26.8	0.079	0.8	NA	0.0	0.0	0.00	0.07	59.0
All Vehicles		252	27.2	0.079	1.0	NA	0.1	0.8	0.03	0.09	58.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 6: North St - Carrington Ave (AM) Peak - Operational (2019)

Site 6: North St - Carrington Ave (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	13	8.3	0.027	5.8	LOS A	0.1	0.7	0.19	0.54	53.3
2	T1	19	5.6	0.027	5.1	LOS A	0.1	0.7	0.19	0.54	53.7
3	R2	29	0.0	0.035	6.9	LOS A	0.1	0.8	0.35	0.62	52.3
Approach		61	3.4	0.035	6.1	LOS A	0.1	0.8	0.27	0.58	52.9
East: Carrington Ave - eastern leg											
4	L2	35	6.1	0.091	5.8	LOS A	0.4	2.7	0.16	0.30	54.8
5	T1	69	7.6	0.091	0.2	LOS A	0.4	2.7	0.16	0.30	56.5
6	R2	53	8.0	0.091	5.9	LOS A	0.4	2.7	0.16	0.30	54.4
Approach		157	7.4	0.091	3.3	NA	0.4	2.7	0.16	0.30	55.4
North: North St - northern leg											
7	L2	46	4.5	0.031	5.8	LOS A	0.1	0.9	0.17	0.54	52.9
8	T1	26	12.0	0.042	5.3	LOS A	0.1	1.2	0.34	0.58	53.2
9	R2	12	27.3	0.042	7.3	LOS A	0.1	1.2	0.34	0.58	52.0
Approach		84	10.0	0.042	5.9	LOS A	0.1	1.2	0.24	0.56	52.9
West: Carrington Ave - western leg											
10	L2	15	7.1	0.061	5.8	LOS A	0.1	1.0	0.09	0.15	56.4
11	T1	79	2.7	0.061	0.1	LOS A	0.1	1.0	0.09	0.15	58.3
12	R2	15	21.4	0.061	6.1	LOS A	0.1	1.0	0.09	0.15	55.5
Approach		108	5.8	0.061	1.7	NA	0.1	1.0	0.09	0.15	57.7
All Vehicles		411	6.9	0.091	3.8	NA	0.4	2.7	0.17	0.35	55.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 6: North St - Carrington Ave (PM) Peak - Operational (2019)

Site 6: North St - Carrington Ave (PM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	8	0.0	0.018	5.7	LOS A	0.1	0.4	0.20	0.53	53.7
2	T1	13	0.0	0.018	5.1	LOS A	0.1	0.4	0.20	0.53	53.8
3	R2	34	0.0	0.045	7.5	LOS A	0.1	1.0	0.41	0.66	51.9
Approach		55	0.0	0.045	6.6	LOS A	0.1	1.0	0.33	0.61	52.6
East: Carrington Ave - eastern leg											
4	L2	45	0.0	0.104	5.7	LOS A	0.4	3.0	0.16	0.31	55.0
5	T1	80	1.3	0.104	0.2	LOS A	0.4	3.0	0.16	0.31	56.4
6	R2	62	0.0	0.104	5.8	LOS A	0.4	3.0	0.16	0.31	54.7
Approach		187	0.6	0.104	3.4	NA	0.4	3.0	0.16	0.31	55.5
North: North St - northern leg											
7	L2	116	0.0	0.076	5.8	LOS A	0.3	2.2	0.18	0.54	53.1
8	T1	44	0.0	0.062	5.2	LOS A	0.2	1.5	0.34	0.58	53.6
9	R2	17	0.0	0.062	6.7	LOS A	0.2	1.5	0.34	0.58	53.2
Approach		177	0.0	0.076	5.7	LOS A	0.3	2.2	0.23	0.56	53.2
West: Carrington Ave - western leg											
10	L2	9	0.0	0.057	5.8	LOS A	0.1	0.6	0.07	0.11	57.1
11	T1	86	0.0	0.057	0.1	LOS A	0.1	0.6	0.07	0.11	58.7
12	R2	12	0.0	0.057	5.9	LOS A	0.1	0.6	0.07	0.11	56.8
Approach		107	0.0	0.057	1.2	NA	0.1	0.6	0.07	0.11	58.3
All Vehicles		526	0.2	0.104	4.1	NA	0.4	3.0	0.18	0.38	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 7: Oberon St - Un-named Rd - Ross St (AM) Peak - Operational (2019)

Site 7: Oberon St - Un-named Rd - Ross St (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Ross St - southern leg											
1	L2	52	2.0	0.067	5.9	LOS A	0.3	1.8	0.22	0.55	53.2
2	T1	22	0.0	0.067	5.1	LOS A	0.3	1.8	0.22	0.55	53.4
3	R2	11	0.0	0.067	6.6	LOS A	0.3	1.8	0.22	0.55	52.7
Approach		84	1.3	0.067	5.7	LOS A	0.3	1.8	0.22	0.55	53.2
East: Oberon St - eastern leg											
4	L2	24	4.3	0.076	5.7	LOS A	0.1	0.8	0.06	0.15	56.6
5	T1	103	4.1	0.076	0.0	LOS A	0.1	0.8	0.06	0.15	58.3
6	R2	14	0.0	0.076	5.7	LOS A	0.1	0.8	0.06	0.15	56.2
Approach		141	3.7	0.076	1.6	NA	0.1	0.8	0.06	0.15	57.8
North: Un-named Rd - northern leg											
7	L2	11	0.0	0.023	5.7	LOS A	0.1	0.6	0.19	0.56	53.3
8	T1	6	0.0	0.023	5.0	LOS A	0.1	0.6	0.19	0.56	53.5
9	R2	8	0.0	0.023	6.8	LOS A	0.1	0.6	0.19	0.56	52.8
Approach		25	0.0	0.023	5.9	LOS A	0.1	0.6	0.19	0.56	53.2
West: Oberon St - western leg											
10	L2	29	3.6	0.072	5.8	LOS A	0.2	1.6	0.13	0.24	55.6
11	T1	72	2.9	0.072	0.2	LOS A	0.2	1.6	0.13	0.24	57.3
12	R2	25	12.5	0.072	6.0	LOS A	0.2	1.6	0.13	0.24	54.6
Approach		126	5.0	0.072	2.6	NA	0.2	1.6	0.13	0.24	56.3
All Vehicles		377	3.4	0.076	3.2	NA	0.3	1.8	0.13	0.30	55.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 7: Oberon St - Un-named Rd - Ross St (PM) Peak - Operational (2019)

Site 7: Oberon St - Un-named Rd - Ross St (PM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Ross St - southern leg											
1	L2	59	1.8	0.064	5.9	LOS A	0.2	1.7	0.21	0.56	53.0
2	T1	5	0.0	0.064	5.7	LOS A	0.2	1.7	0.21	0.56	53.2
3	R2	15	0.0	0.064	7.2	LOS A	0.2	1.7	0.21	0.56	52.6
Approach		79	1.3	0.064	6.1	LOS A	0.2	1.7	0.21	0.56	52.9
East: Oberon St - eastern leg											
4	L2	19	0.0	0.073	5.8	LOS A	0.1	0.7	0.07	0.12	57.0
5	T1	106	4.0	0.073	0.1	LOS A	0.1	0.7	0.07	0.12	58.5
6	R2	11	0.0	0.073	6.0	LOS A	0.1	0.7	0.07	0.12	56.4
Approach		136	3.1	0.073	1.3	NA	0.1	0.7	0.07	0.12	58.1
North: Un-named Rd - northern leg											
7	L2	14	0.0	0.054	6.0	LOS A	0.2	1.3	0.33	0.61	52.8
8	T1	12	0.0	0.054	5.6	LOS A	0.2	1.3	0.33	0.61	52.9
9	R2	24	0.0	0.054	7.5	LOS A	0.2	1.3	0.33	0.61	52.3
Approach		49	0.0	0.054	6.6	LOS A	0.2	1.3	0.33	0.61	52.5
West: Oberon St - western leg											
10	L2	48	2.2	0.151	5.9	LOS A	0.6	4.0	0.17	0.24	55.5
11	T1	152	2.8	0.151	0.2	LOS A	0.6	4.0	0.17	0.24	57.0
12	R2	73	0.0	0.151	5.8	LOS A	0.6	4.0	0.17	0.24	55.0
Approach		273	1.9	0.151	2.7	NA	0.6	4.0	0.17	0.24	56.2
All Vehicles		537	2.0	0.151	3.2	NA	0.6	4.0	0.16	0.29	55.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 8: Albion St - Duckmaloi Rd (AM) Peak - Operational (2019)

Site 8: Albion St - Duckmaloi Rd (AM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Duckmaloi Rd - eastern leg											
5	T1	53	8.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	35	54.5	0.032	6.2	LOS A	0.1	1.3	0.10	0.57	50.5
Approach		87	26.5	0.032	2.5	NA	0.1	1.3	0.04	0.23	55.8
North: Albion St - northern leg											
7	L2	23	72.7	0.032	6.5	LOS A	0.1	1.2	0.09	0.55	50.4
9	R2	6	16.7	0.032	6.5	LOS A	0.1	1.2	0.09	0.55	52.4
Approach		29	60.7	0.032	6.5	LOS A	0.1	1.2	0.09	0.55	50.8
West: Duckmaloi Rd - western leg											
10	L2	3	0.0	0.002	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	23	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	0.0	0.012	0.7	NA	0.0	0.0	0.00	0.07	59.2
All Vehicles		143	28.7	0.032	3.0	NA	0.1	1.3	0.04	0.26	55.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 8: Albion St - Duckmaloi Rd (PM) Peak - Operational (2019)

Site 8: Albion St - Duckmaloi Rd (PM) Peak - Operational (2019)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Duckmaloi Rd - eastern leg											
5	T1	41	10.3	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	31	65.5	0.030	6.6	LOS A	0.1	1.3	0.16	0.56	49.9
Approach		72	33.8	0.030	2.8	NA	0.1	1.3	0.07	0.24	55.2
North: Albion St - northern leg											
7	L2	24	43.5	0.033	6.3	LOS A	0.1	1.1	0.14	0.55	51.4
9	R2	9	0.0	0.033	6.3	LOS A	0.1	1.1	0.14	0.55	53.0
Approach		34	31.3	0.033	6.3	LOS A	0.1	1.1	0.14	0.55	51.8
West: Duckmaloi Rd - western leg											
10	L2	9	11.1	0.006	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	44	2.4	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		54	3.9	0.023	1.0	NA	0.0	0.0	0.00	0.10	58.7
All Vehicles		159	23.2	0.033	2.9	NA	0.1	1.3	0.06	0.26	55.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 1: Abercrombie Rd - Rupert St (AM) Peak - Operational (2029)

Site 1: Abercrombie Rd - Rupert St (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abercrombie Rd - southern leg											
2	T1	23	36.4	0.040	0.0	LOS A	0.2	1.3	0.01	0.09	59.1
3	R2	51	12.5	0.040	5.7	LOS A	0.2	1.3	0.09	0.53	52.6
Approach		74	20.0	0.040	3.9	NA	0.2	1.3	0.06	0.39	54.5
East: Rupert St - eastern leg											
4	L2	26	8.0	0.022	5.7	LOS A	0.1	0.6	0.07	0.55	53.1
6	R2	1	0.0	0.022	6.1	LOS A	0.1	0.6	0.07	0.55	53.2
Approach		27	7.7	0.022	5.7	LOS A	0.1	0.6	0.07	0.55	53.1
North: Abercrombie Rd - northern leg											
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
8	T1	18	35.3	0.011	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		19	33.3	0.011	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		120	19.3	0.040	3.7	NA	0.2	1.3	0.06	0.37	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 1: Abercrombie Rd - Rupert St (PM) Peak - Operational (2029)

Site 1: Abercrombie Rd - Rupert St (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Abercrombie Rd - southern leg											
2	T1	23	54.5	0.036	0.0	LOS A	0.1	1.2	0.03	0.16	58.3
3	R2	43	7.3	0.036	5.6	LOS A	0.1	1.2	0.09	0.49	52.9
Approach		66	23.8	0.036	3.7	NA	0.1	1.2	0.07	0.37	54.7
East: Rupert St - eastern leg											
4	L2	56	0.0	0.045	5.6	LOS A	0.2	1.1	0.08	0.55	53.4
6	R2	2	0.0	0.045	6.1	LOS A	0.2	1.1	0.08	0.55	53.1
Approach		58	0.0	0.045	5.6	LOS A	0.2	1.1	0.08	0.55	53.3
North: Abercrombie Rd - northern leg											
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
8	T1	25	4.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	4.0	0.013	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		151	11.2	0.045	3.8	NA	0.2	1.2	0.06	0.38	55.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 2: O'Connell Rd - Abercrombie Rd - Albion St (AM) Peak - Operational (2029)

Site 2: O'Connell Rd - Abercrombie Rd - Albion St (AM) Peak - Operational (2029)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Rd - southern leg											
1	L2	1	0.0	0.050	4.2	LOS A	0.2	1.7	0.21	0.43	54.3
2	T1	57	3.7	0.050	4.4	LOS A	0.2	1.7	0.21	0.43	55.5
3	R2	5	0.0	0.050	9.0	LOS A	0.2	1.7	0.21	0.43	55.6
Approach		63	3.3	0.050	4.8	LOS A	0.2	1.7	0.21	0.43	55.5
East: Albion St - eastern leg											
4	L2	4	0.0	0.055	4.1	LOS A	0.3	2.4	0.20	0.55	52.3
5	T1	14	61.5	0.055	5.0	LOS A	0.3	2.4	0.20	0.55	52.2
6	R2	42	35.0	0.055	9.5	LOS A	0.3	2.4	0.20	0.55	52.2
Approach		60	38.6	0.055	8.1	LOS A	0.3	2.4	0.20	0.55	52.2
North: O'Connell Rd - northern leg											
7	L2	54	29.4	0.082	4.2	LOS A	0.4	3.3	0.10	0.44	54.0
8	T1	53	8.0	0.082	4.2	LOS A	0.4	3.3	0.10	0.44	56.1
9	R2	6	0.0	0.082	8.8	LOS A	0.4	3.3	0.10	0.44	56.3
Approach		113	17.8	0.082	4.5	LOS A	0.4	3.3	0.10	0.44	55.1
West: Abercrombie Rd - western leg											
10	L2	5	0.0	0.015	4.3	LOS A	0.1	0.6	0.27	0.45	54.2
11	T1	9	55.6	0.015	5.3	LOS A	0.1	0.6	0.27	0.45	54.2
12	R2	1	0.0	0.015	9.2	LOS A	0.1	0.6	0.27	0.45	55.5
Approach		16	33.3	0.015	5.2	LOS A	0.1	0.6	0.27	0.45	54.3
All Vehicles		252	20.1	0.082	5.5	LOS A	0.4	3.3	0.16	0.46	54.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 2: O'Connell Rd - Abercrombie Rd - Albion St (PM) Peak - Operational (2029)

Site 2: O'Connell Rd - Abercrombie Rd - Albion St (PM) Peak - Operational (2029)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: O'Connell Rd - southern leg											
1	L2	2	0.0	0.044	4.0	LOS A	0.2	1.6	0.14	0.40	54.8
2	T1	54	13.7	0.044	4.4	LOS A	0.2	1.6	0.14	0.40	55.8
3	R2	1	0.0	0.044	8.9	LOS A	0.2	1.6	0.14	0.40	56.1
Approach		57	13.0	0.044	4.4	LOS A	0.2	1.6	0.14	0.40	55.8
East: Albion St - eastern leg											
4	L2	2	50.0	0.024	4.9	LOS A	0.1	0.9	0.22	0.56	50.9
5	T1	5	20.0	0.024	4.6	LOS A	0.1	0.9	0.22	0.56	53.1
6	R2	19	27.8	0.024	9.4	LOS A	0.1	0.9	0.22	0.56	52.4
Approach		26	28.0	0.024	8.1	LOS A	0.1	0.9	0.22	0.56	52.4
North: O'Connell Rd - northern leg											
7	L2	33	38.7	0.082	4.4	LOS A	0.4	3.3	0.14	0.44	53.5
8	T1	65	9.7	0.082	4.3	LOS A	0.4	3.3	0.14	0.44	55.8
9	R2	8	12.5	0.082	9.0	LOS A	0.4	3.3	0.14	0.44	55.4
Approach		106	18.8	0.082	4.7	LOS A	0.4	3.3	0.14	0.44	55.0
West: Abercrombie Rd - western leg											
10	L2	7	14.3	0.032	4.4	LOS A	0.1	1.3	0.23	0.45	53.6
11	T1	23	50.0	0.032	5.0	LOS A	0.1	1.3	0.23	0.45	54.1
12	R2	4	0.0	0.032	9.0	LOS A	0.1	1.3	0.23	0.45	55.3
Approach		35	36.4	0.032	5.4	LOS A	0.1	1.3	0.23	0.45	54.1
All Vehicles		224	21.1	0.082	5.2	LOS A	0.4	3.3	0.16	0.44	54.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 3: Lowes Mount Rd - Albion St - North St (AM) Peak - Operational (2029)

Site 3: Lowes Mount Rd - Albion St - North St (AM) Peak - Operational (2029)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	23	4.5	0.084	4.3	LOS A	0.4	3.1	0.25	0.54	53.0
2	T1	27	0.0	0.084	4.5	LOS A	0.4	3.1	0.25	0.54	54.5
3	R2	48	26.1	0.084	9.5	LOS A	0.4	3.1	0.25	0.54	53.4
Approach		99	13.8	0.084	6.9	LOS A	0.4	3.1	0.25	0.54	53.6
East: Albion St - eastern leg											
4	L2	47	6.7	0.098	4.3	LOS A	0.5	4.2	0.23	0.48	54.2
5	T1	41	30.8	0.098	4.8	LOS A	0.5	4.2	0.23	0.48	55.0
6	R2	23	72.7	0.098	10.1	LOS A	0.5	4.2	0.23	0.48	52.7
Approach		112	29.2	0.098	5.7	LOS A	0.5	4.2	0.23	0.48	54.2
North: Lowes Mount Rd - northern leg											
7	L2	31	72.4	0.075	5.5	LOS A	0.3	3.2	0.29	0.50	51.6
8	T1	32	3.3	0.075	4.6	LOS A	0.3	3.2	0.29	0.50	54.9
9	R2	15	35.7	0.075	9.8	LOS A	0.3	3.2	0.29	0.50	53.5
Approach		77	37.0	0.075	6.0	LOS A	0.3	3.2	0.29	0.50	53.3
West: Albion St - western leg											
10	L2	9	44.4	0.060	5.0	LOS A	0.3	2.4	0.28	0.52	51.6
11	T1	29	39.3	0.060	5.1	LOS A	0.3	2.4	0.28	0.52	53.2
12	R2	24	13.0	0.060	9.4	LOS A	0.3	2.4	0.28	0.52	53.6
Approach		63	30.0	0.060	6.7	LOS A	0.3	2.4	0.28	0.52	53.1
All Vehicles		351	26.7	0.098	6.3	LOS A	0.5	4.2	0.26	0.51	53.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 3: Lowes Mount Rd - Albion St - North St (PM) Peak - Operational (2029)

Site 3: Lowes Mount Rd - Albion St -North St (PM) Peak - Operational (2029)
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	28	3.7	0.112	4.3	LOS A	0.6	4.2	0.25	0.54	53.0
2	T1	47	13.3	0.112	4.7	LOS A	0.6	4.2	0.25	0.54	54.0
3	R2	62	8.5	0.112	9.3	LOS A	0.6	4.2	0.25	0.54	54.0
Approach		138	9.2	0.112	6.7	LOS A	0.6	4.2	0.25	0.54	53.8
East: Albion St - eastern leg											
4	L2	66	9.5	0.112	4.6	LOS A	0.5	4.7	0.31	0.51	53.9
5	T1	27	34.6	0.112	5.1	LOS A	0.5	4.7	0.31	0.51	54.7
6	R2	24	73.9	0.112	10.6	LOS A	0.5	4.7	0.31	0.51	52.5
Approach		118	28.6	0.112	5.9	LOS A	0.5	4.7	0.31	0.51	53.8
North: Lowes Mount Rd - northern leg											
7	L2	28	66.7	0.106	5.9	LOS A	0.5	4.2	0.36	0.53	51.5
8	T1	55	0.0	0.106	4.9	LOS A	0.5	4.2	0.36	0.53	54.7
9	R2	23	36.4	0.106	10.2	LOS A	0.5	4.2	0.36	0.53	53.2
Approach		106	25.7	0.106	6.3	LOS A	0.5	4.2	0.36	0.53	53.5
West: Albion St - western leg											
10	L2	16	46.7	0.111	5.3	LOS A	0.5	4.6	0.34	0.55	51.4
11	T1	58	43.6	0.111	5.4	LOS A	0.5	4.6	0.34	0.55	53.0
12	R2	39	2.7	0.111	9.4	LOS A	0.5	4.6	0.34	0.55	53.8
Approach		113	29.9	0.111	6.8	LOS A	0.5	4.6	0.34	0.55	53.0
All Vehicles		475	22.6	0.112	6.4	LOS A	0.6	4.7	0.31	0.53	53.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 4: Horace St - Albion St (AM) Peak - Operational (2029)

Site 4: Horace St - Albion St (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - western leg											
5	T1	97	37.0	0.066	0.0	LOS A	0.1	0.5	0.04	0.05	59.2
6	R2	8	0.0	0.066	5.7	LOS A	0.1	0.5	0.04	0.05	57.0
Approach		105	34.0	0.066	0.5	NA	0.1	0.5	0.04	0.05	59.0
North: Horace St - northern leg											
7	L2	3	0.0	0.011	5.8	LOS A	0.0	0.3	0.22	0.57	53.0
9	R2	9	0.0	0.011	6.1	LOS A	0.0	0.3	0.22	0.57	52.5
Approach		13	0.0	0.011	6.0	LOS A	0.0	0.3	0.22	0.57	52.6
West: Albion St - western leg											
10	L2	12	0.0	0.058	5.5	LOS A	0.0	0.0	0.00	0.08	57.3
11	T1	78	44.6	0.058	0.0	LOS A	0.0	0.0	0.00	0.08	58.9
Approach		89	38.8	0.058	0.7	NA	0.0	0.0	0.00	0.08	58.6
All Vehicles		207	34.0	0.066	0.9	NA	0.1	0.5	0.03	0.09	58.4

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 4: Horace St - Albion St (PM) Peak - Operational (2029)

Site 4: Horace St - Albion St (PM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - western leg											
5	T1	104	31.3	0.072	0.1	LOS A	0.1	0.7	0.06	0.06	59.1
6	R2	12	9.1	0.072	6.0	LOS A	0.1	0.7	0.06	0.06	56.4
Approach		116	29.1	0.072	0.7	NA	0.1	0.7	0.06	0.06	58.8
North: Horace St - northern leg											
7	L2	7	0.0	0.019	5.9	LOS A	0.1	0.5	0.26	0.57	52.9
9	R2	13	16.7	0.019	6.7	LOS A	0.1	0.5	0.26	0.57	51.6
Approach		20	10.5	0.019	6.4	LOS A	0.1	0.5	0.26	0.57	52.1
West: Albion St - western leg											
10	L2	6	16.7	0.081	5.7	LOS A	0.0	0.0	0.00	0.03	57.2
11	T1	126	30.0	0.081	0.0	LOS A	0.0	0.0	0.00	0.03	59.7
Approach		133	29.4	0.081	0.3	NA	0.0	0.0	0.00	0.03	59.6
All Vehicles		268	27.8	0.081	0.9	NA	0.1	0.7	0.05	0.08	58.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 5: Endeavour St - Albion St (AM) Peak - Operational (2029)

Site 5: Endeavour St - Albion St (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - eastern leg											
5	T1	93	31.8	0.059	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
6	R2	1	100.0	0.059	6.7	LOS A	0.0	0.1	0.01	0.01	55.0
Approach		94	32.6	0.059	0.2	NA	0.0	0.1	0.01	0.01	59.8
North: Endeavour St - northern leg											
7	L2	2	50.0	0.010	6.4	LOS A	0.0	0.4	0.24	0.56	50.9
9	R2	6	83.3	0.010	7.6	LOS A	0.0	0.4	0.24	0.56	48.9
Approach		8	75.0	0.010	7.3	LOS A	0.0	0.4	0.24	0.56	49.4
West: Albion St - western leg											
10	L2	12	72.7	0.053	6.4	LOS A	0.0	0.0	0.00	0.08	54.5
11	T1	68	36.9	0.053	0.0	LOS A	0.0	0.0	0.00	0.08	59.6
Approach		80	42.1	0.053	0.9	NA	0.0	0.0	0.00	0.08	58.8
All Vehicles		182	38.7	0.059	0.8	NA	0.0	0.4	0.01	0.07	58.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 5: Endeavour St - Albion St (PM) Peak - Operational (2029)

Site 5: Endeavour St - Albion St (PM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Albion St - eastern leg											
5	T1	103	26.5	0.063	0.0	LOS A	0.0	0.1	0.01	0.01	59.9
6	R2	1	0.0	0.063	5.9	LOS A	0.0	0.1	0.01	0.01	57.6
Approach		104	26.3	0.063	0.1	NA	0.0	0.1	0.01	0.01	59.9
North: Endeavour St - northern leg											
7	L2	6	50.0	0.023	6.6	LOS A	0.1	0.8	0.28	0.59	50.8
9	R2	15	42.9	0.023	7.2	LOS A	0.1	0.8	0.28	0.59	50.5
Approach		21	45.0	0.023	7.0	LOS A	0.1	0.8	0.28	0.59	50.6
West: Albion St - western leg											
10	L2	17	62.5	0.082	6.3	LOS A	0.0	0.0	0.00	0.07	55.0
11	T1	116	23.6	0.082	0.0	LOS A	0.0	0.0	0.00	0.07	59.6
Approach		133	28.6	0.082	0.8	NA	0.0	0.0	0.00	0.07	59.0
All Vehicles		258	29.0	0.082	1.0	NA	0.1	0.8	0.03	0.09	58.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 6: North St - Carrington Ave (AM) Peak - Operational (2029)

Site 6: North St - Carrington Ave (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	13	8.3	0.027	5.8	LOS A	0.1	0.7	0.19	0.54	53.3
2	T1	19	5.6	0.027	5.1	LOS A	0.1	0.7	0.19	0.54	53.7
3	R2	29	0.0	0.035	6.9	LOS A	0.1	0.8	0.35	0.62	52.3
Approach		61	3.4	0.035	6.1	LOS A	0.1	0.8	0.27	0.58	52.9
East: Carrington Ave - eastern leg											
4	L2	35	6.1	0.091	5.8	LOS A	0.4	2.7	0.16	0.30	54.8
5	T1	69	7.6	0.091	0.2	LOS A	0.4	2.7	0.16	0.30	56.5
6	R2	53	8.0	0.091	5.9	LOS A	0.4	2.7	0.16	0.30	54.4
Approach		157	7.4	0.091	3.3	NA	0.4	2.7	0.16	0.30	55.4
North: North St - northern leg											
7	L2	46	4.5	0.031	5.8	LOS A	0.1	0.9	0.17	0.54	52.9
8	T1	26	12.0	0.042	5.3	LOS A	0.1	1.2	0.34	0.58	53.2
9	R2	12	27.3	0.042	7.3	LOS A	0.1	1.2	0.34	0.58	52.0
Approach		84	10.0	0.042	5.9	LOS A	0.1	1.2	0.24	0.56	52.9
West: Carrington Ave - western leg											
10	L2	15	7.1	0.061	5.8	LOS A	0.1	1.0	0.09	0.15	56.4
11	T1	79	2.7	0.061	0.1	LOS A	0.1	1.0	0.09	0.15	58.3
12	R2	15	21.4	0.061	6.1	LOS A	0.1	1.0	0.09	0.15	55.5
Approach		108	5.8	0.061	1.7	NA	0.1	1.0	0.09	0.15	57.7
All Vehicles		411	6.9	0.091	3.8	NA	0.4	2.7	0.17	0.35	55.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 6: North St - Carrington Ave (PM) Peak - Operational (2029)

Site 6: North St - Carrington Ave (PM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: North St - southern leg											
1	L2	8	0.0	0.018	5.7	LOS A	0.1	0.4	0.20	0.53	53.7
2	T1	13	0.0	0.018	5.1	LOS A	0.1	0.4	0.20	0.53	53.8
3	R2	34	0.0	0.045	7.5	LOS A	0.1	1.0	0.41	0.66	51.9
Approach		55	0.0	0.045	6.6	LOS A	0.1	1.0	0.33	0.61	52.6
East: Carrington Ave - eastern leg											
4	L2	45	0.0	0.104	5.7	LOS A	0.4	3.0	0.16	0.31	55.0
5	T1	80	1.3	0.104	0.2	LOS A	0.4	3.0	0.16	0.31	56.4
6	R2	62	0.0	0.104	5.8	LOS A	0.4	3.0	0.16	0.31	54.7
Approach		187	0.6	0.104	3.4	NA	0.4	3.0	0.16	0.31	55.5
North: North St - northern leg											
7	L2	116	0.0	0.076	5.8	LOS A	0.3	2.2	0.18	0.54	53.1
8	T1	44	0.0	0.062	5.2	LOS A	0.2	1.5	0.34	0.58	53.6
9	R2	17	0.0	0.062	6.7	LOS A	0.2	1.5	0.34	0.58	53.2
Approach		177	0.0	0.076	5.7	LOS A	0.3	2.2	0.23	0.56	53.2
West: Carrington Ave - western leg											
10	L2	9	0.0	0.057	5.8	LOS A	0.1	0.6	0.07	0.11	57.1
11	T1	86	0.0	0.057	0.1	LOS A	0.1	0.6	0.07	0.11	58.7
12	R2	12	0.0	0.057	5.9	LOS A	0.1	0.6	0.07	0.11	56.8
Approach		107	0.0	0.057	1.2	NA	0.1	0.6	0.07	0.11	58.3
All Vehicles		526	0.2	0.104	4.1	NA	0.4	3.0	0.18	0.38	54.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 7: Oberon St - Un-named Rd - Ross St (AM) Peak - Operational (2029)

Site 7: Oberon St - Un-named Rd - Ross St (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Ross St - southern leg											
1	L2	52	2.0	0.067	5.9	LOS A	0.3	1.8	0.22	0.55	53.2
2	T1	22	0.0	0.067	5.1	LOS A	0.3	1.8	0.22	0.55	53.4
3	R2	11	0.0	0.067	6.6	LOS A	0.3	1.8	0.22	0.55	52.7
Approach		84	1.3	0.067	5.7	LOS A	0.3	1.8	0.22	0.55	53.2
East: Oberon St - eastern leg											
4	L2	24	4.3	0.076	5.7	LOS A	0.1	0.8	0.06	0.15	56.6
5	T1	103	4.1	0.076	0.0	LOS A	0.1	0.8	0.06	0.15	58.3
6	R2	14	0.0	0.076	5.7	LOS A	0.1	0.8	0.06	0.15	56.2
Approach		141	3.7	0.076	1.6	NA	0.1	0.8	0.06	0.15	57.8
North: Un-named Rd - northern leg											
7	L2	11	0.0	0.023	5.7	LOS A	0.1	0.6	0.19	0.56	53.3
8	T1	6	0.0	0.023	5.0	LOS A	0.1	0.6	0.19	0.56	53.5
9	R2	8	0.0	0.023	6.8	LOS A	0.1	0.6	0.19	0.56	52.8
Approach		25	0.0	0.023	5.9	LOS A	0.1	0.6	0.19	0.56	53.2
West: Oberon St - western leg											
10	L2	29	3.6	0.072	5.8	LOS A	0.2	1.6	0.13	0.24	55.6
11	T1	72	2.9	0.072	0.2	LOS A	0.2	1.6	0.13	0.24	57.3
12	R2	25	12.5	0.072	6.0	LOS A	0.2	1.6	0.13	0.24	54.6
Approach		126	5.0	0.072	2.6	NA	0.2	1.6	0.13	0.24	56.3
All Vehicles		377	3.4	0.076	3.2	NA	0.3	1.8	0.13	0.30	55.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 7: Oberon St - Un-named Rd - Ross St (PM) Peak - Operational (2029)

Site 7: Oberon St - Un-named Rd - Ross St (PM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Ross St - southern leg											
1	L2	59	1.8	0.064	5.9	LOS A	0.2	1.7	0.21	0.56	53.0
2	T1	5	0.0	0.064	5.7	LOS A	0.2	1.7	0.21	0.56	53.2
3	R2	15	0.0	0.064	7.2	LOS A	0.2	1.7	0.21	0.56	52.6
Approach		79	1.3	0.064	6.1	LOS A	0.2	1.7	0.21	0.56	52.9
East: Oberon St - eastern leg											
4	L2	19	0.0	0.073	5.8	LOS A	0.1	0.7	0.07	0.12	57.0
5	T1	106	4.0	0.073	0.1	LOS A	0.1	0.7	0.07	0.12	58.5
6	R2	11	0.0	0.073	6.0	LOS A	0.1	0.7	0.07	0.12	56.4
Approach		136	3.1	0.073	1.3	NA	0.1	0.7	0.07	0.12	58.1
North: Un-named Rd - northern leg											
7	L2	14	0.0	0.054	6.0	LOS A	0.2	1.3	0.33	0.61	52.8
8	T1	12	0.0	0.054	5.6	LOS A	0.2	1.3	0.33	0.61	52.9
9	R2	24	0.0	0.054	7.5	LOS A	0.2	1.3	0.33	0.61	52.3
Approach		49	0.0	0.054	6.6	LOS A	0.2	1.3	0.33	0.61	52.5
West: Oberon St - western leg											
10	L2	48	2.2	0.151	5.9	LOS A	0.6	4.0	0.17	0.24	55.5
11	T1	152	2.8	0.151	0.2	LOS A	0.6	4.0	0.17	0.24	57.0
12	R2	73	0.0	0.151	5.8	LOS A	0.6	4.0	0.17	0.24	55.0
Approach		273	1.9	0.151	2.7	NA	0.6	4.0	0.17	0.24	56.2
All Vehicles		537	2.0	0.151	3.2	NA	0.6	4.0	0.16	0.29	55.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 8: Albion St - Duckmaloi Rd (AM) Peak - Operational (2029)

Site 8: Albion St - Duckmaloi Rd (AM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Duckmaloi Rd - eastern leg											
5	T1	53	8.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	38	58.3	0.035	6.3	LOS A	0.1	1.5	0.11	0.57	50.3
Approach		91	29.1	0.035	2.6	NA	0.1	1.5	0.04	0.24	55.5
North: Albion St - northern leg											
7	L2	26	76.0	0.035	6.6	LOS A	0.1	1.4	0.09	0.55	50.3
9	R2	6	16.7	0.035	6.6	LOS A	0.1	1.4	0.09	0.55	52.4
Approach		33	64.5	0.035	6.6	LOS A	0.1	1.4	0.09	0.55	50.7
West: Duckmaloi Rd - western leg											
10	L2	3	0.0	0.002	5.5	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	23	0.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		26	0.0	0.012	0.7	NA	0.0	0.0	0.00	0.07	59.2
All Vehicles		149	31.7	0.035	3.1	NA	0.1	1.5	0.05	0.28	55.0

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: Site 8: Albion St - Duckmaloi Rd (PM) Peak - Operational (2029)

Site 8: Albion St - Duckmaloi Rd (PM) Peak - Operational (2029)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Duckmaloi Rd - eastern leg											
5	T1	41	10.3	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	34	68.8	0.034	6.6	LOS A	0.1	1.5	0.17	0.56	49.8
Approach		75	36.6	0.034	3.0	NA	0.1	1.5	0.07	0.25	54.9
North: Albion St - northern leg											
7	L2	27	50.0	0.077	6.4	LOS A	0.3	3.2	0.19	0.55	50.9
9	R2	33	71.0	0.077	7.9	LOS A	0.3	3.2	0.19	0.55	49.8
Approach		60	61.4	0.077	7.2	LOS A	0.3	3.2	0.19	0.55	50.3
West: Duckmaloi Rd - western leg											
10	L2	9	11.1	0.006	5.7	LOS A	0.0	0.0	0.00	0.57	53.2
11	T1	44	2.4	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		54	3.9	0.023	1.0	NA	0.0	0.0	0.00	0.10	58.7
All Vehicles		188	35.2	0.077	3.8	NA	0.3	3.2	0.09	0.31	54.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Stephenson

Environmental Management Australia

AIR QUALITY IMPACT ASSESSMENT

PROPOSED PARTICLE BOARD PLANT

BORG MANUFACTURING PTY LTD

OBERON NSW

PROJECT NO.: **5572C/S24151A/16**

DATE OF FINAL ISSUE: **12 MAY 2016**

DATE OF REVISION C: **31 MAY 2016**

Stephenson

Environmental Management Australia

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PROJECT NO.: **5572C/S24151A/16**

DATE OF FINAL ISSUE: **12 MAY 2016**

DATE OF REVISION C: **31 MAY 2016**

P W STEPHENSON

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EXECUTIVE SUMMARY

Stephenson Environmental Management Australia (SEMA) has been commissioned by Borg Manufacturing Pty Ltd, to undertake an air quality impact assessment (AQIA) of a proposed Particle Board (PB) manufacturing mill and plant in conjunction with the existing MDF manufacturing complex at Oberon, New South Wales (NSW). This AQIA has been prepared in accordance with the Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.

For the purpose of this AQIA, Borg has provided the design emissions data, operational data, discharge stack dimensions and building dimension data for the proposed PB Plant. SEMA has used TSP, PM_{10}, NOx and formaldehyde emission measurements conducted by SEMA at the existing plant as emissions input data for the MDF plant. Where data has not been available, SEMA has made conservative assumptions; which include:

1. Where PM_{10} emission data was not available, SEMA has assumed a conservative PM_{10} to TSP ratio of 100%.
2. A conservative ratio of 40% conversion of the NOx to NO_2 has been assumed for this study.

Table 1 presents a summary of the predicted GLCs for TSP, PM_{10} and NO_2 from the existing facility; the proposed PB Plant and the cumulative effects of both these sources which are in compliance with the relevant IAC. However, predicted formaldehyde GLC's exceed the relevant IAC in the Blenheim State Forest located north-west of Borg but not in the populated Oberon township.

TABLE ES-1 IMPACT ASSESSMENT PREDICTIONS – CUMULATIVE WHOLE SITE BORG OBERON

Pollutant	Units	Averaging period	IAC	Maximum Peak Predicted GLC	
				Proposed PB Plant	Cumulative (Modified Existing Facility + PB Plant)
TSP (100%ile)	$\mu g/m^3$	Annual	90	6	8
PM_{10} (100%ile)	$\mu g/m^3$	24 hours	50	21	25
	$\mu g/m^3$	Annual	30	3	4
NO_2* (100%ile)	$\mu g/m^3$	1 hour	246	57	225
	$\mu g/m^3$	Annual	62	1	4
HCHO (99.9%ile)	mg/m^3	1 hour	0.02	0.01	0.03

Key: IAC = Impact Assessment Criteria
GLC = Ground Level Concentration
TSP = total suspended particulate matter
PM_{10} = particulate matter less than 10 microns
NO_2 = nitrogen dioxide
HCHO = formaldehyde
* = 40% NO_x to NO_2 conversion assumed

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1 INTRODUCTION

Stephenson Environmental Management Australia (SEMA) was engaged by Borg Constructions Pty Ltd (Borg) to undertake an Air Quality Impact Assessment (AQIA) for the proposed Borg Particle Board (PB) Plant at the existing plant at Oberon, New South Wales (NSW).

The objective of this AQIA is to determine the ground level concentration (GLC) of total suspended particles (TSP), fine particulate (PM_{10}), nitrogen dioxide (NO_2) and formaldehyde from the proposed PB Plant plus the cumulative impacts of this proposed plant with the existing Borg Panels Oberon whole facility and to ensure it is within Air Quality Standards.

The AERMOD computer based dispersion model was used to determine the maximum TSP, PM_{10}, NO_2 and formaldehyde GLCs for this assessment in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (AMMAAP).*

Borg provided proposed emissions data, operational data, discharge stack dimension and building dimension data for the proposed PB Plant; all of which are required as input data for the dispersion modelling of the emissions to air.

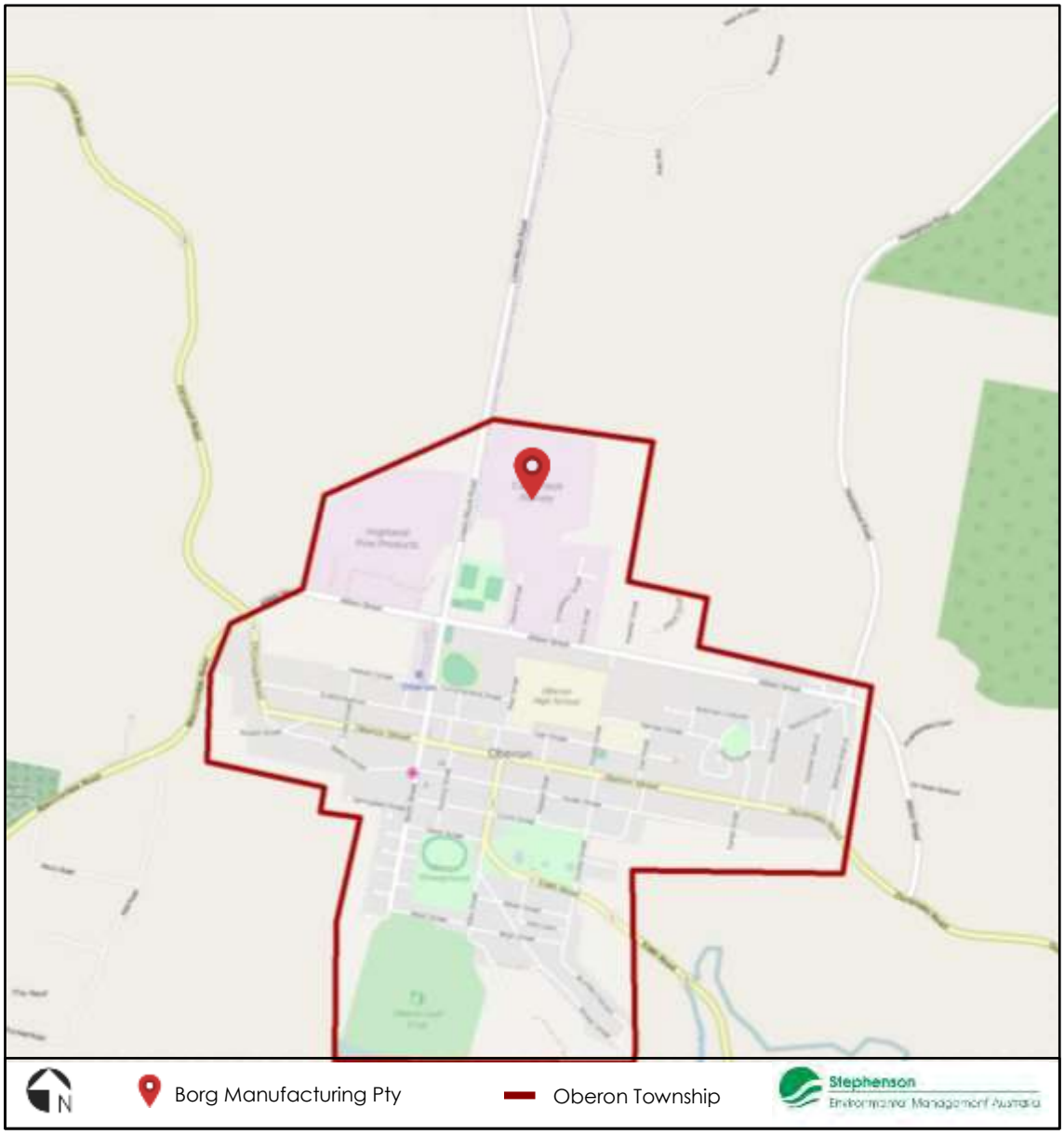
TSP, PM_{10}, NOx and formaldehyde emission measurements conducted by SEMA at the existing MDF plant on the 23rd to 27th February 2015 and 30th March 2015 have been used as the existing plant emissions input data for the modelling.

2 THE SITE

The Borg Oberon site occupies about 40 hectares, located approximately one kilometre north of the Oberon Post Office. Figure 2-1 displays the modelling domain extent and an aerial view of the existing facility. Figure 2-2 illustrates the Oberon township in relation to the total area of the modelling domain.

FIGURE 2-1 THE MODELLING DOMAIN (TOTAL AREA INCLUDED IN THE DISPERSION MODELLING)

FIGURE 2-2 OBERON TOWNSHIP (FORMS PART OF TOTAL MODELLING DOMAIN)



3 PLANT OPERATIONS

Borg advised that the Oberon facility operates on a cycle of 19 days on with two days off for scheduled maintenance on Mondays and Tuesdays every third week.

For the purpose of determining worst case impacts from the proposed Oberon PB Plant, this AQIA assumes the total Oberon facility will run 24 hours a day, seven days a week.

4 PROPOSED BORG OBERON PARTICLE BOARD PLANT

The proposed Oberon PB Plant design and operational specifications have been provided by Borg and are detailed in this section.

4.1 PROPOSED PB PLANT BUILDINGS AND STRUCTURES

Figure 4-1 illustrates the layout of the existing and proposed structures on the Borg Oberon site.

FIGURE 4-1 BORG OBERON SHOWING EXISTING AND PROPOSED BORG PB INFRASTRUCTURE

4.2 EMISSION POINTS – PROPOSED PB PLANT

The locations and dimensions of the emissions points (stacks and vents) for the proposed PB Plant, provided by Borg, are presented in Table 4-1.

Further detail of these emission points including emission concentrations, mass emission rates, exhaust gas flow rates, velocities and temperatures are detailed in Section 7.5 and Tables 7-2 and 7-3 of this AQIA.

TABLE 4-1 PROPOSED BORG OBERON PB PLANT POINT SOURCE SPECIFICATIONS

Proposed PB Emission Point		Proposed PB Stack dimensions			Co-ordinates	
No.	**Name**	**Height** (m)	**Exit diam.** (m)	**Exit area** (m^2)	**x**	**y**
E1	HD - Transport Sawdust and MDF Fines	20	0.26	0.05	764816	6267958
E2	HM particles- transport cyclofilter	20	0.22	0.04	764842	6267952
E3	Chipper cyclofilter	7	0.66	0.34	764974	6267885
E4	Hammer mill baghouse	10	0.97	0.74	764818	6267957
E5	Flaker mill baghouse	19	1.1	0.95	764875	6267947
E7	Baghouse dust transport	20	0.25	0.05	764816	6268012
E8	Baghouse air grader	10	1.39	1.53	764911	6267980
E9	Cyclofilter oversize mill	12	0.72	0.41	764914	6268034
E10	Cyclofilter oversize mill	12	0.72	0.41	764914	6268031
E12	Baghouse Forming line	40	1.6	2.01	764932	6267999
E13	Baghouse	10	0.96	0.72	764941	6268000
E14	Baghouse reject mat transport	20	0.69	0.37	764808	6267977
E15	Baghouse exhaust DD and trimming saws	20	0.91	0.65	764808	6267975
E16	Baghouse- material dust transport, E12,13,15.	20	0.25	0.05	764808	6267973
E19	Wet Electrostatic Precipitator	40	2.80	6.16	764871	6268019

Source: Borg Manufacturing

Key: E = Emission point
m = metres
diam. = diameter
m^2 = square metre(s)

FIGURE 4-2 BORG OBERON SITE ELEVATIONS

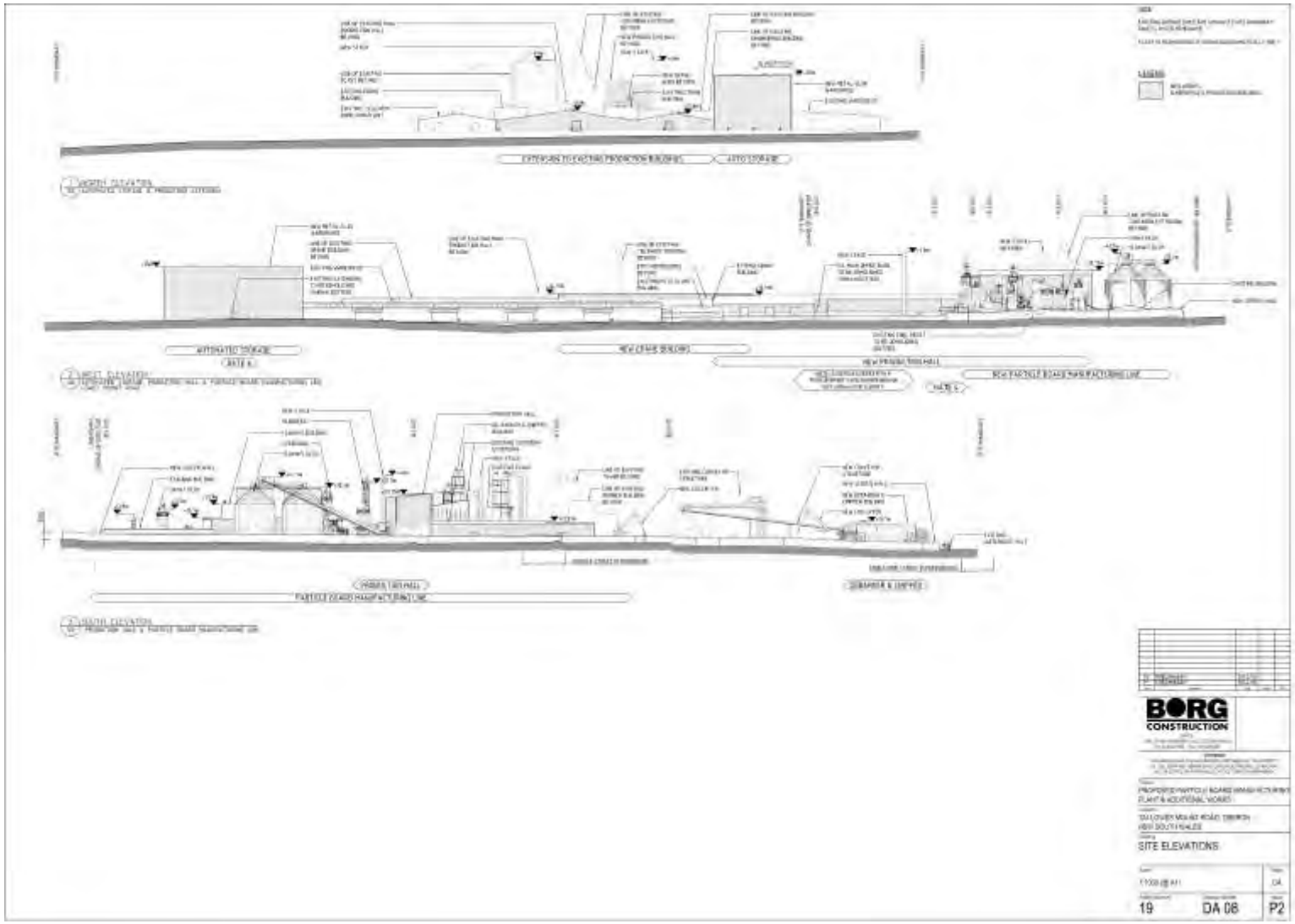
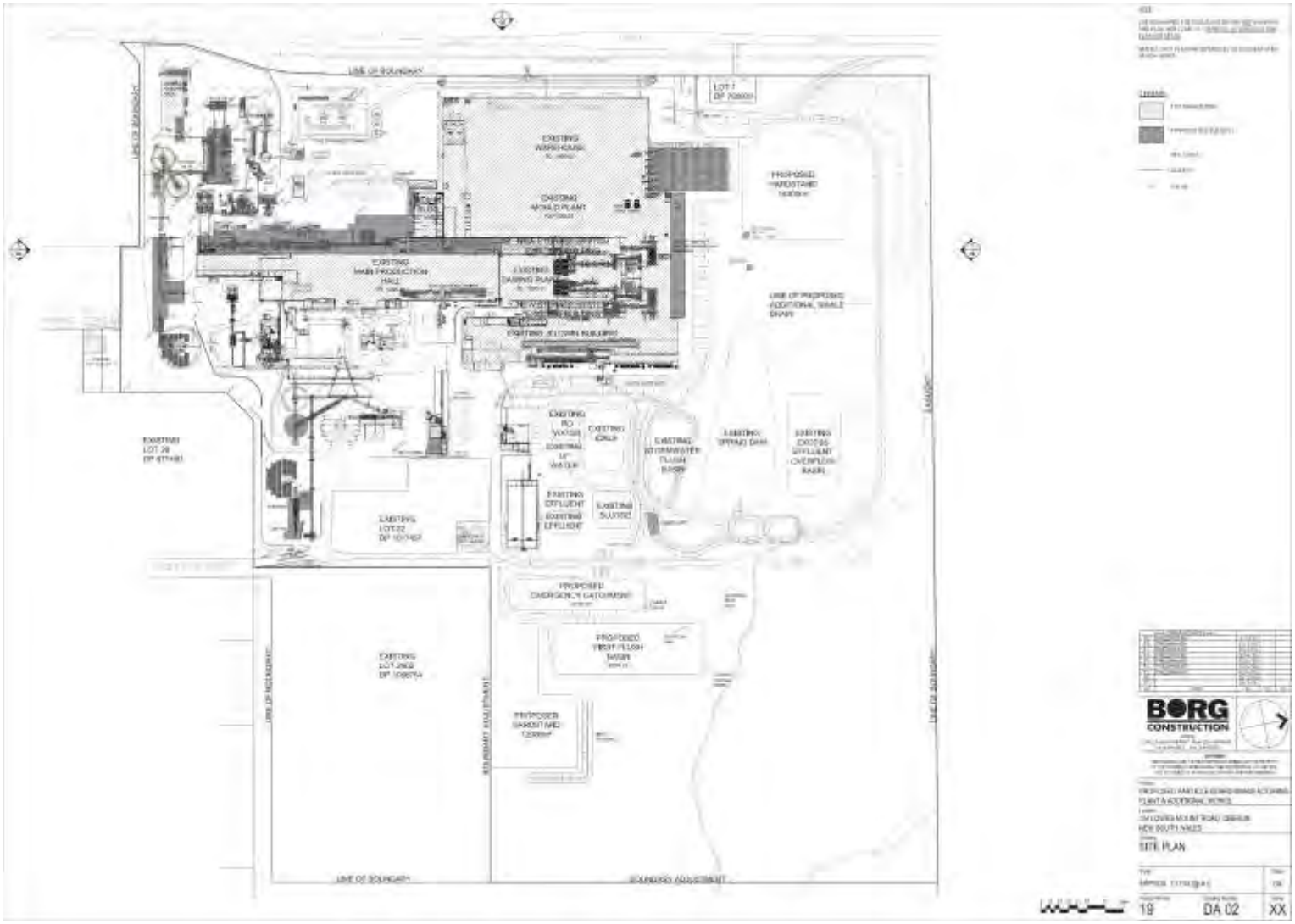


FIGURE 4-3 BORG OBERON PROPOSED PB PLANT LAYOUT



5 EXISTING EMISSIONS FROM MDF PLANTS PLUS PROPOSED COMBINED STACK

TSP, PM_{10}, NO_2 and formaldehyde emission measurements were conducted by Stephenson Environmental Management Australia (SEMA) at the existing Borg Oberon MDF facility on the 23 -27 February 2015 and 30 March 2015.

Modifications have been proposed for the existing approved MDF facility, which include additional mitigative measures on some existing emission points and the installation of new emission points. Borg has provided details of the emissions associated with these proposed modifications.

These modifications to the existing approved MDF facility, which form part of the assumptions for this AQIA, include:

1. EPA ID 23 (Paper treater) together with another additional treater (with a total flow rate of 80,000 m^3 per hour), will be diverted to EPA ID 11 (Conti-2 heat plant) where 95% of formaldehyde will be removed before discharge to the atmosphere;

2. EPA ID 12-2 (Conti 1 roof vent) will be diverted to EPA ID 17 (Conti-1 heat plant) were 95% of formaldehyde will be removed before discharge to the atmosphere;

3. A new 'combined stack' will be installed. This stack is proposed to be 40 metres high, 1.5 metres diameter, with a total flow rate of 100,000 m^3 per hour;

4. EPA ID 4 (DC1 baghouse) and EPA ID 5 (DC2 baghouse) will be discharged to the atmosphere through the proposed combined stack;

5. A wet scrubber system will be installed on the Conti 2 press line. This system is designed to emit a maximum of 40 mg/m^3 of TSP and 30 mg/m^3 of formaldehydes with a total flowrate of 100,000 m^3 per hour, which will be emitted through the combined stack.

The emissions details collected by SEMA for the existing facility, together with emission details provided by Borg regarding proposed modifications to MDF emission points and the proposed PB Plant have been included in this AQIA as cumulative emissions from the total Oberon facility. Table 5-1 presents the physical characteristics, exhaust gas temperature, flow rate and exit velocity of the emissions points used for the MDF facility.

Table 5-2 presents the TSP, PM_{10}, formaldehydes and NO_x emission rates for these stacks.

Refer to Section 9 for results of the cumulative impact assessment.

TABLE 5-1 MODIFIED EXISTING MDF FACILITY - EMISSION POINT PHYSICAL CHARACTERISTICS

EPA ID	Emission Point	Stack Height (m)	Stack Exit Diameter (m)	Flow Rate (am^3/min)	Exit Velocity (m/s)	Exit Temp. (°C)
7	Conti 2 cyclone (west)	44.40	2.48	3540	12.2	48
8	Conti 2 cyclone (east)	44.40	2.48	3767	13.0	48
9	Conti 1 South	30.50	2.23	3851	16.4	54
10	Conti 1 North	30.50	2.23	3660	15.6	55
11	Conti 2 heat plant	22.00	1.50	751	7.1	333
12-1	Conti 1 roof vent	11.95	1.14	668	10.9	52
12-5	Conti 1 roof vent	11.95	1.17	761	11.8	33
12-6	Conti 1 roof vent	11.95	1.19	908	13.6	34
17	Conti 1 Heat Plant	30.50	1.20	688	10.1	258
--	Conti-2 Proposed 40m Stack	40.00	1.50	1667	15.7	35

TABLE 5-2 MODIFIED EXISTING MDF FACILITY - TSP, PM_{10}, HCHO & NO_x EMISSION RATES

EPA ID	Emission Point	TSP (g/s)	PM_{10} (g/s)	HCHO (g/s)	NOx (g/s)
7	Conti 2 cyclone (west)	0.852	0.852	N/A	5.31
8	Conti 2 cyclone (east)	0.575	0.575	N/A	7.13
9	Conti 1 South	0.329	0.373	0.3397	2.40
10	Conti 1 North	0.505	0.256	0.5432	2.06
11	Conti 2 heat plant	0.983	0.887	0.0155	3.70
12-1	Conti 1 roof vent	0.010	0.012	0.0002	0.04
12-5	Conti 1 roof vent	0.001	0.002	0.0125	0.04
12-6	Conti 1 roof vent	0.002	0.002	0.0058	0.00
17	Conti 1 Heat Plant	1.055	0.976	0.0032	4.66
--	Conti-2 Proposed 40m Stack	1.114	1.114	0.4538	0.03

Key to Tables 5.1 and 5.2:

m	=	metres
am^3/min	=	actual cubic metres per minute
m/s	=	metres per second
°C	=	degrees Celsius
TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
HCHO	=	formaldehyde
NO_2	=	nitrogen dioxide
g/s	=	grams per second
N/A	=	Not Applicable

6 IMPACT ASSESSMENT CRITERIA

The AMMAAP criterion for TSP, PM_{10}, NO_2 and formaldehyde is outlined in Table 6-1.

For the purpose of this study, the maximum predicted ground level concentration at each ground level receptor location is defined as the 99.9th percentile peak concentration for formaldehyde and the 100th percentile peak concentration for NO_2, PM_{10} and TSP in accordance with AMMAAP.

TABLE 6-1 IMPACT ASSESSMENT CRITERIA FOR PARTICULATES

Pollutant	Averaging period	Units of measure	Impact Assessment Criteria	Source
TSP	Annual	µg/m^3	90	NHMRC (1996)
PM_{10}	24 hours	µg/m^3	50	NEPC (1998)
	Annual	µg/m^3	30	EPA (1998)
NO_2	1 hour	µg/m^3	246	NEPC (1998)
	Annual	µg/m^3	62	NEPC (1998)
HCHO	1 hour	mg/m^3	0.02	VGG (2001)

Key:

TSP	=	total suspended particulate matter
NO_2	=	nitrogen dioxide
PM_{10}	=	particulate Matter less than 10 micron
HCHO	=	formaldehyde
µg/m^3	=	micrograms per cubic metre
mg/m^3	=	milligrams per cubic metre
NHMRC	=	National Health and Medical Research Council
NEPC	=	National Environment Protection Council
EPA	=	NSW Environment Protection Authority
VGG	=	Victorian Government Gazette

7 DISPERSION MODELLING INPUT DATA

USEPA's AERMOD model was used to assess the potential impact of emissions from the proposed Borg PB Plant at Oberon. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

To best approximate site conditions and thus predict the most accurate ground level concentrations for pollutants modelled, AERMOD is customised with operation and input parameters, which are discussed in further detail below.

7.1 METEOROLOGICAL DATA

The meteorological data for this Oberon, NSW site was processed in two steps. MM5 (5th-generation Mesoscale Model) which is a prognostic meteorology model developed by Pennsylvania State University and the U.S. National Center for Atmospheric Research (NCAR) was used for modelling 2014 surface and upper air meteorological data for the dispersion modelling domain. Further processing of the MM5 data was then undertaken in AERMET to produce the wind field and weather data suitable for dispersion modelling with AERMOD.

Figure 7-1 summarises the annual 2014 wind strength, direction and frequency near Borg Oberon, showing prevailing winds were from a south-westerly direction. The 2014 meteorological data was selected as representative for the purposes of the dispersion modelling.

7.2 BUILDING DATA

As winds approach buildings and other structures, the wind tries to flow over or around the structure. This results in higher air pressures on the upwind side of the structures and lower air pressures on the downwind side of the structures. Depending on the discharge height of the stack relative to building or structure heights the lower pressures on the downwind side of buildings can cause plumes from stacks and other building openings to be trapped in the wake air flows, which increase ground level impacts and decrease the effects of dispersion on the downwind side of the buildings. This scenario is referred to as building wake or building down wash effects.

The AERMOD model contains options for including the effects of building wakes/downwash in the calculations. The model requires the building heights and widths and geographic coordinates as input to calculate the effects of building downwash.

The location and dimensions of existing and proposed major structures at the Borg Oberon site have been included for the purpose of this AQIA. Figure 7-2 shows the building structures which have been incorporated in the model and their orientation in relation to the emission points.

FIGURE 7-1 ANNUAL WIND ROSE, OBERON 2014

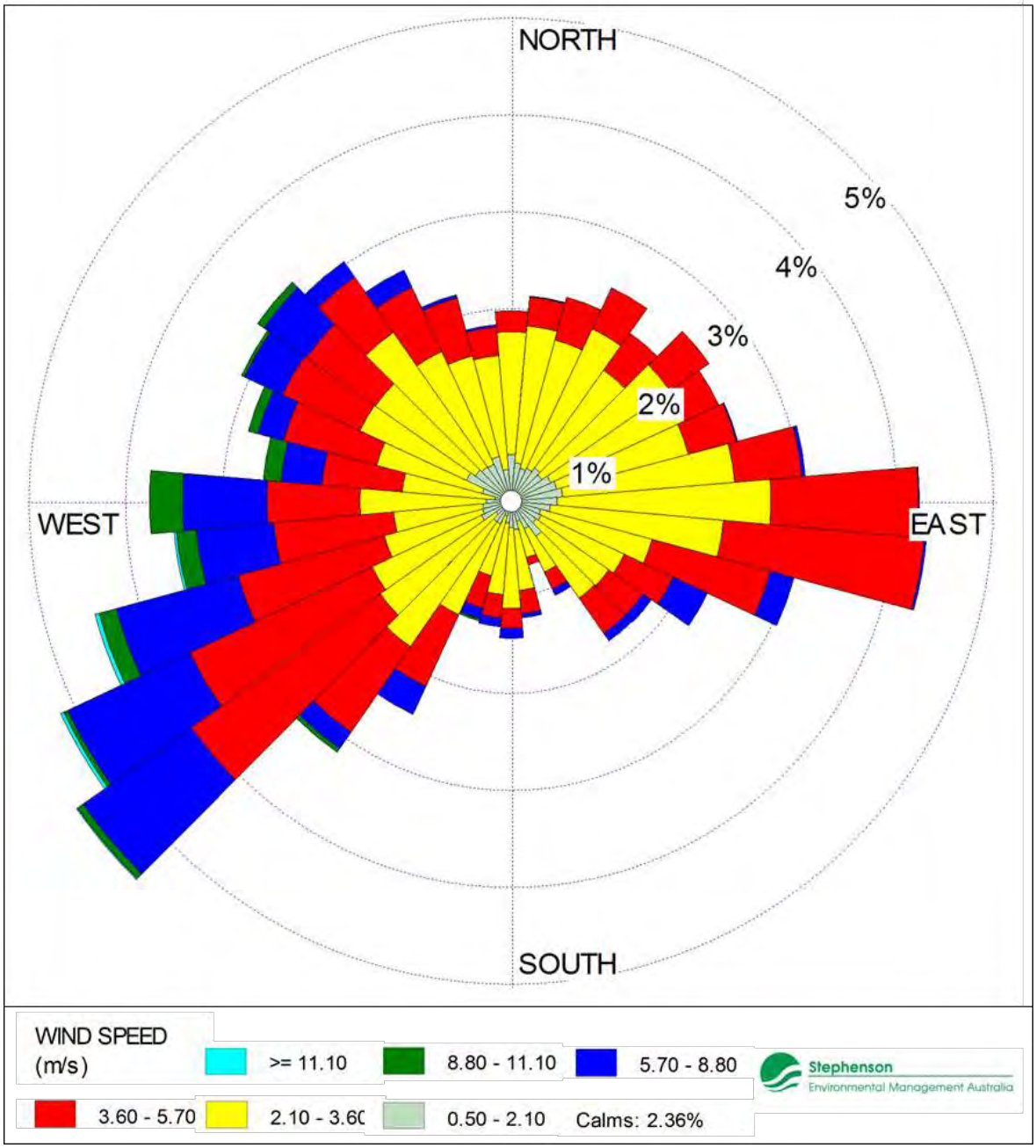
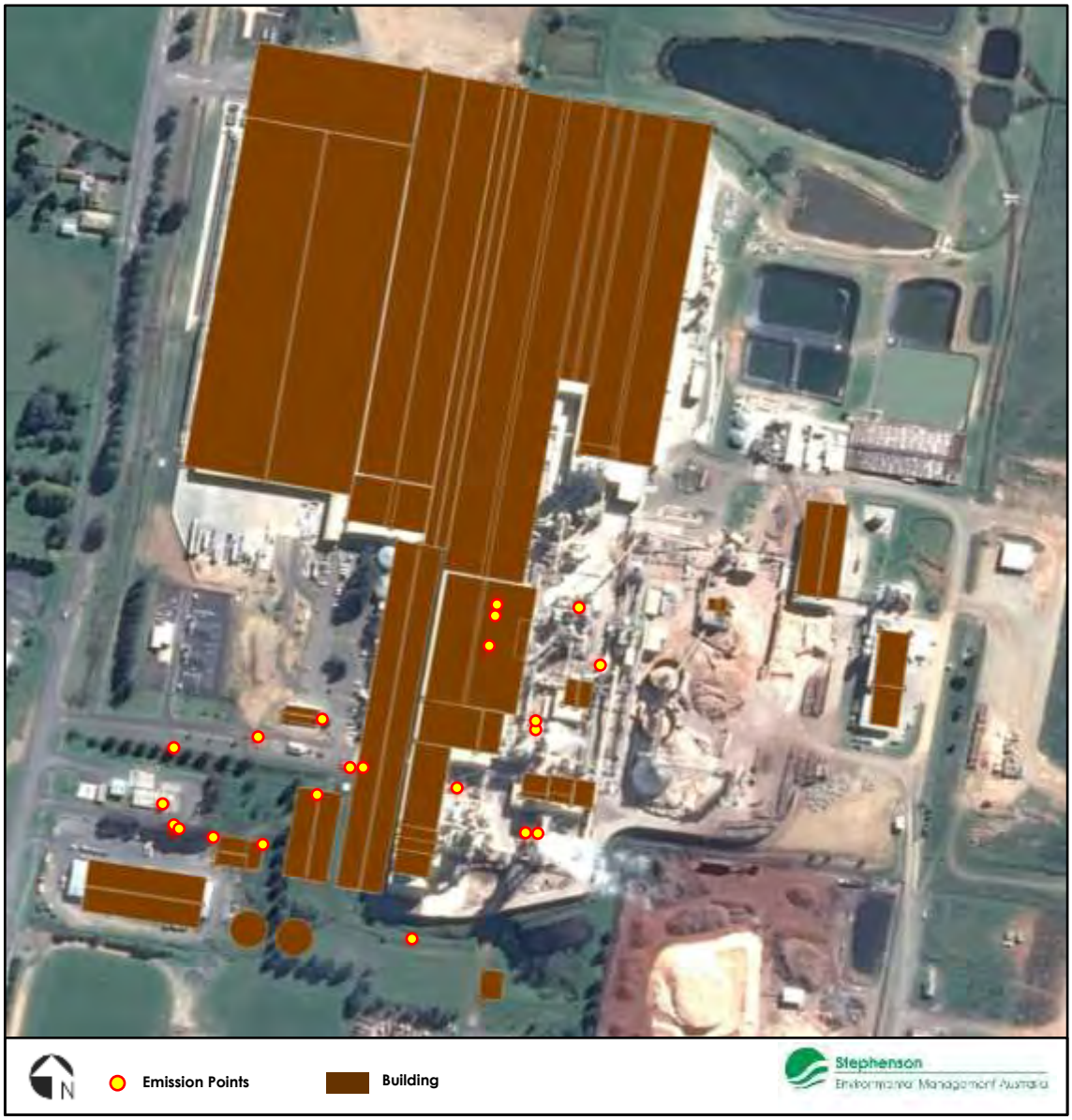


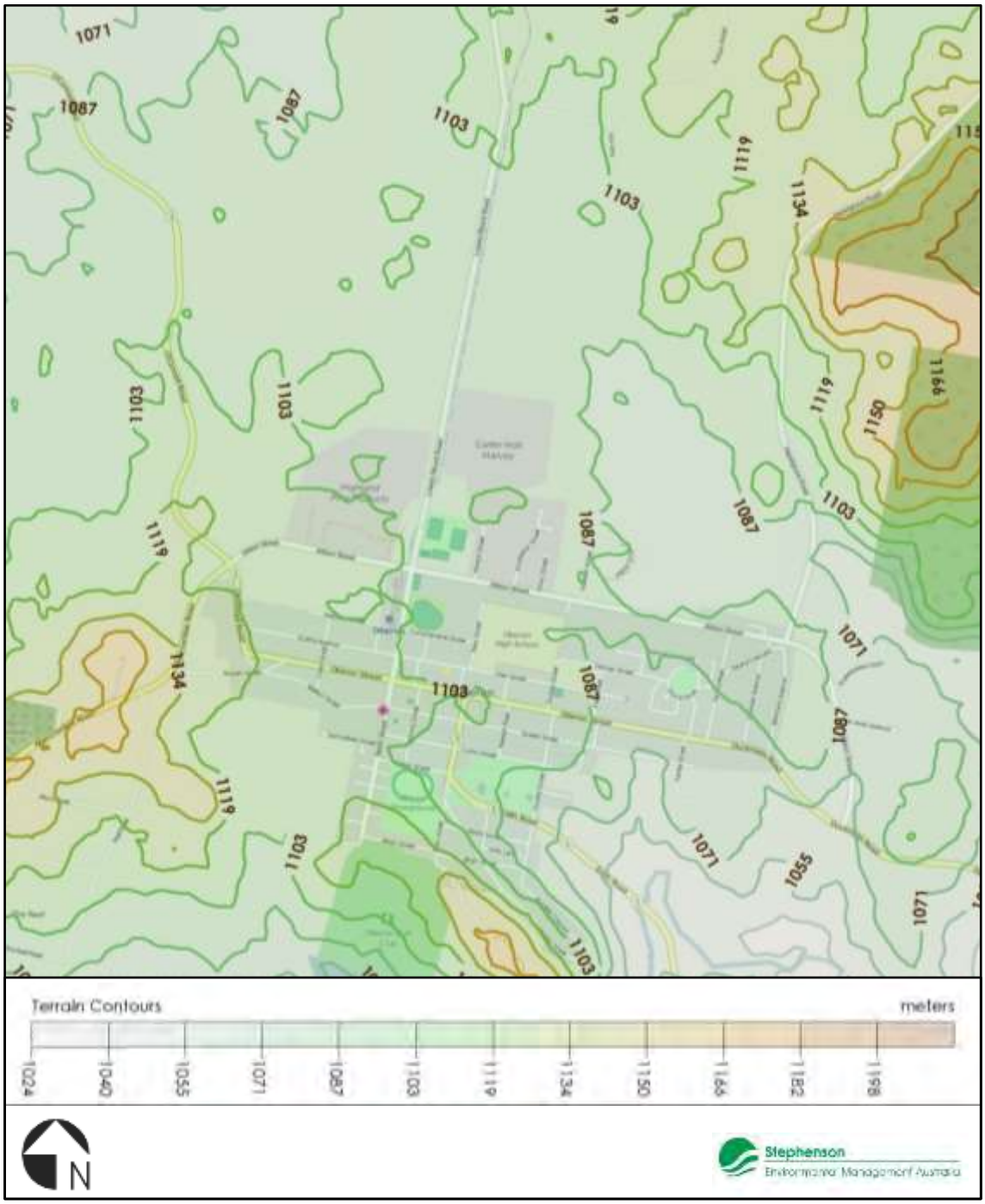
FIGURE 7-2 MODELLING ASSESSMENT BUILDING PROFILE



7.3 TERRAIN DATA

Shuttle Radar Topography Mission (1 arc second) (SRTM1) (Global ~30m) terrain data was processed through AERMAP and elevations were applied to all buildings, emission points and receptors modelled. Refer Figure 7-3 for a terrain map illustrating the elevations of the modelling domain.

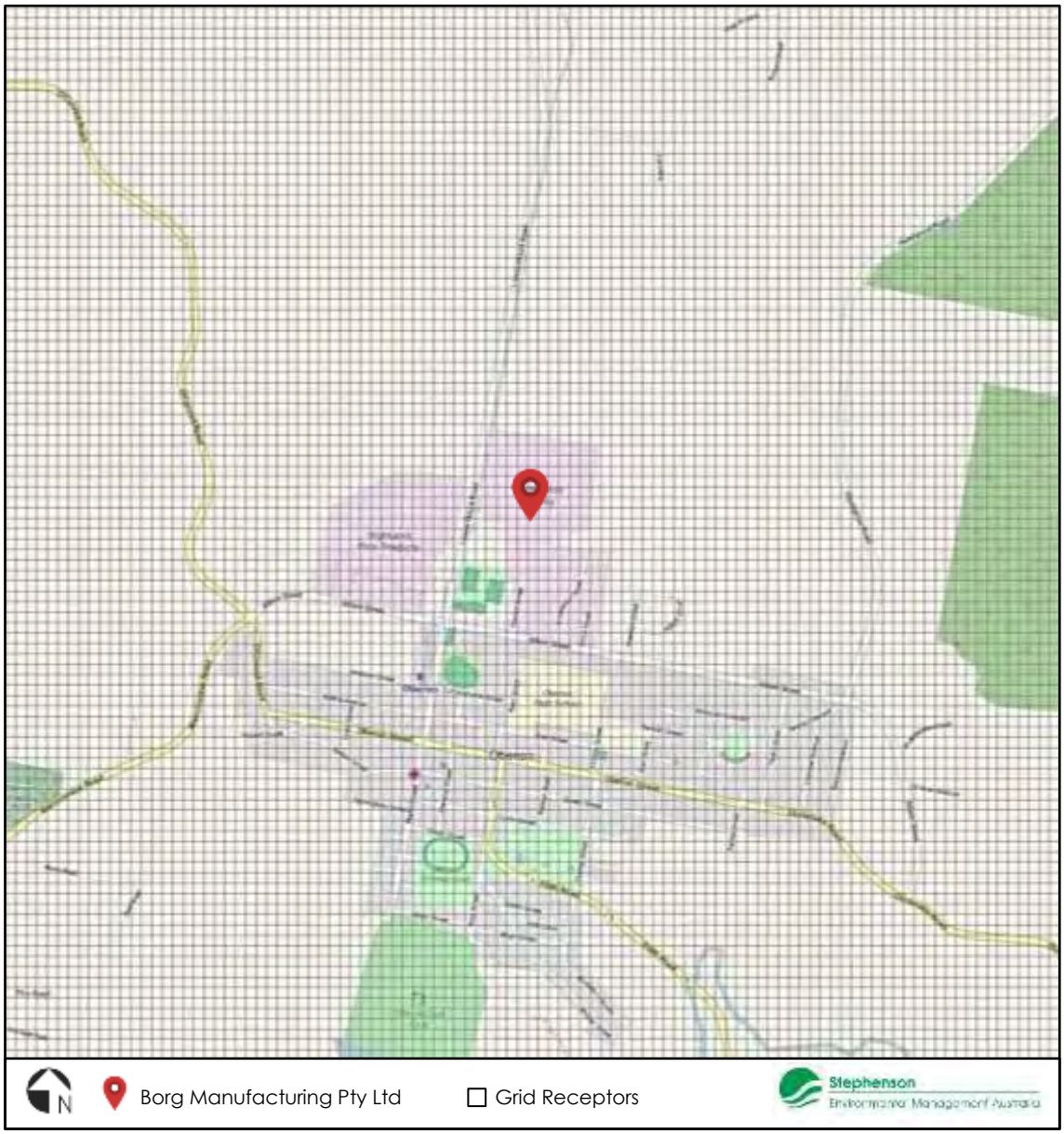
FIGURE 7-3 ELEVATION OF MODELLING DOMAIN



7.4 RECEPTORS

Cartesian grid receptors were setup over the modelling domain at 50 metre intervals. Figure 7-4 illustrates these receptors. Additional receptors were setup at the boundary of the Borg site. Receptors inside the boundary of the Borg Oberon site were removed.

FIGURE 7-4 RECEPTOR LOCATIONS



7.5 PROPOSED PB PLANT EMISSIONS INPUT DATA

Emissions input data for the proposed PB Plant was sourced from the following:

- Borg provided building locations, stack and vent locations and dimensions. Refer Section 4.
- SEMA provided actual measured stack and vent emissions from existing facility. Refer Section 5.
- Supplier specifications were provided by Borg for equipment design calculations and conservative emission data from the proposed emission points.

  Refer Table 7-1 for flow rates, velocities and exhaust gas temperatures and Table 7-2 for TSP, PM_{10}, NO_2 and formaldehyde concentrations and mass emission rates.

TABLE 7-1 PROPOSED BORG PB PLANT - EMISSION POINT FLOW RATES, VELOCITIES & TEMPERATURES

Emission Point	Nominated				
	Stack Height (m)	**Stack Exit Diameter** (m)	**Flow Rate** (am^3/min)	**Exit Velocity** (m/s)	**Exit Temperature** (°C)
E1	20.0	0.26	64	20.0	ambient
E2	20.0	0.22	45	20.0	ambient
E3	7.0	0.66	417	20.0	ambient
E4	10.0	0.97	667	15.0	ambient
E5	19.0	1.10	855	15.0	ambient
E7	20.0	0.25	45	15.0	ambient
E8	10.0	1.39	917	10.0	45
E9	12.0	0.72	367	15.0	50
E10	12.0	0.72	367	15.0	50
E12	40.0	1.60	2583	21.4	20
E13	10.0	0.96	433	10.0	20
E14	20.0	0.69	333	15.0	20
E15	20.0	0.91	583	15.0	20
E16	20.0	0.25	45	15.0	ambient
E19	40.0	2.80	6353	17.2	67

Key overleaf

TABLE 7-2 PROPOSED BORG PB PLANT - EMISSION POINT MASS EMISSION RATES

Emission Point	TSP	PM_{10}*	NOx	HCHO
	g/s	g/s	g/s	g/s
E1	0.005	0.005	--	--
E2	0.004	0.004	--	--
E3	0.035	0.035	--	--
E4	0.056	0.056	--	--
E5	0.072	0.072	--	--
E7	0.004	0.004	--	--
E8	0.076	0.076	--	--
E9	0.306	0.031	--	--
E10	0.306	0.031	--	--
E12	0.160	0.160	--	0.22
E13	0.036	0.036	--	--
E14	0.028	0.028	--	--
E15	0.049	0.049	--	--
E16	0.004	0.004	--	--
E19	1.588	1.588	9.72	0.32

Key to Tables 7.1 and 7.2

m	=	metres
am^3/min	=	actual cubic metres per minute
m/s	=	metres per second
°C	=	degrees Celsius
TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	oxides of nitrogen
HCHO	=	formaldehyde
g/s	=	grams per second
N/A	=	Not Applicable
*	=	assumed same as TSP

8 IMPACT ASSESSMENT PREDICTIONS

Section 8.1 provides the impacts of the proposed PB Plant. Section 8.2 provides the cumulative impacts from the proposed PB Plant together with the existing MDF facility with its proposed modifications.

For the purpose of this AQIA, the NO_2 ground level concentration prediction has been conducted by modelling the total oxides of nitrogen emission rate from each source, with the results scaled by an empirical nitric oxide/nitrogen dioxide conversion ratio. A ratio of 40% conversion of the NO_x to NO_2 has been assumed for this study, which is very conservative considering the size of the domain and the ratio of short travel/conversion reaction time of plume to the maximum ground level concentrations.

8.1 PROPOSED PB PLANT IMPACT ASSESSMENT PREDICTIONS

This AQIA predicts maximum GLC's from the proposed PB Plant will be as follows:

- Annual average worst case predicted TSP GLC is 6µg/m^3.
- 24-hour average worst case predicted PM_{10} GLC is 21µg/m^3.
- Annual average worst case predicted PM_{10} GLC is 3µg/m^3.
- One-hour average worst case predicted NO_2 GLC is 57µg/µm^3.
- Annual average worst case predicted NO_2 GLC is 1µg/m^3.
- One-hour average worst case predicted formaldehyde GLC is 0.01 mg/m^3.

Table 8-1 presents proposed PB Plant impact assessment predictions for the total modelling domain, the Oberon township and the Borg site boundary.

Figure 8-1 to Figure 8-6 present the impact assessment schematic plots for each pollutant.

TABLE 8-1 IMPACT ASSESSMENT PREDICTIONS – BORG PROPOSED PB PLANT

Pollutant	Units	Averaging period	IAC	Predicted worst case GLC location		
				Total Modelling Domain	Borg Oberon Site Boundary	Oberon Township
TSP	µg/m³	Annual	90	6	6	6
PM_{10}	µg/m³	24 hours	50	21	21	20
	µg/m³	Annual	30	3	3	3
NO_2*	µg/m³	1 hour	246	57	11	31
	µg/m³	Annual	62	1	1	1
HCHO	mg/m³	1 hour	0.02	0.01	0.002	0.002

Key:

TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	nitrogen dioxide
HCHO	=	formaldehyde
GLC	=	Ground Level Concentration
IAC	=	Impact Assessment Criteria
µg/m³	=	micrograms per cubic metre
mg/m³	=	milligrams per cubic metre
*	=	40% NO_x to NO_2 conversion assumed

FIGURE 8-1 PREDICTED IMPACT - ANNUAL AVERAGE TSP CONCENTRATIONS - PB PLANT ONLY

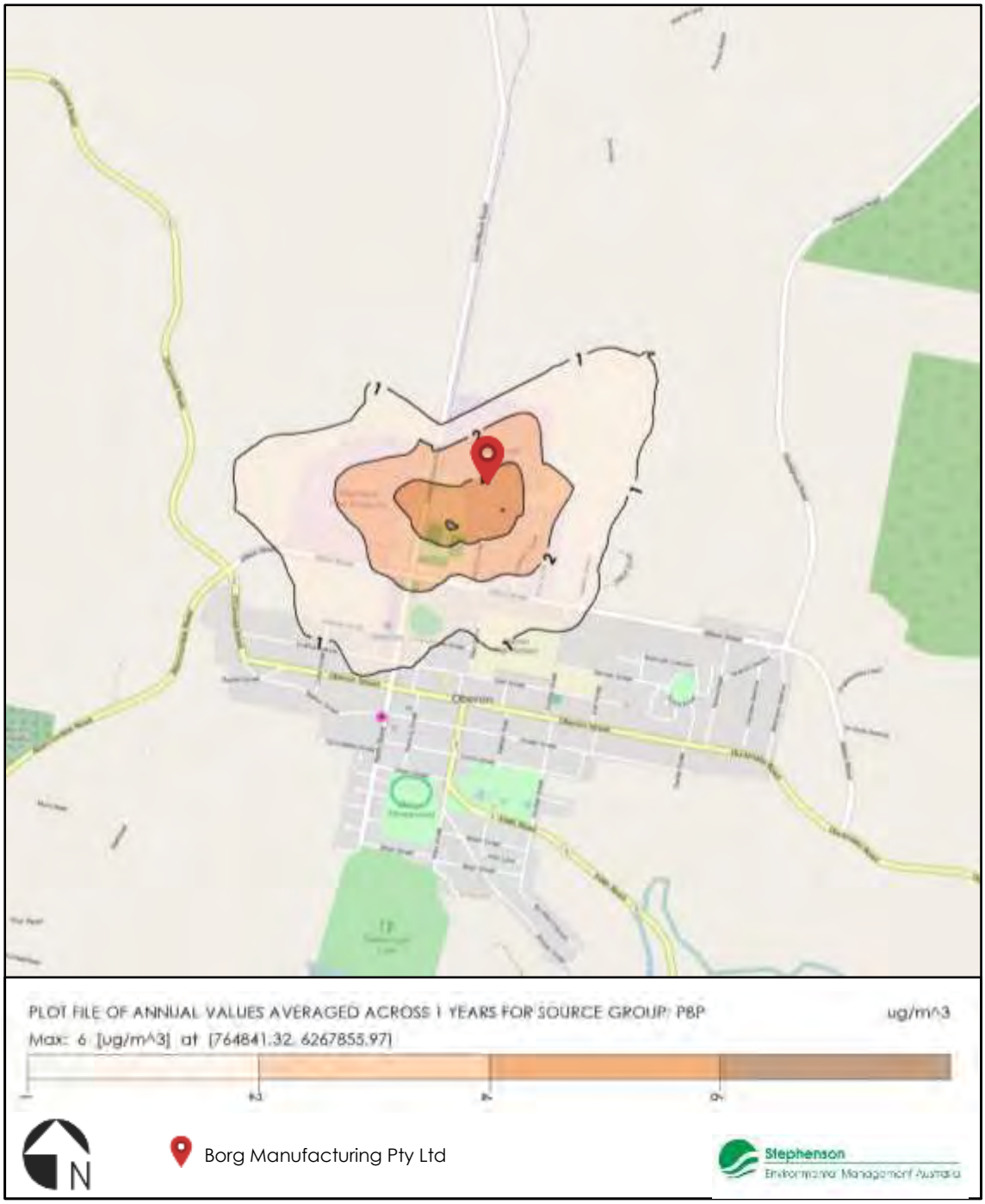


FIGURE 8-2 PREDICTED IMPACT - 24 HR AVERAGE PM_{10} CONCENTRATIONS- PB PLANT ONLY

FIGURE 8-3 PREDICTED IMPACT - ANNUAL AVERAGE PM_{10} CONCENTRATIONS - PB PLANT ONLY

FIGURE 8-4 PREDICTED IMPACT - 1 HR AVERAGE NO_2 CONCENTRATIONS - PB PLANT ONLY

FIGURE 8-5 PREDICTED IMPACT - ANNUAL AVERAGE NO_2 CONCENTRATIONS - PB PLANT ONLY

FIGURE 8-6 PREDICTED IMPACT - 1 HR AVERAGE FORMALDEHYDE CONCENTRATIONS- PB PLANT ONLY

9 CUMULATIVE IMPACT ASSESSMENT – EXISTING MDF PLANT PLUS PB PLANT

The cumulative impact of the Borg Oberon PB Plant and the existing Oberon MDF plant is detailed in this section. The cumulative impact assessment indicates that; in the total modelling domain:

- The annual average worst case predicted TSP GLC is 8 µg/m^3.
- The 24-hour average worst case predicted PM_{10} GLC is 25 µg/m^3.
- The annual average worst case predicted PM_{10} GLC is 4 µg/m^3.
- The one-hour average worst case predicted NO_2 GLC is 225 µg/m^3.
- The annual average worst case predicted NO_2 GLC is 4 µg/m^3.
- The one-hour average worst case predicted formaldehyde GLC is 0.03 mg/m^3.

Table 9-1 presents the cumulative impact assessment predictions for the proposed PB Plant with the MDF Plant (after modifications).

Figures 9-1 to Figure 9-6 present the impact assessment plots for the ground level impact of each pollutant.

TABLE 9-1 IMPACT ASSESSMENT PREDICTIONS – CUMULATIVE EXISTING MDF PLUS PROPOSED PB

Pollutant	Units	Averaging period	IAC	Predicted Cumulative Maximum GLC		
				Total Modelling Domain	Borg Oberon Site Boundary	Oberon Township
TSP	µg/m^3	Annual	90	8	8	7
PM_{10}	µg/m^3	24 hours	50	25	24	25
	µg/m^3	Annual	30	4	4	4
NO_2*	µg/m^3	1 hour	246	225	51	49
	µg/m^3	Annual	62	4	3	3
HCHO	mg/m^3	1 hour	0.02	0.03	0.01	0.01

Key:

IAC	=	Impact Assessment Criteria
TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	nitrogen dioxide
HCHO	=	formaldehyde
GLC	=	Ground Level Concentration
µg/m^3	=	micrograms per cubic metre
mg/m^3	=	milligrams per cubic metre
*	=	40% NO_x to NO_2 conversion assumed

FIGURE 9-1 PREDICTED IMPACT - CUMULATIVE ANNUAL AVERAGE TSP GLC

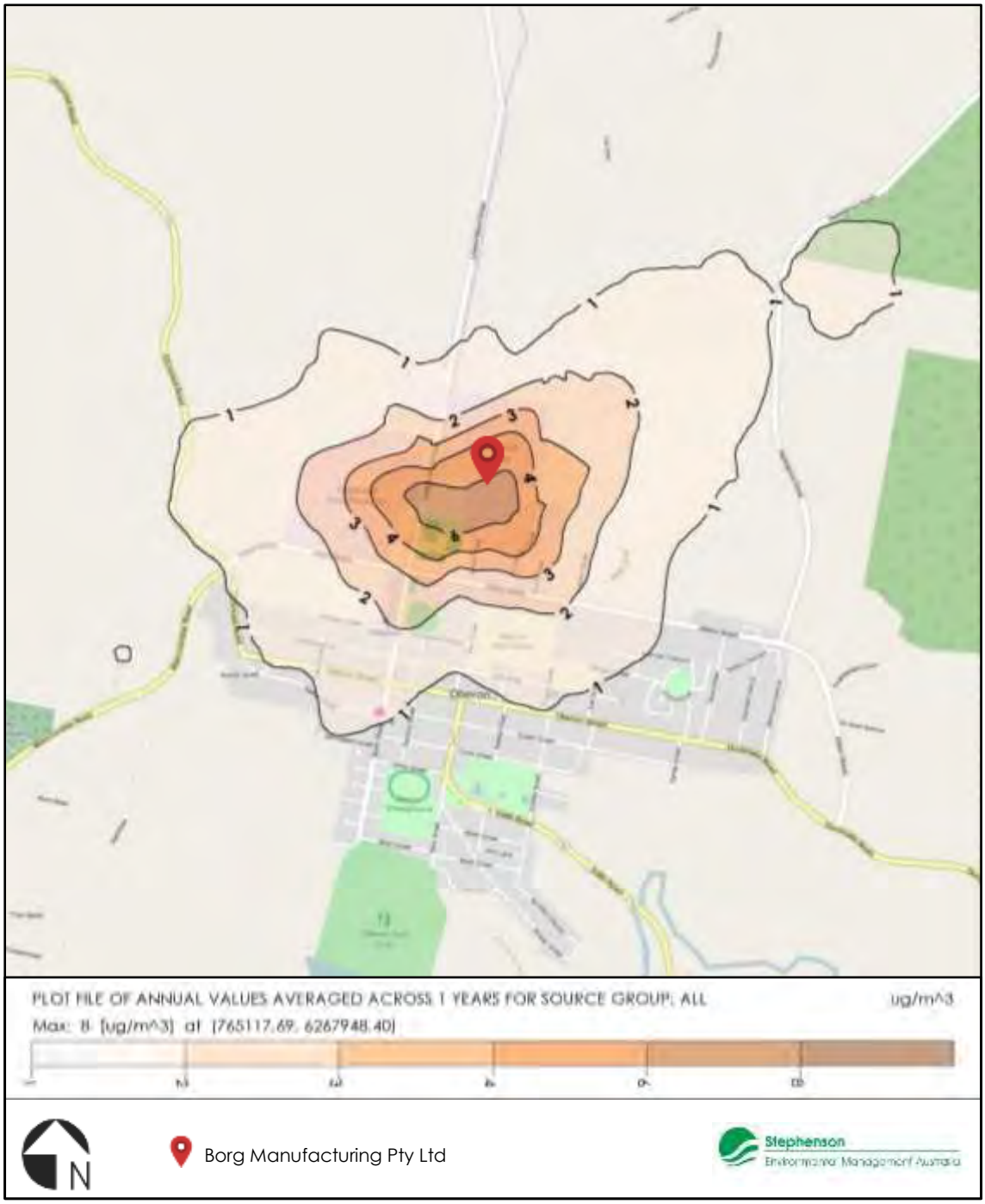


FIGURE 9-2 PREDICTED IMPACT - CUMULATIVE 24 HR AVERAGE PM_{10} GLC

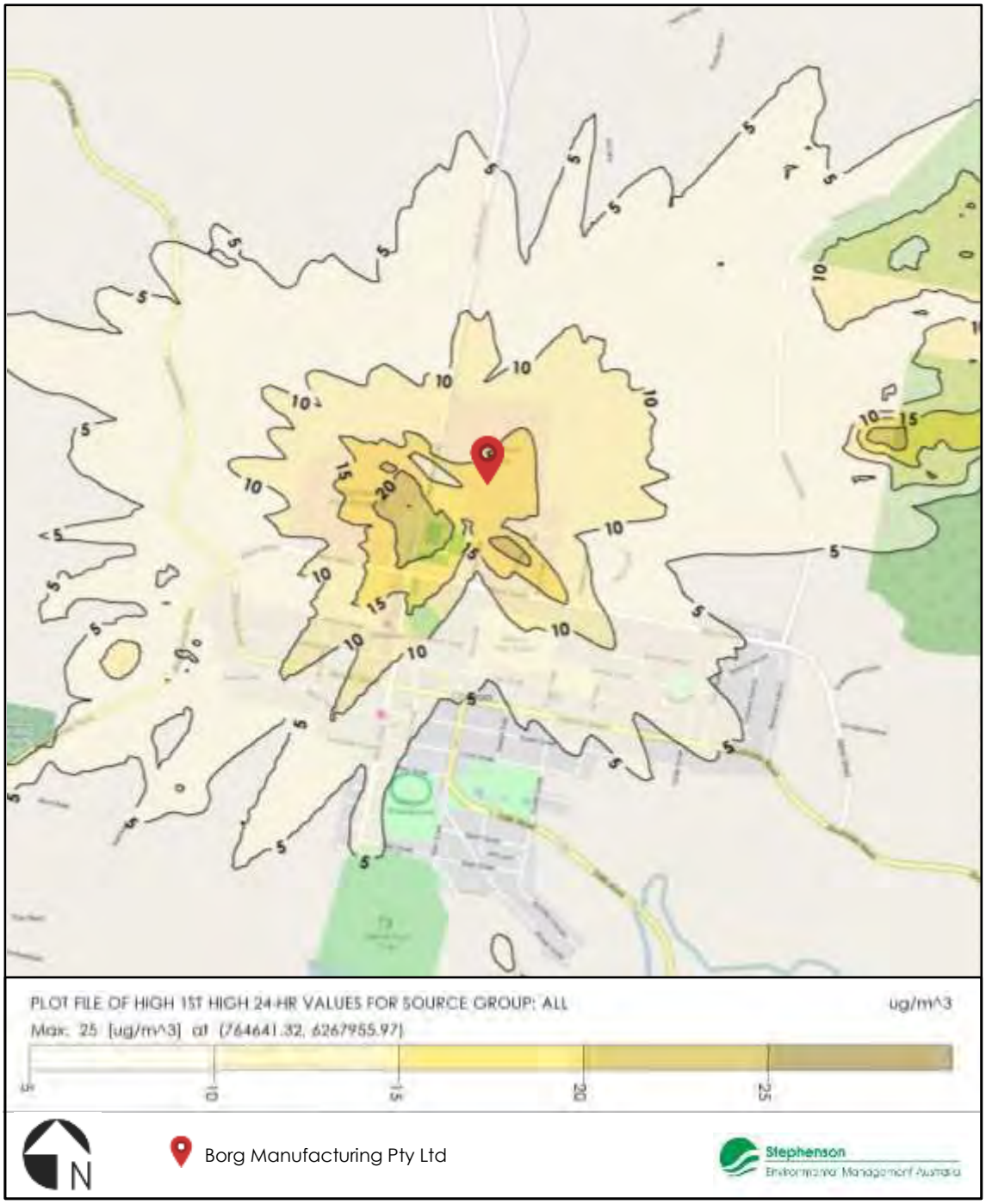


FIGURE 9-3 PREDICTED IMPACT - CUMULATIVE ANNUAL AVERAGE PM_{10} GLC

FIGURE 9-4 PREDICTED IMPACT - CUMULATIVE 1 HR AVERAGE NO_2 GLC

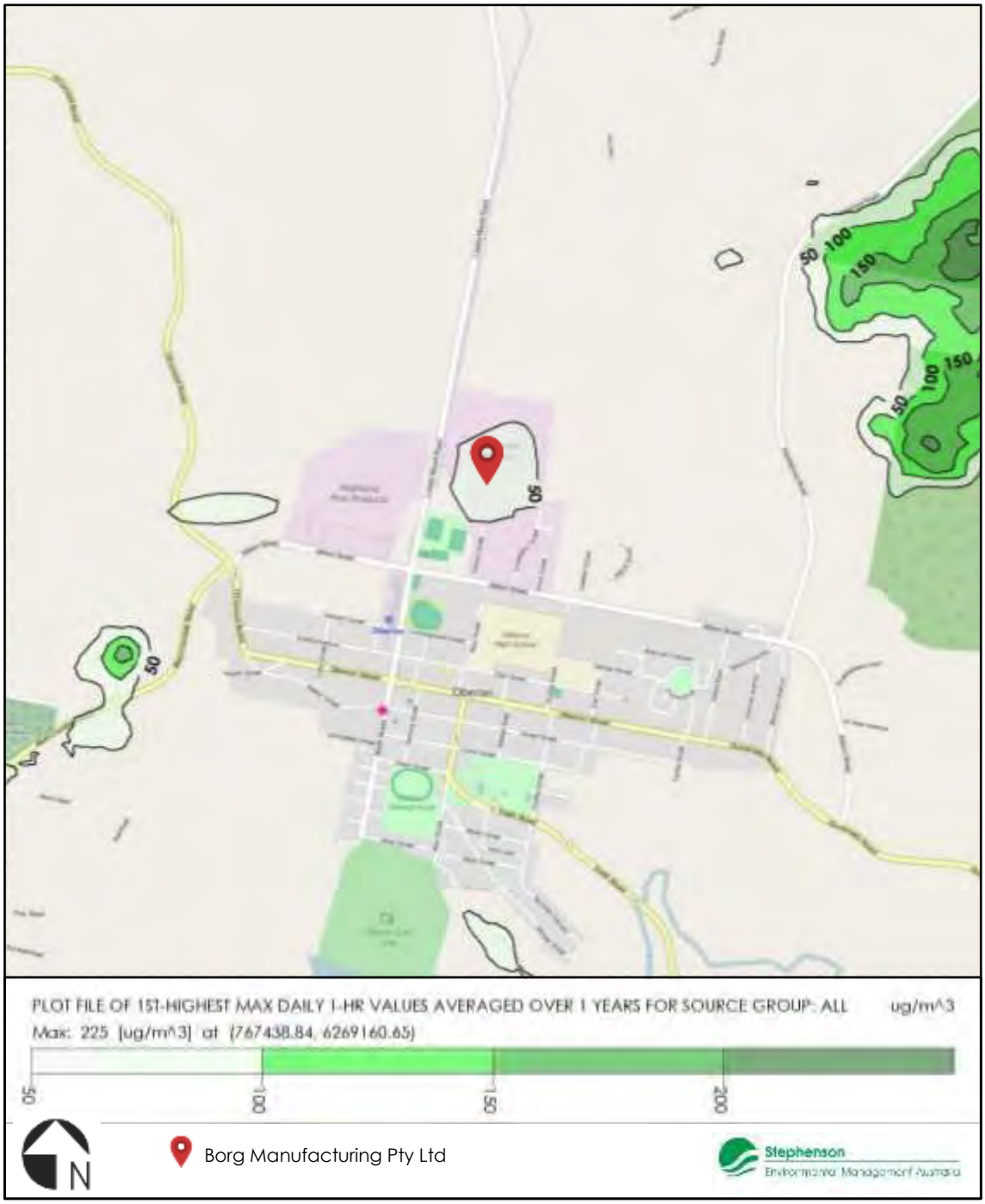


FIGURE 9-5 PREDICTED IMPACT - CUMULATIVE ANNUAL AVERAGE NO_2 GLC

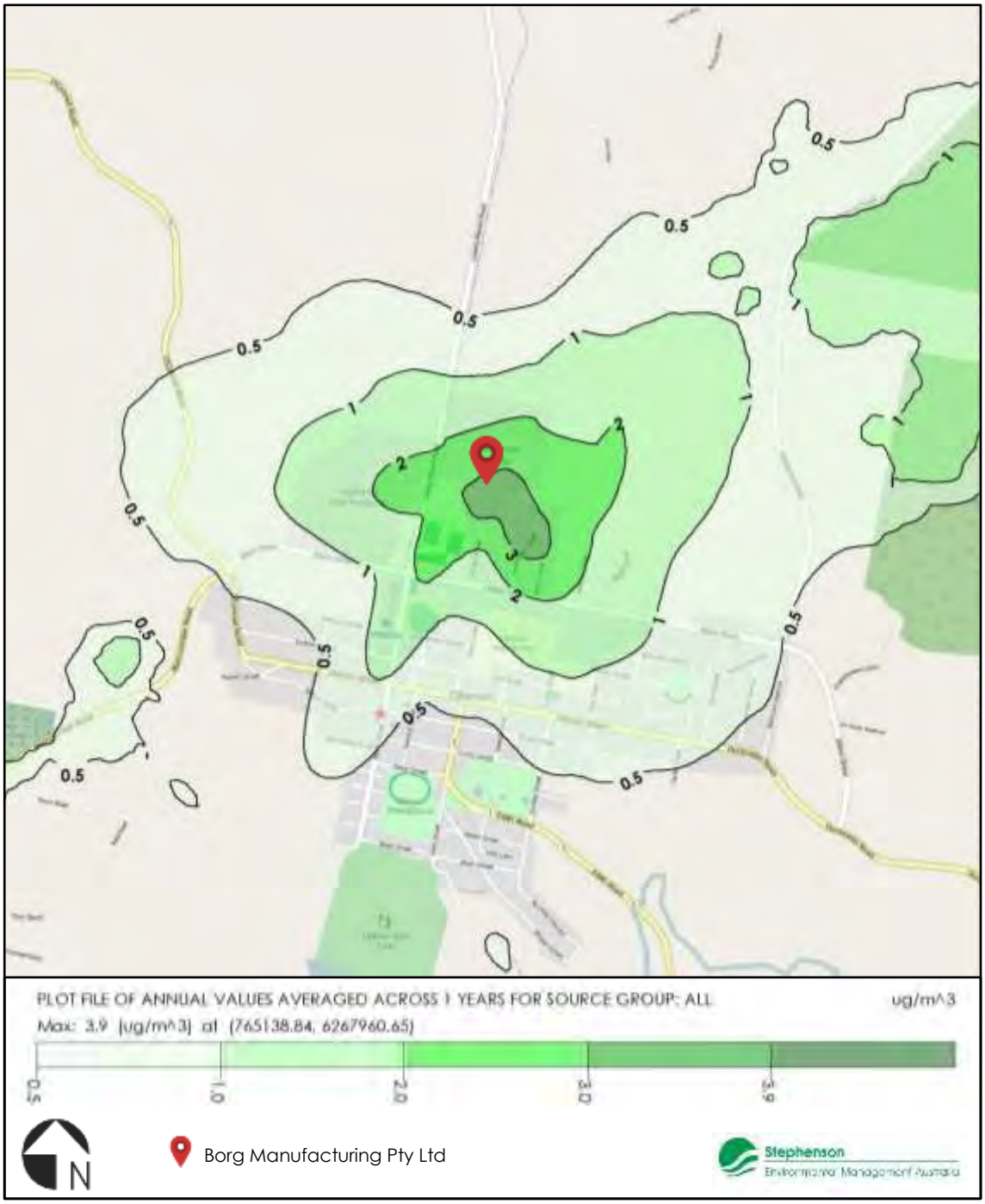
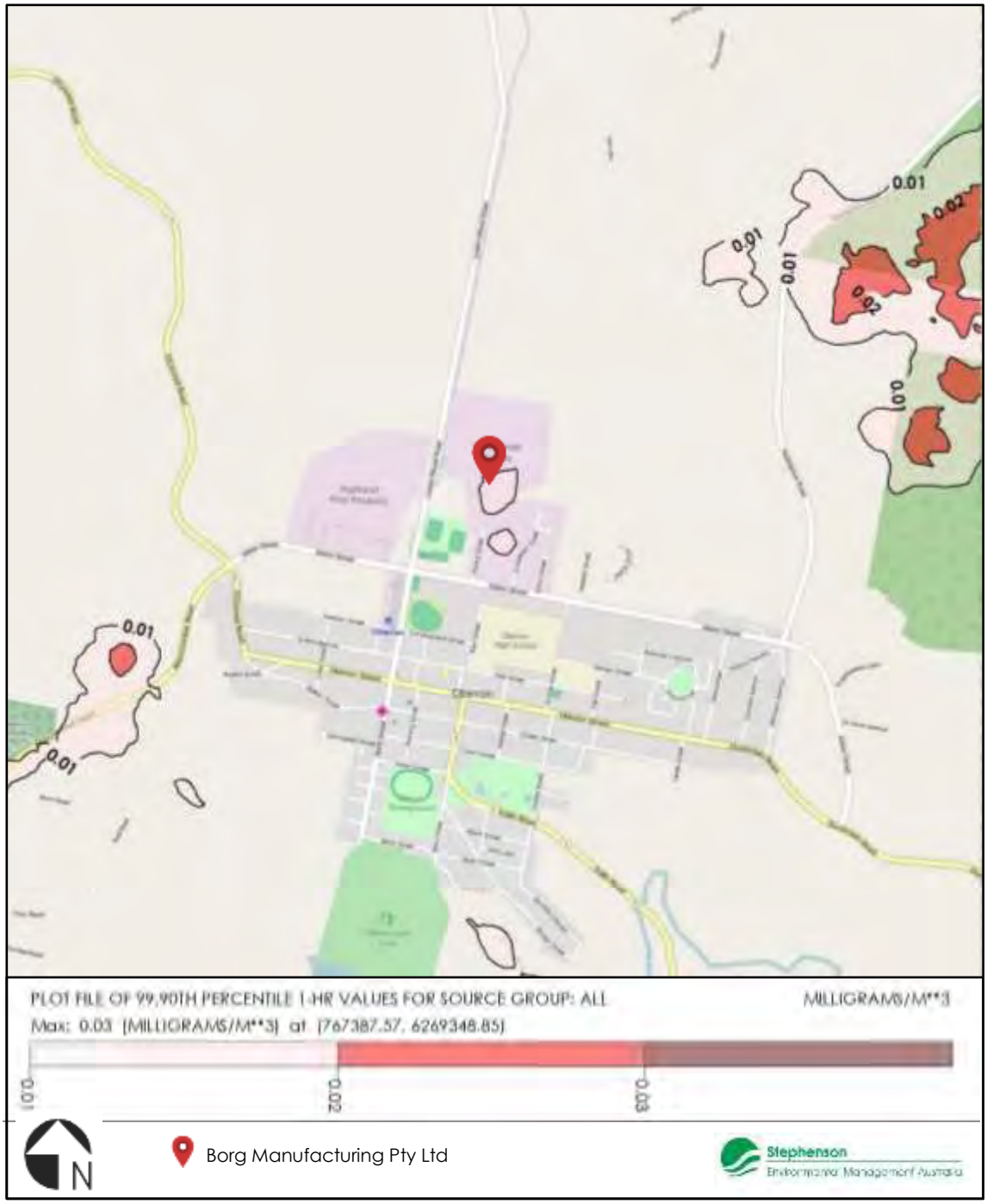


FIGURE 9-6 PREDICTED IMPACT - CUMULATIVE 1 HR AVERAGE HCHO GLC



10 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of this AQIA are discussed in this section in 10.1 to 10.4. Mitigation measures proposed to be implemented are discussed in 10.5. Table 10.1 shows this data in tabular form.

These conclusions are based on the assumptions that the:

- background levels for TSP, PM_{10}, NO_2 and formaldehyde in the vicinity of the Borg Oberon facility are zero;
- proposed modifications to the existing MDF plant are complete; and
- proposed PB Plant is in operation.

10.1 TOTAL SOLID PARTICULATE MATTER (TSP)

TSP GLCs are predicted to be below the IAC of 90 $\mu g/m^3$. The maximum cumulative Borg facility, (which includes the proposed PB Plant), annual average TSP GLC is predicted to be 8 $\mu g/m^3$ at both the site boundary and throughout the total modelling domain, and is predicted to be 7 $\mu g/m^3$ at receptors in the Oberon township.

10.2 PARTICULATE MATTER LESS THAN 10 MICRONS (PM_{10})

PM_{10} GLCs are predicted to be below both the 24-hour average PM_{10} GLC IAC of 50 $\mu g/m^3$ and the annual average PM_{10} GLC IAC of 30 $\mu g/m^3$.

The total modelling domain maximum cumulative 24-hour average PM_{10} GLC is predicted to be 25 $\mu g/m^3$ and the total modelling domain maximum annual average PM_{10} GLC is predicted to be 4 $\mu g/m^3$.

At receptors in the Oberon township, the maximum 24-hour average PM_{10} GLC is predicted to be 25 $\mu g/m^3$ for the cumulative Borg facility (including the proposed PB Plant) and the annual average PM_{10} GLC is predicted to be 4 $\mu g/m^3$ for the cumulative Borg facility (including the proposed PB Plant).

At the Borg Oberon site boundary, the maximum 24-hour average PM_{10} GLC is predicted to be 24 $\mu g/m^3$ for the cumulative Borg facility (including the proposed PB Plant) and the annual average PM_{10} GLC is predicted to be 4 $\mu g/m^3$ for the whole Borg facility.

10.3 NITROGEN DIOXIDE (NO_2)

NO_2 GLCs are predicted to be below both the 1-hour average IAC of 246 $\mu g/m^3$ and the annual average IAC of 62 $\mu g/m^3$.

The total modelling domain maximum cumulative 1-hour average NO_2 GLC is predicted to be 225 µg/ m^3 and the total modelling domain maximum cumulative annual average NO_2 GLC is predicted to be 4 µg/ m^3.

At receptors in the Oberon township, the cumulative Borg facility (including the proposed PB Plant) maximum 1-hour average NO_2 GLC is predicted to be 49 µg/m^3, and the maximum annual average NO_2 GLC is predicted to be 3 µg/ m^3.

At the Borg Oberon site boundary, the maximum 1-hour average NO_2 GLC is predicted to be 53 µg/ m^3 for the cumulative Borg facility (including the proposed PB Plant) and the maximum annual average NO_2 GLC is predicted to be 3 µg/ m^3.

10.4 FORMALDEHYDE (HCHO)

At receptors in the Oberon township, the maximum annual average formaldehyde GLC is predicted to be 0.002 mg/ m^3 for the proposed PB Plant and 0.01 mg/ m^3 for the cumulative Borg facility including the proposed PB Plant. Both predicted GLCs are less than the relevant IAC limit.

At the Borg Oberon site boundary, the maximum annual average formaldehyde GLC is predicted to be 0.002 mg/ m^3 for the proposed PB Plant and 0.01 mg/ m^3 for the cumulative Borg facility including the proposed PB Plant. Both GLCs are less than the relevant IAC limit.

However, the total modelling domain maximum cumulative annual average formaldehyde GLC is predicted to be 0.03 mg/m^3 which will exceed the IAC.

10.5 PROPOSED PB PLANT MITIGATION MEASURES

The following mitigation measures have been provisioned for the proposed particle board plant to reduce ground level impact:

- E12 will utilise dispersion to reduce impacts.
- Press scrubber does not vent directly to atmosphere as the emissions will be diverted to the Combustion chamber and excess gas will be emitted via the WESP stack.
- Wet Electrostatic Precipitator will be used as particulate control for moisture laden air from dryer.
- Low NO_x burner will be used for dryer Hot gas generator.
- Baghouses and cyclofilters will be installed on all other material transport and process applications.

Table 10-1 summarises the predicted emissions from the existing facility, the proposed PB Plant and the cumulative effects of the emission sources on both the existing MDF plants and the proposed PB plant.

TABLE 10-1 COMPARISON OF THE GROUND LEVEL IMPACT OF EXISTING AND PROPOSED EMISSIONS

Pollutant	Units	Averaging period	IAC	Maximum Peak Predicted GLC	
				Proposed PB Plant	Cumulative (Modified Existing Facility + PB Plant)
TSP (100%ile)	µg/m³	Annual	90	6	8
PM_{10} (100%ile)	µg/m³	24 hours	50	21	25
	µg/m³	Annual	30	3	4
NO_2* (100%ile)	µg/m³	1 hour	246	57	225
	µg/m³	Annual	62	1	4
HCHO (99.9%ile)	mg/m³	1 hour	0.02	0.01	0.03

Key:

TSP	=	total suspended particulate matter
PM_{10}	=	particulate matter less than 10 microns
NO_2	=	nitrogen dioxide
HCHO	=	formaldehyde
GLC	=	Ground Level Concentration
µg/m³	=	micrograms per cubic metre
mg/m³	=	milligrams per cubic metre
*	=	40% NO_x to NO_2 conversion assumed

REPORT

STATE ENVIRONMENTAL PLANNING POLICY (SEPP) 33 RISK SCREENING

TIMBER PANEL MANUFACTURING FACILITY

OBERON, NSW

BORG MANUFACTURING

PREPARED FOR: **Victor Bendevski,**
Environmental and Regulatory Compliance

DOCUMENT NO: **21034-RP-001**
REVISION: **2**
DATE: **12-May-2016**

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Title: **State Environmental Planning Policy (SEPP) 33 Risk Screening** **Timber Panel Manufacturing Facility** **Oberon, NSW**	**QA verified:** **A. Campanilla** **Date: 12-May-2016**

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ABBREVIATIONS

ADG	Australian Dangerous Goods
DA	Development Application
DG	Dangerous Goods
DPE	(NSW) Department of Planning and Environment
EIS	Environmental Impact Statement
EPL	Environmental Protection License
HIPAP	Hazardous Industry Planning Advisory Paper
IBC	Intermediate Bulk Container
LPG	Liquefied Petroleum Gas
MDF	Medium Density Fibreboard
MHF	Major Hazard Facility
NSW	New South Wales
OHS	Occupational Health and Safety
PG	Packing Group
PHA	Preliminary Hazard Analysis
SDS	Safety Data Sheet
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environment Planning Policy

1. INTRODUCTION

1.1. Background

Borg Manufacturing (Borg) produces a range of Medium Density Fibreboard (MDF) products at a timber manufacturing and processing facility located at Oberon, NSW. The Borg Panels MDF site is located on Lot 26 DP 1200697 and the Woodchem Australia site is located on adjacent Lot 22 DP 1017457. The MDF and Woodchem facilities are separate entities on different titles. Woodchem is a Major Hazard Facility (MHF) that manufactures and supplies chemicals to Borg and other customers.

Borg proposes to expand existing operations by constructing a reconstituted panel processing facility as follows:

- Construction of a new particle board manufacturing facility.
- Expansion of existing MDF and laminating operations.

In April 2015 Borg submitted a request for Secretaries Environmental Assessment Requirements (DA Number SSD 7016) for the expansion of the site, inclusive of modifications to the Woodchem facility, (referred to as the 'proposed expansion') under the *Environmental Planning and Assessment Act 1979* through an Environmental Impact Statement (EIS).

The Secretary's Environmental Assessment Requirements (SEARs, issued 28/05/15) attached to the application includes the following statements:

1. A requirement to undertake a preliminary risk screening completed in accordance with the State Environmental Planning Policy No. 33 (SEPP 33) – Hazardous and Offensive Development Application Guidelines, Ref. 1.
2. Work Cover NSW requires the applicant to justify the rationale for not considering the total area in the proposal as a MHF.

Borg has engaged Sherpa Consulting Pty Ltd (Sherpa) to assist in addressing the two SEARs. It is noted that the SEARs are interdependent as a decision to treat the site as a single MHF will influence the materials that are considered in the SEPP33 assessment. Hence the steps require item 2 (above) to be addressed first to form the basis for item 1.

The purpose of this review is to determine:

- whether the entire area covered in the proposal should be considered as an MHF
- Whether the proposed expansion of the Borg facility would be considered to be '*potentially hazardous industry*' in the context of SEPP 33 and whether a Preliminary Hazard Analysis (PHA) is required to be included in the EIS.

In support of the assessment, Sherpa undertook a site visit on 19 February 2016 to gather data and review the site.

1.2. SEPP 33 applicability

SEPP 33 links the permissibility of an industrial development to its offsite safety and environmental risks. Developments that involve storage, handling or processing materials which, in the absence of locational, technical or operational controls, may create an offsite risk or offence to people, property or the environment are defined by SEPP 33 as *'potentially hazardous industry'* or '*potentially offensive industry'.*

Development proposals that are classified as 'potentially hazardous' industry must undergo a PHA to determine the risk to people, property and the environment. If the residual risk exceeds the acceptability criteria (as defined in NSW Hazardous Industry Planning Advisory Paper (HIPAP) no. 4), the development is a 'hazardous industry' and may not be permissible within NSW.

Developments that have the potential to emit contaminants to the environment and which require an Environmental Protection License (EPL) are 'potentially offensive'. Borg already operates with an EPL and as such the site is already considered potentially offensive which is acceptable given the controls imposed by the EPL.

An assessment of any changes to the EPL as a result of the development is outside the scope of this study.

1.3. Exclusions and limitations

The following exclusions apply:

- Assessment of low level/continuous emissions or whether the development is '*potentially offensive'* under SEPP 33. The focus of the study is hazardous incidents with a potential acute impact.

2. PROCESS DESCRIPTION

The proposed expansion involves constructing a new facility to manufacture particle board and expand existing MDF and laminating operations. The expansion will be located on the south west corner of the site and be integrated into the overall process.

A site layout showing the existing facility and the location of new plant equipment for the proposed expansion is shown in Figure 2.1.

Particle board manufacturing typically involves:

- Processing virgin wood and residual wood waste from sawmills, and
- Recycling and processing appropriately used wood to create suitable sized particles. These are then processed to form particle board.

A description for the particle board manufacturing process is provided below:

Reduction of timber to chips: Round wood lumber is brought to site from external locations and the timber is processed through a debarker and chipper in a timber yard. The chipper is to reduce the timber to a consistent particle size. Recycled boards and reclaimed timber are also introduced at this stage. Once the chips have been produced, the product is screened to ensure consistency in size and any foreign ferrous contaminants are removed using magnets. The chips are stored in the chip reclaimers.

Sizing to macro sized particles: These chips are then moved through (via belts and conveyors) to a silo prior to being further reduced to optimum macro sized particles using knife ring flakers. These particles are stored in additional silos prior to being fed into a drier.

Drying of particles: Saw dust is introduced to the particles at this stage. The dry saw dust and wet wood particles are dried in a rotating drum drier. Any small particles generated during the drying process which are smaller than required size are removed using cyclone extractors. Surplus air generated (not required for the drying process) is cleaned using a wet electrostatic precipitator prior to being released to the atmosphere as clean air. Once dried and processed in this manner, the particles are removed and stored in a third silo.

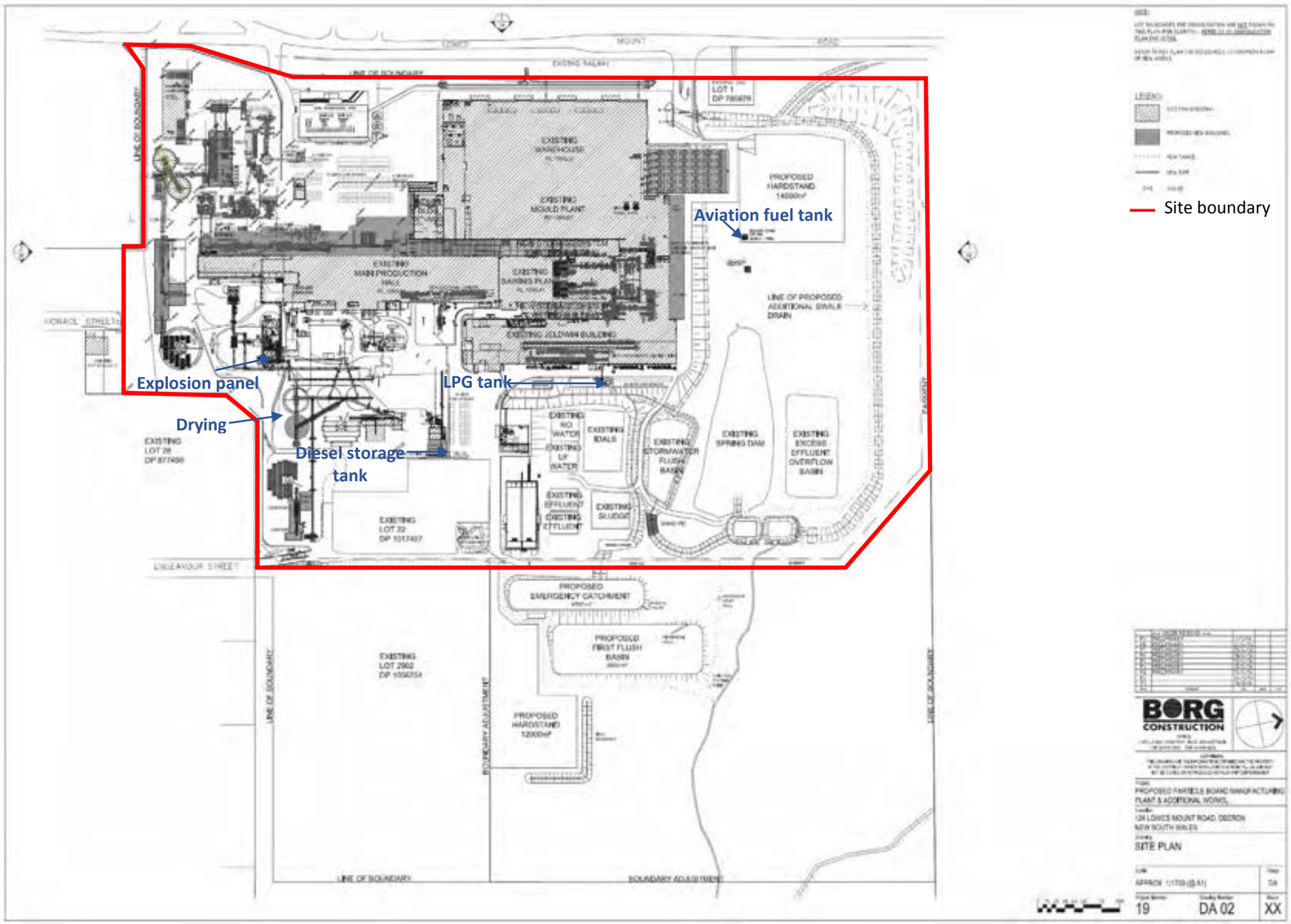
Screening and blending: After drying, appropriate sized particles are sent to storage, whilst oversize particles are sent to a grinding mill to reduce them to an appropriate size. The particles are blended with glue and additives (usually a blend of urea formaldehyde and paraffin wax, and a catalyst to accelerate the reaction) in a specially designed ring blender.

Mat formation and pressing: After blending, the resinated particles are sent to the appropriate mat forming stations. The forming stations are designed to ensure an even distribution of particles across both the width and the thickness of the board. The mat is then weighed and adjusted electronically to ensure that the finished product has a consistent density.

The forming line then transports the layered mat in a continuous format to the press, while simultaneously measuring moisture and removing any remaining ferrous material. The forming line is able to reject and recycle the mat before pressing if the specified product parameters are not of a suitable standard. Any rejected material is reused on site. The press then applies the specified heat and pressure required to cure and consolidate the board in order to meet or exceed the relevant Australian Standards. This process is remotely controlled from the press control room.

Cutting, cooling and curing of pressed boards: The pressed board is then cut square, checked to ensure it meets the required standards, cooled and stored in an automated storage system. Once cooled and cured, the boards are removed from storage and processed through the sander to ensure they meet final standards.

Figure 2.1: Site layout



3. MAJOR HAZARD FACILITY CONSIDERATIONS

3.1. Background

In 2010 the Borg Group purchased the MDF plant and Woodchem facilities from Carter Holt Harvey. The Borg Manufacturing facility (Borg) and the Woodchem Australia facility are located on two separate sites sharing a common driveway created by the way of a registered access easement (See Figure 2.1).

Borg Panels and Woodchem Australia are located within the wider Oberon Timber Complex (OTC) which includes a number of facilities owned by Carter Holt Harvey Ltd, Boral and the Borg Group.

Woodchem is a Major Hazard Facility (MHF), license number 10012-01 granted on the 21st March 2016. Woodchem Australia continues to operate as an independent facility with some corporate support services supplied as required.

3.2. Objective

The objective of this section is to determine if the Borg MDF and Woodchem Australia facilities should be considered as a single operating entity.

The conclusion of the assessment will determine the scope of the materials to be considered in the SEPP 33 review.

3.3. Development Application

The initial proposed expansion list included Lot 22 DP 1017454 (Woodchem). The lot was included on request from the department to provide a complete picture of the site and to facilitate an administrative tidy up to combine all the lots under a single DA.

However, the work to be undertaken under the DA will not impact the Woodchem lot (Lot 22, DP 1017454) and there are no proposed physical changes at Woodchem site as a result of the submission.

On this basis, Borg is proposing to submit a DA to exclude Lot 22 1017454 (Woodchem) from the proposed expansion.

3.4. Ownership

The NSW Work Health and Safety Regulation 2011 (WHS regulations) places duties on the *operator* of a MHF to notify and subsequently to submit a safety case for the MHF.

In the context of the two sites and the definition of an operator in the WHS regulation, the two companies share a common parent company but are separate businesses and operating entities.

Designating the parent company as having management and control across both facilities does not reflect how the sites are organised and operated on a local level nor does it quantify the overall operational safety of the Woodchem Facility.

3.5. Business Activities

Woodchem is a chemical processing facility that receives raw materials which are transformed into finished products using reactive chemistry. The finished products are supplied via a pipeline to Borg for immediate use, and in packages or bulk to other customers.

Dangerous Goods (DG) manufactured or stored at Woodchem are not transferred to Borg and are not stored at Borg.

Borg and Woodchem are independently licensed by the Environmental Protection Authority.

Each facility can operate in the absence of the other. With the exception of some shared corporate services, there is no linkage of business activity.

3.6. Change of overall risk profile

Requiring the sites to operate as a single MHF would result in no change in the overall risk profile as:

- The safety management system at Woodchem was developed in the context of the site being an MHF with a requirement to manage the risks associated with Schedule 15 materials and reactive chemistry.
- The Borg safety management system was developed in the context of managing occupational health and safety risks associated with operating machinery.
- There are no Schedule 15 materials stored at more than 10% of the Schedule 15 threshold at Borg hence the Borg facility itself would not be an MHF. The proposed expansion does not affect this, i.e. there will still be no Schedule 15 materials > 10% threshold.
- Based on the review of the Woodchem safety report and the site visit undertaken, Sherpa recommends revising the Woodchem safety report to clearly demarcate Borg as a separate and independent site from Woodchem; and addressing areas that were identified at Borg with the potential to escalate to involve Schedule 15 materials at Woodchem as external incidents in the safety report.
- On the basis the safety report revision recommendations are resolved; there are no credible incidents at Borg Panels with the potential to result in an incident involving Schedule 15 materials at Woodchem.

3.7. Conclusion

The sites operate as two independent businesses and operating entities and hence the dangerous goods considered in the SEPP 33 review of the Borg development are limited to those present at the Borg facility and covered under the DA for the Borg development.

The key points are:

- The sites are operated by separate companies.
- The sites undertake different activities.
- The DA for the Borg expansion recognises that Woodchem is an MHF and states that any changes at Woodchem will be managed under a separate process.

4. SEPP 33 ASSESSMENT

4.1. Methodology

The screening process published in the NSW Department of Planning and Environment (DPE) guideline *Hazardous & Offensive Development Application Guidelines – Applying SEPP 33 (January 2011)* was used to establish whether the development is '*potentially hazardous*' or not.

SEPP 33 defines '*potentially hazardous*' as follows:

> *'Potentially hazardous industry' means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:*
>
> *(a) to human health, life or property; or*
>
> *(b) to the biophysical environment, and:*
>
> *Includes a hazardous industry and a hazardous storage establishment.*

To determine whether a proposed development is '*potentially hazardous'*, the screening in SEPP 33 considers the type and quantity of hazardous materials stored on the site, the distance of the storage area to the nearest site boundary and the expected number of transport movements.

'Hazardous materials' are defined within the *Applying SEPP33* guideline as substances that fall within the classification of the Australian Dangerous Goods (ADG) Code.

4.2. Dangerous goods (DG)

4.2.1. Types and quantities of DG

A list of the expected types and quantities of materials to be stored or handled at the proposed development (including existing Borg operations, together with the relevant SEPP33 screening threshold, is presented in Table 4.1.

In addition to materials that are categorized as DGs, Applying SEPP 33 guidelines require 'consideration of hazards arising from factors other than the presence of DGs that are not covered in the risk screening method. Additional hazards are assessed in Section 4.4.

4.2.2. Storage arrangements

A site layout showing the location of DG within the proposed facility is shown in Figure 2.1.

Diesel, aviation fuel and Liquefied Petroleum Gas (LPG) are stored in above ground tanks. Class 9 Environmentally hazardous substances are stored above ground in the

warehouse area. Hot oil (heated to 275°C, above flash point) is stored in an above ground tank. The proposed expansion requires relocation of DGs on site but does not result in an increase in the storage of DGs at the Borg facility.

4.3. Transport

A list of the expected types and quantities of hazardous materials transport movements to and from the site together with the relevant SEPP 33 screening threshold is presented in Table 4.2.

Table 4.1 SEPP 33 hazardous material storage screening summary

Material	Storage ID	Storage type	UN No.	DG class [(a)]	Sub-class	Approximate quantity stored on site		SEPP 33 threshold storage (Table 1 in Ref. 2– what changes with development?	Threshold exceeded?
						m^3	tonnes [(a)]		
Diesel	DF 1	Above ground tank	00C1	Combustible C1	-	32	27.2	Diesel is not stored with other flammable materials, hence it is not considered to be potentially hazardous based on SEPP 33. The adjacent Woodchem tank farm contains Class 3 and Class 8 materials (e.g. formalin, formaldehydes). However this is located in a separate bunded area. As diesel is not located in the same area as flammable materials, the SEPP 33 threshold is not applicable. See Note b.	Not applicable. See Note b.
Fuel, Aviation, Turbine Engine	JET 1	Above ground tank	1863	3 PG I	-	2.5	2.0	Based on Figure 8 in Ref. 1, the screening distance is approximately 2.2 m and 3 m from sensitive land uses (including residential) and all other land uses (e.g. commercial or industrial) respectively.	The separation distance between the proposed DG storage to the site boundary is approximately 140 m. Not potentially hazardous.
Petroleum Gases, Liquefied	LPG 1	Above ground tank	1075	2.1	-	6.0	3.1	Based on Table 3 in Ref.2, screening threshold is 10 tonne or 16 m^3 (if stored above ground).	Total Class 2.1 (LPG) storage does not exceed the SEPP33 threshold. Not potentially hazardous.
Hot Oil	-	Above ground tank	-	Combustible C1 heated above flash point – treat as Class 3	-	250	200	Treated as a Class 3, assuming the worst case of a packing group 1. Based on Figure 8 in Ref.2, the screening distance is approximately 12 m and 20 m from sensitive land uses (including residential) and all other land uses (e.g. commercial or industrial) respectively.	The separation distance between the DG storage to the site boundary is approximately 200 m. Not potentially hazardous.
Environmentally hazardous substance (liquid N.O.S.)	VA 1	Warehouse	3082	9 PG III	-	1.0	-	No threshold identified based on SEPP 33, Ref.2 Class 9 PG III is not classified as potentially hazardous material as per SEPP 33.	Not applicable.

Notes:

(a) Details such as DG Class and density (to calculate mass in tonnes) were obtained from the materials' Safety Datasheets (SDS). SDS is provided in APPENDIX A.

(b) Based on Ref. 1, if combustible liquids of class C1 are present on site and are stored in a separate bund or within a storage area where there are no flammable materials stored, then they are not considered to be potentially hazardous.

(c) Whilst other hazardous materials are stored onsite (Ref. 3), these materials are not listed in the DG notification (Ref. 4) and are stored in small quantities only.

Table 4.2: SEPP 33 hazardous material transport screening summary

Material	Traffic generation		Approx. annual delivery (m^3)	DG class	Sub-class	Comments	SEPP 33 threshold vehicle movements (Table 2 in Ref. 1)		Threshold exceeded?
	Annually	Peak monthly					Annually	Peak Weekly	
Diesel	36	3	283	Combustible C1	-	Delivery by road. No threshold identified based on SEPP 33, Ref. 1.	See comment.		Not applicable.
Fuel, Aviation, Turbine Engine	12	1	11.7	3 PG I	-	Delivery by road.	>500	>30	No
Petroleum Gases, Liquefied	2 (estimated)	-	2.0	2.1	-	Delivery by road. It should be noted that the annual delivery of LPG is on the decline.	>500	>30	No
Environmentally hazardous substance (liquid N.O.S.)	48 (estimated)	4		9 PG III	-	Delivery by road. One delivery (comprising three IBCs) per week.	>1000	>60	No

4.4. Other hazards

Additional hazards to be considered include:

- Dust explosion hazards.
- Hazardous processing conditions (e.g. high temperatures and pressures).
- Reactions/incompatibilities between materials.

The drying stage of the particle board manufacturing process involves the introduction of dry saw dust into wet wood particles where the mixture is dried in a rotating drum drier. Saw dust while not a DG is combustible and can potentially result in dust explosions in the presence of high dust concentration within the explosive range and an ignition source.

Explosion panels are included in the design of the drying and dust extraction systems. Typically dust explosions cause localized damage to the facility. The dust handling areas are located to the south of the site with explosion panels orientated to the east (away from the site boundary).

The particle board manufacturing process involves an exothermic blending reaction and pressures of up to 30 bar during the blending and pressing stages. The processing conditions are expected to result in occupational health and safety (OHS) issues only and are not considered to be hazardous with the potential to cause significant offsite impacts.

Other hazardous materials stored onsite that are not specifically included in the SEPP 33 screening thresholds were reviewed for reactions/material incompatibility. These materials are stored in small quantities and no hazards with the potential to cause significant offsite impacts were identified.

Non-DG hazards are managed through the design of the system and the layout. The development will not alter the offsite risk profile associated with non-DG hazards.

5. CONCLUSION

5.1. MHF Considerations and Inclusion of Woodchem in the DA

Borg Panels and Woodchem operate as two independent businesses and operating entities and hence the dangerous goods considered in the SEPP 33 review of the Borg development are limited to those present at the Borg facility.

The key points are:

- The sites are operated by separate companies.
- The sites undertake different activities.
- The DA for the Borg expansion does not impact Woodchem (Lot 22 DP 1017454). It recognises that Woodchem is an MHF and states that any changes at Woodchem will be managed under a separate process.

5.2. SEPP 33

The main findings of this SEPP 33 assessment (Section 4.2 and Section 4.4) are summarised below:

- A total of approximately 2 tonnes of Class 3 PG I material (i.e. aviation fuel) will be stored on the site at a distance of approximately 65 m from the site boundary. This is below the SEPP33 separation distance threshold level for 2 tonnes of Class 3 PG I materials.
- A total of approximately 3.1 tonnes of Class 2.1 material (i.e. LPG) will be stored on the site. This is below the SEPP 33 threshold level of 10 tonnes for Class 2.1 materials.
- A total of approximately 27.2 tonnes of combustible material (i.e. diesel) will be stored on the site. Diesel is not stored with other flammable materials, and hence is not considered to be potentially hazardous under SEPP 33.
- A total of approximately 200 tonnes of hot oil will be stored on the site at a distance of approximately 200 m from the site boundary. This is below the SEPP 33 separation distance threshold level (treating hot oil a DG Class 3, and worst case of Packing Group 1).
- A total of approximately 1 tonne of Class 9 PG III material (i.e. environmentally hazardous substance, liquid N.O.S.) will stored on the site. There is no threshold identified in SEPP 33 for Class 9 materials.
- The operational weekly vehicle movements for hazardous materials are well below the SEPP 33 transport screening threshold levels.

- The process is undertaken in a controlled manner with dust extraction, automatic explosion and fire suppression and certified pressure venting devices. The site is unlikely to generate a dust explosion causing significant offsite impacts.

Based on these findings:

- The development (accounting for both existing and expansion proposal) is not considered 'potentially hazardous' within the meaning of SEPP 33 and a PHA is not required.
- The development is not considered 'potentially hazardous' within the meaning of SEPP 33 with respect to transportation, and a route evaluation study is not required.
- The existing site EPL should be reviewed to determine is any updates are required as a result of the expansion.

Any proposed changes associated with Woodchem will be covered under a separate approvals process taking into account the fact Woodchem is an MHF.

APPENDIX A. SAFETY DATA SHEETS

Material Safety Data Sheet

Infosafe No.	SG1E5	Issue Date : April 2006	ISSUED by BPAUST

Product Name : **Jet A-1**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name	Jet A-1
Company Name	BP Australia Pty Ltd (ABN 53 004 085 616)
Address	Melbourne Central, 360 Elizabeth Street, Melbourne, Victoria 3000 Australia
Emergency Tel.	24hr 1800 638 556
Telephone/Fax Number	Tel: 61 3 9268 4111 Fax: (03) 9268-3321
Recommended Use	Aviation turbine fuel
Other Information	BP Technical Helpline: 1300 139 700 (local call) MSDS website www.msds.bp.com.au/ All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet. The data and advice given apply when the product is sold for the stated application or applications. You should not use the product other than for the stated application or applications without seeking advice from us. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. The BP Group shall not be responsible for any damage or injury resulting from use, other than the stated product use of the material, from any failure to adhere to ecommendations, or from any hazards inherent in the nature of the material. Purchasers of the product for supply to a third party for use at work, have a duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet. Employers have a duty to tell employees and others who may be affected of any hazards described in this sheet and of any precautions that should be taken.

2. HAZARDS IDENTIFICATION

Hazard Classification	HAZARDOUS SUBSTANCE. DANGEROUS GOODS. Hazard classification according to the criteria of NOHSC. Dangerous goods classification according to the Australia Dangerous Goods Code.
Risk Phrase(s)	R10 Flammable. R38 Irritating to skin. R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R65 Harmful: may cause lung damage if swallowed.
Safety Phrase(s)	S2 Keep out of reach of children. S23 Do not breathe gas/fumes/vapour/spray S24 Avoid contact with skin. S61 Avoid release to the environment. Refer to special instructions/safety data sheet. S62 If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label.
Other Information	Flammable liquid. As the material has a low flash point, any spillage should be considered a potential fire hazard. Spray applications increase the fire, and possible explosion, hazard. Use in hot climates further increases this hazard. This product may be aspirated on swallowing. Product may be irritating to the skin.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Information on Composition	A complex combination of hydrocarbons produced by the distillation of crude oil. It consists of hydrocarbons having carbon numbers predominantly in the

range C9 through C16.

Kerosine, petroleum	8008-20-6	100 %

4. FIRST AID MEASURES

Inhalation
Remove the source of contamination or move the victim to fresh air. Ensure airways are clear and have qualified person give oxygen through a face mask if breathing is difficult. Apply artificial respiration if not breathing. Seek immediate medical attention.

Ingestion
DO NOT INDUCE VOMITING. Wash out mouth with water and give plenty of water to drink. Where vomiting occurs naturally have victim place head below hip level in order to reduce risk of aspiration. Seek immediate medical attention.

Skin
Wash skin thoroughly with soap and water as soon as reasonably practicable. Remove heavily contaminated clothing and wash underlying skin. If irritation occurs seek medical advice.

Eye
If contact with the eye(s) occur, wash with copious amounts of water for approximately 15 minutes holding eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. In all cases of eye contamination it is a sensible precaution to seek medical advice.

First Aid Facilities
Eye wash and normal washroom facilities.

Advice to Doctor
Product can be aspirated on swallowing or following regurgitation of stomach contents, and can cause severe and potentially fatal chemical pneumonitis, which will require urgent treatment. Because of the risk of aspiration, induction of vomiting and gastric lavage should be avoided.
Gastric lavage should be undertaken only after endotracheal intubation.
Monitor for cardiac dysrhythmias.

5. FIRE FIGHTING MEASURES

Fire Fighting Measures
For major fires, call the Fire Brigade immediately. Ensure an escape path is always available from any fire. There is a risk of flashback if sparks or hot surfaces ignite vapour.
In case of fire, use foam, dry chemical, carbon dioxide, vaporising liquid or water delivered as a fine spray. DO NOT USE water jets.
Fires in confined spaces should be dealt with by trained personnel wearing approved breathing apparatus.
Water may be used to cool nearby heat exposed areas/objects/packages.
Avoid spraying directly into storage containers because of the danger of boil-over.

Hazards from Combustion Products
Toxic fumes may be evolved on burning or exposure to heat.
See Stability and Reactivity, Section 10 of this MATERIAL SAFETY DATA Sheet.

Hazchem Code
3[Y]

6. ACCIDENTAL RELEASE MEASURES

Emergency Procedures
Any spillage should be regarded as a potential fire risk.
In the event of spillage, remove all sources of ignition and ensure good ventilation.
Wear protective equipment. (See Exposure Controls/Personal Protection, Section 8 of this MATERIAL SAFETY DATA SHEET for details)
Contain and recover liquid using sand or other suitable inert absorbent material.
It is advised that stocks of suitable absorbent material should be held in quantities sufficient to deal with any spillage which may be reasonably anticipated.
Spilled material may make surfaces slippery. Clean up spilled material immediately.
Recovery of large spillages should be effected by specialist personnel.
Protect drains from potential spills to minimise contamination.
Do not wash product into drainage system.
Vapour is heavier than air and may travel to remote sources of ignition (eg. along drainage systems, in basements, etc.).
If spillage has occurred in a confined space, ensure adequate ventilation and check that a safe, breathable atmosphere is present before entry.
In the case of spillage on water, prevent the spread of product by the use of suitable barrier equipment. Recover product from the surface.
Protect environmentally sensitive areas and water supplies.

In case of spillage at sea, approved dispersants may be used where authorised by the appropriate regulatory authority. In the event of spillages, contact the appropriate authorities. Regular surveillance on the location of the spillage should be maintained.

7. HANDLING AND STORAGE

Precautions for Safe Handling

Ensure good ventilation and avoid, as far as reasonably practicable, the inhalation and contact with vapours, mists or fumes which may be generated during use. If such vapour, mists or fumes are generated, their concentration in the workplace air should be controlled to the lowest reasonably practicable level.
Avoid contact with eyes. If splashing is likely to occur wear a full face visor or chemical goggles as appropriate.
Avoid skin contact. Good working practices, high standards of personal hygiene and plant cleanliness must be maintained at all times.
Do not siphon product by mouth. Keep out of reach of children.
Whilst using, do not eat, drink or smoke. Wash hands thoroughly after contact.
Use disposable cloths and discard when soiled. Do not put soiled cloths into pockets.
Take all necessary precautions against accidental spillage into soil or water.

Conditions for Safe Storage

Store and dispense only in well ventilated areas away from heat and sources of ignition.
Store and use only in equipment/containers designed for use with the product.
Containers must be properly labelled and kept closed when not in use.
Do not remove warning labels from containers. Empty packages may retain residual product; retain hazard warning labels on empty packages as a guide to their safe handling, storage and disposal.
Do not enter storage tanks without breathing apparatus unless the tank has been well ventilated and the tank atmosphere has been shown to contain hydrocarbon vapour concentrations below 1% of the lower flammability limit and an oxygen concentration of at least 20% by volume.
Always have sufficient personnel standing by outside the tank with appropriate breathing apparatus and equipment to effect a quick rescue.

Other Information

Fire Prevention
Light hydrocarbon vapours can build up in the headspace of tanks. These can cause flammability/explosion hazards, even at temperatures below the normal flash point.
Tank headspaces should always be regarded as potentially flammable and care should be taken to avoid static electricity discharge and all ignition sources during filling, ullaging and sampling from storage tanks. Hoses should be electrically continuous.
Ensure equipment used is properly earthed or bonded to the tank structure.
Will present a flammability hazard if heated above the flash point but bulk liquids at normal storage temperatures present a low fire hazard.
If fuel contacts hot surfaces, or leaks from high pressure fuel pipes, the vapour and/or mists generated will create a flammability or explosion hazard.
Product soaked rags, paper or material used to absorb spillages, represent a fire hazard and should not be allowed to accumulate. Dispose of safely after use. Empty containers represent a fire hazard as they may contain remaining flammable residues and vapour.
Do not weld, heat or drill the container. Do not introduce an ignition source. Heating may cause an explosion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

National Exposure Standards

Ensure good ventilation.
Avoid, as far as reasonably practicable, inhalation of vapour, mists or fumes generated during use.
If vapour, mists or fumes are generated, their concentration in the workplace air should be controlled to the lowest reasonably practicable level.

Biological Limit Values

No biological limit allocated.

Respiratory Protection

If engineering controls are not effective in controlling airborne exposure then respiratory protective equipment should be used suitable for protecting against airborne contaminants. Final choice of appropriate breathing protection is dependent upon actual airborne concentrations and the type of breathing protection required will vary according to individual circumstances.

	Expert advice may be required to make this decision. Reference should be made to Australian/New Zealand Standards AS/NZS 1715, Selection, Use and maintenance of Respiratory Protective Devices; and AS/NZS 1716, Respiratory Protective Devices.
Eye Protection	Safety glasses with side shields, goggles or full-face shield as appropriate recommended. Final choice of appropriate eye/face protection will vary according to individual circumstances ie. methods of handling or engineering controls and according to risk assessments undertaken. Eye protection should conform with Australian/New Zealand Standard AS/NZS 1337 - Eye Protectors for Industrial Applications.
Hand Protection	Wear gloves of impervious material. Final choice of appropriate gloves will vary according to individual circumstances ie. methods of handling or according to risk assessments undertaken. Reference should be made to AS/NZS 2161.1: Occupational protective gloves - Selection, use and maintenance.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Pale yellow / straw coloured mobile liquid
Odour	Mild
Melting Point	Not available
Boiling Point	150 - 280°C Test Method: ASTM D 86
Solubility in Water	Insoluble
pH Value	Not applicable
Vapour Pressure	< 0.3 kPa @ 38°C Test Method: ASTM D 323
Vapour Density (Air=1)	Not available
Density	0.80 kg/L @ 15°C Test Method: ASTM D 1298
Flash Point	> 38°C (PMC) Test Method: ASTM D 93
Flammability	FLAMMABLE. This product should be stored and used in a well ventilated area away from naked flames, sparks and other sources of ignition. Electrically link and ground metal containers for transfers of the product to prevent accumulation of static electricity. Keep the container tightly closed.
Auto-Ignition Temperature	380°C
Flammable Limits - Lower	0.7%
Flammable Limits - Upper	5.0%

10. STABILITY AND REACTIVITY

Chemical Stability	Products of this type are stable and unlikely to react in a hazardous manner under normal conditions of use. This material is flammable.
Conditions to Avoid	Heat, flames and other ignition sources.
Incompatible Materials	Avoid contact with strong oxidising agents.
Hazardous Decomposition Products	Thermal decomposition can produce a variety of compounds, the precise nature of which will depend on the decomposition conditions. Incomplete combustion/thermal decomposition will generate smoke, carbon dioxide and hazardous gases, which will include carbon monoxide.
Hazardous Polymerization	Hazardous polymerisation reactions will not occur.

11. TOXICOLOGICAL INFORMATION

Toxicology Information	No component of this product at levels greater than or equal to 0.1% is identified as a carcinogen by ACGIH, the International Agency for Research on Cancer (IARC), the European Commission (EC), or the National Occupational Health and Safety Commission (Australia).
Inhalation	May cause irritation to eyes, nose and throat due to exposure to high concentrations of vapour, mists or fumes.

Ingestion	Harmful: may cause lung damage if swallowed. Ingestion of this product will irritate the gastric tract causing nausea and vomiting. Aspiration into the lungs may result in chemical pneumonitis.
Skin	Likely to cause skin irritation.
Eye	Unlikely to cause more than transient stinging or redness if accidental eye contact occurs.
Chronic Effects	Middle distillate: From skin-painting studies of petroleum distillates of similar composition and distillate range, it has been shown that these types of materials often possess weak carcinogenic activity in laboratory animals. In these tests, the material is painted on the shaved backs of mice twice a week for their lifetime. The material is not washed off between applications. Therefore, there may be a potential risk of skin cancer from prolonged or repeated skin contact with this product in the absence of good personal hygiene. This particular product has not been tested for carcinogenic activity, but we have chosen to be cautious in light of the findings with other distillate streams. Occasional skin contact with this product is not expected to have serious effects, but good personal hygiene should be practiced and repeated skin contact avoided. This product can also be expected to produce skin irritation upon prolonged or repeated skin contact. Personal hygiene measures taken to prevent skin irritation are expected to be adequate to prevent risk of skin cancer.

12. ECOLOGICAL INFORMATION

Persistence / Degradability	This product is inherently biodegradable.
Mobility	Spillages may penetrate the soil causing ground water contamination.
Bioaccumulative Potential	This product is not expected to bioaccumulate through food chains in the environment.
Environ. Protection	Prevent this material entering waterways, drains and sewers.
Acute Toxicity - Other Organisms	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment Spills may form a film on water surfaces causing physical damage to organisms. Oxygen transfer could also be impaired.

13. DISPOSAL CONSIDERATIONS

Disposal Considerations	Dispose of via an authorised person/licensed waste disposal contractor in accordance with local regulations, or if approved, allowed to degrade in situ. Incineration may be carried out under controlled conditions provided that local regulations for emissions are met. Dispose of product and container carefully and responsibly. Do not dispose of near ponds, ditches, down drains or onto soil. Empty packages may contain some remaining product. Hazard warning labels are a guide to the safe handling of empty packages and should not be removed.

14. TRANSPORT INFORMATION

Transport Information	ADG - FUEL, AVIATION, TURBINE ENGINE, UN 1863, Class 3 - Flammable Liquid , Packaging Group III, 3[Y]. IMDG - KEROSENE , UN 1223, Class 3.3 - Flammable Liquid, Packaging Group III. IATA/ICAO - FUEL, AVIATION, TURBINE ENGINE, UN 1863, Class 3 - Flammable Liquid, Packaging Group III.
U.N. Number	1863
Proper Shipping Name	FUEL, AVIATION TURBINE ENGINE
DG Class	3
Hazchem Code	3[Y]
Packaging Method	3.8.3RT1
Packing Group	III
EPG Number	3A1
IERG Number	14

Material Safety Data Sheet

Infosafe No.	SG1E5	Issue Date : April 2006	ISSUED by BPAUST

Product Name : **Jet A-1**

15. REGULATORY INFORMATION

Regulatory Information	Fuels are exempt from the Standard Uniform Schedule for Drugs and Poisons, except when packed in containers having a capacity of 20 litres or less. Classified as a Scheduled 5 (S5) Poison using the criteria in the Standard Uniform Schedule for Drugs and Poisons when used for other applications rather than as a fuel.
Poisons Schedule	S5
Hazard Category	Harmful,Irritant,Dangerous for the environment

16. OTHER INFORMATION

Date of preparation or last revision of MSDS	MSDS Review: March 2006 Supersedes: March 2001
Other Information	Compiled by: Health, Safety, Environment and Security Division, ...End Of MSDS...

Safety Data Sheet (SDS)
LPG364

Commercial Propane

1 PRODUCT AND COMPANY DETAILS	
Product Name	**Commercial Propane**
Other Names	Propane, LPG, LP Gas, Liquefied Petroleum Gas
Use	As fuel in domestic, commercial, industrial and automotive applications.
Company	Origin Energy LPG Limited Australia Square 264 – 278 George Street Sydney NSW 2000
General Enquiries	133 LPG (133 574) Technical Information Telephone 07 3867 0362 Technical Information Fax 07 3867 0278
Emergency Telephone 1800 808 526 all hours	

2 HAZARDS IDENTIFICATION

Commercial Propane as supplied by Origin contains less than 0.1% of 1,3 Butadiene and is not classified as hazardous according to criteria of Safe Work Australia. Commercial Propane is classified as a Dangerous Good by the Australian Dangerous Goods Code.

UN number 1978	Hazchem Code 2YE
Dangerous Goods Class 2.1	Emergency Guide EPG 2A2
Flammable (F)	R12 — Extremely flammable

S9, 16 Keep container in a well ventilated place away from sources of ignition — No Smoking

Smell: People with poor or no sense of smell should be made aware of the risk in the event of a gas leak.

3 COMPOSITION AND INFORMATION ON INGREDIENTS

Chemical Entity	CAS Number	Proportion
Propane	[74-98-6]	25-99%
Propene	[115-07-1]	0-60%
Butane	[106-97-8]	0-7.5%
Butene	[106-98-9]	0-2%
Ethyl Mercaptan (Odorant)	[75-08-1]	25mg/kg

Alternative Names:	UN Number:
Propane	1978
LP Gas, LPG or Liquefied Petroleum Gas	1075

NOTICE - Origin believes that information given herein is accurate and reliable at the date of compilation, and conforms to the guidelines of Safe Work Australia for the preparation of SDS, but no warranty, express or implied, is made. While the SDS provides adequate information for most users, an SDS is not a substitute for expert advice on development of engineering and safe handling practices.

4 FIRST AID	
Swallowed	Due to the high volatility of the product, this is not likely to occur.
Eyes	Hold eyes open and continuously wash with clean water while seeking urgent medical attention. Eye wash bottles containing sterile water or normal saline solution should be kept readily available.
Skin	Immediately wash affected areas with plenty of water at room temperature to overcome frostbite. Do not use iced water. Warm up gently. In hot conditions, cover with damp sheet to prevent too rapid heating up of affected area. Seek urgent medical attention.
Inhaled	Move patient to fresh air and allow to rest. If patient is unconscious and breathing, place them in the coma position, check airway and observe. If patient is not breathing, clear airway and apply mouth to mouth resuscitation. If patient is not breathing and does not have a pulse, commence cardio pulmonary resuscitation. Seek urgent medical attention.
Advice to doctor	Treat symptomatically.
5 FIRE FIGHTING MEASURES	
Fire/explosion hazard	Evacuate area, remove ignition sources. Cut off gas supply if safe to do so - do not endanger life. DO NOT EXTINGUISH FIRE - allow gas to burn out. Use water to keep vessel(s) cool. **Note:** If ignition has occurred and water is not available, the tank metal may weaken from the heat and may result in an explosion. **The area should be evacuated immediately.** **From a safe location, notify emergency services.** Hazchem Code **2YE**
Combustion products	Carbon dioxide, water vapour, traces of carbon monoxide and nitrogen oxides. Fumes, smoke, carbon monoxide and aldehydes can be formed during incomplete combustion.

	Fire fighters may need self contained breathing apparatus.

6 ACCIDENTAL RELEASE MEASURES

Spills and disposal (Contact Origin if disposal of material is required)	**Any release of Commercial Propane to the atmosphere poses a risk of fire or explosion.** Move people away and upwind from spill. Shut off supply of gas if it is safe to do so. Eliminate sources of ignition e.g. power supply, matches, non-intrinsically safe communication equipment. Ventilate area. Remove leaking cylinder to open air. Avoid breathing vapour and contact with liquid or vapour. Disperse vapour with water spray. **Note: Vapour is heavier than air and will settle at the lowest point e.g. ditches, drains and water courses.**

7 HANDLING AND STORAGE

Store in approved areas as defined by current issue of AS1596.

Comply with the current issue of the Australian Code for the Transportation of Dangerous Goods by Road and Rail, and with the relevant Dangerous Goods Legislation in each State or Territory.

Store containers in an upright position (even when empty); keep away from heat sources; do not drop; keep valves closed when not in use.

Ensure dust and rain caps are fitted at all times.

Store away from oxidising substances e.g. pool chlorine.

Store in well ventilated area.

8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Propane is an asphyxiant — Safe Work Australia Exposure Standard

Propylene is an asphyxiate — Safe Work Australia Exposure Standard

Butane — ES-TWA 800ppm TWA 1900mg/m3	
Engineering Controls	
Ignition sources	**No Smoking. No Flames.** Follow procedures to avoid static discharges. Use only intrinsically safe communication equipment (e.g. mobile phones and pagers). Use non-spark generating tools and flameproof (intrinsically safe) equipment.
Ventilation	Maintain adequate ventilation. LPG appliances can be hazardous when used in a poorly ventilated room.
Usage	In applications other than as a forklift cylinder, all cylinders should be used in the upright position. Use only equipment approved for LPG installations and install in accordance with AS1596 and AS5601.
Personal Protection	
Thermally insulated gloves and either goggles or close fitting protective glasses with side visors are recommended when handling liquid LPG. Long sleeved shirts and long trousers made from natural materials should be worn when handling. If personnel are required to work in areas where the concentration of LPG may be above the exposure standard respiratory protection should be used. This should be a supplied air facemask or self contained breathing apparatus complying with ASJ715 and AS1716.	

9 PHYSICAL AND CHEMICAL PROPERTIES

Physical Description/Properties	
Appearance	Colourless, odourless gas supplied in compressed liquid form in a pressure container. A strong and distinctive odour is added to assist in the early detection of even minor leaks.
Boiling Point = - 42ºC	Flash Point = -104ºC
Vapour Pressure (at 40ºC) = 1530	Flammability Limits = 2.4% to 9.6% in air (v/v)

kPa Max	
Solubility in Water (at 20ºC) <200ppm	Auto ignition Temperature = 494ºC to 549ºC
Specific Gravity Liquid = 0.51 (water = 1)	Specific Gravity Gas = 1.52 (air = 1)

10 STABILITY AND REACTIVITY

Stable under normal ambient conditions of storage and use.

Avoid heat sources.

Can react violently with oxidising agents - chlorine, pool chlorine or nitric acid.

11 TOXICOLOGICAL INFORMATION

Health Effects from Acute Exposure

Swallowed	Due to high volatility of product, this is not likely to occur.
Eyes	Liquid will cause severe damage. Vapour will cause irritation.
Skin	Vapourising liquid or liquid contact can result in cold contact burns.
Inhaled	May cause light-headedness, dizziness and drowsiness. Excessive exposure may cause unconsciousness or even death, due to asphyxiation (refers to vapour not liquid).

Health Effects from Chronic Exposure

No chronic systemic effects reported from industrial exposures.

Carcinogenicity	No known effect
Mutagenicity	No known effect
Teratogenicity	No known effect

12 ECOLOGICAL INFORMATION

Liquid propane will vapourise rapidly when released to atmosphere.

Commercial Propane consists of hydrocarbons that photo chemically decompose under atmospheric conditions.

13 DISPOSAL CONSIDERATIONS

Contact Origin if disposal of LPG is required.

LPG cylinders should be returned to the owning organisation stamped on the cylinder when no longer required.

Small customer owned cylinders should be made safe at a Gas Cylinder Test Station before disposal. Check with local Council re acceptance for disposal to landfill.

Also see Section 16.

14 TRANSPORT INFORMATION

Transport information	UN number **UN 1978**	Shipping name **Propane**
	Class **2.1**	Hazchem Code **2YE**
	Cylinders must be secured in an upright position for transport.	
	Transport in accordance with the requirements of ADG Code and the Load Restraint Guide.	

Alternative Names: LP Gas, LPG or Liquefied Petroleum Gas	UN Number: 1075

15 REGULATORY INFORMATION

Poisons schedule number — none allocated.

LPG is a prescribed Dangerous Good and its storage and handling is covered by various pieces of legislation in all States.

The installation of LPG equipment must be performed only by appropriately licensed or authorised persons.

16 OTHER INFORMATION

'Empty' container warning	'Empty' containers retain residue (liquid and/or vapour) and can be dangerous. Do not attempt to clean since residue is difficult to remove. **Do not pressurise, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks and**

	other sources of ignition. They may explode and cause injury or death. All containers should be returned to the supplier. Privately owned containers no longer required, should be disposed of in an environmentally safe manner, and in accordance with Government regulations. Seek expert advice if repairs or modifications to installation are required.

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Objective ID	A299102	
Authorised by:	Group Manager Operational Integrity	
Telephone SDS enquiries only:	(07) 3867 0362	
Telephone all other enquiries:	133 LPG (133 574)	

Material Safety Data Sheet

LOW SULFUR DIESEL

Infosafe No.	JAC5D	**Issue Date**	April 2005	**Status**	ISSUED by CALTEX

Classified as hazardous according to criteria of NOHSC

COMPANY DETAILS

Company Name	CALTEX AUSTRALIA LIMITED
Address	MLC BUILDING 19 - 29 Martin Place SYDNEY NSW 2000
Tel/Fax	Tel: (02) 9250 5000 Fax: (02) 9250 5742
Other Information	The most recent MSDS for this product can be obtained from the Caltex Australia website - 'www.caltex.com.au'.

IDENTIFICATION

Product Name	LOW SULFUR DIESEL
Proper Shipping Name	None Allocated

Other Names	**Name**	**Product Code**
	LOW SULFUR DIESEL UNMARKED	
	AUTOMOTIVE DIESEL FUEL	
	DIESEL	
	DIESEL FUEL UNMARKED	

UN Number	None Allocated
DG Class	None Allocated
Packing Group	None Allocated
Hazchem Code	None Allocated
Poisons Schedule	S5
Product Use	Fuel, mould oil.

Physical Data

Appearance	Light brown oil, with a slight characteristic odour.
Boiling Point	200 - 400°C
Vapour Pressure	< 1 mmHg
Specific	

Gravity	0.85
Flash Point	80°C (PMCC)
Flamm. Limit LEL	Not available.
Flamm. Limit UEL	Not available.
Solubility in Water	Insoluble.

Other Properties

Autoignition Temp.	350°C
Vapour Density	>1 (cf Air = 1)
pH Value	Not Applicable
Viscosity	3.0 cSt @ 40°C
Stability	Stable under normal conditions of storage and handling.
Materials to Avoid	Strong oxidising agents.

Ingredients

Information on Composition Mixture of diesel fuel, additives and no more than 500ppm sulfur.

Ingredients

Name	CAS	Proportion
Diesel Fuel	68334-30-5	60-100 %
Ingredients determined not to be hazardous	Not required	(Balance)

HEALTH HAZARD INFORMATION

Health Effects

Acute - Swallowed	Harmful, may cause lung damage if swallowed. Ingestion of this product will irritate the gastric tract causing nausea and vomiting. Aspiration into the lungs may result in chemical pneumonitis.
Acute - Eye	May cause irritation in contact with the eyes, which can result in redness, stinging and tearing.
Acute - Skin	May cause irritation to the skin that may result in redness, itchiness and swelling. Repeated or prolonged contact may dry and defat the skin, resulting in skin irritation and possibly lead to dermatitis.
Acute - Inhaled	Mists and vapours generated may cause irritation of the upper respiratory tract. Inhalation of high concentration may lead to headache, dizziness, nausea, vomiting, drowsiness or narcosis.

Hazards Identification

Classified as Hazardous according to the criteria of the NOHSC.
Not classified as dangerous goods according to the ADG Code.

Risk Phrase:

	R40(3) Possible risk of irreversible effects. Safety Phrase: S16 Keep away from sources of ignition - No smoking. S2 Keep out of reach of children. S23 Do not breathe gas/fumes/vapour/spray S24/25 Avoid contact with skin and eyes. S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
Chronic	Possible risk of irreversible effect. Prolonged or repeated skin contact may cause skin irritation leading to dermatitis. Repeated or prolonged inhalation of high vapour concentrations can cause drowsiness and lead to narcosis or death.

First Aid

Swallowed	DO NOT induce vomiting. Give nothing by mouth to an unconscious person. Seek IMMEDIATE medical attention.
Eye	If contact with the eye(s) occur, wash with copious amounts of water, holding eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. If irritation develops, seek medical attention.
Skin	Remove contaminated clothing and wash before re-use. Wash thoroughly with soap and water. If irritation develops, seek medical attention.
Inhaled	Remove the source of contamination or move the victim to fresh air. Ensure airways are clear and have qualified person give oxygen through a facemask if breathing is difficult. If irritation develops, seek medical attention.
First Aid Facilities	Eye wash and normal washroom facilities.
Other Information	For advice, contact a Poisons Information Centre (Phone eg Australia 131 126; New Zealand 0800 764 766) or a doctor (at once).

Advice to Doctor

Advice to Doctor	Treat symptomatically. For further advice, contact the Poisons Information Centre.

Other Health Hazard Information

PRECAUTIONS FOR USE

Other Exposure Info.	No value assigned for this specific material by the National Occupational Health and Safety Commission (NOHSC). However, Caltex recommends a daily 8 hour TWA Exposure Standards of 100 ppm of total hydrocarbons.
Eng. Controls	Provide sufficient ventilation to keep airborne levels below the exposure limit. Where vapours or mists are generated and exposure standards are exceeded, the use of respiratory protection, or a local exhaust ventilation system is recommended.

Personal Protection

Respirator Type (AS 1716)	Avoid breathing of vapours/mists. Where ventilation is inadequate and vapours/mists are generated, the use of an approved respirator with filter complying with AS/NZS 1715 and AS/NZS 1716 is recommended; however final choice of appropriate breathing protection is dependant upon actual airborne concentrations and the type of breathing protection required will vary according to

	individual circumstances. Expert advice may be required to make this decision. Reference should be made to Australian Standards AS/NZS 1715- Selection, Use and Maintenance of Respiratory Protective Devices; and AS/NZS 1716- Respiratory Protective Devices.
Eye Protection	If possibility of eye contact exists safety glasses with face shield should be worn as described in Australian Standard AS/NZS 1337- Eye Protectors for Industrial Applications.
Glove Type	Impervious PVC or rubber gloves should be worn to minimise skin contact.
Clothing	Any routine contact with this material should require the use of protective clothing such as an apron made of neoprene, nitrile, or n-butyl rubber suitable for the application.
Footwear	Safety boots with non-slip soles as required.
Other Information	Biological Limit Values: No biological limit allocated.

Flammability

Fire Hazards	Classified as a Class 1- Combustible liquid. Avoid all sources of ignitions, heat or sparks. May emit toxic fumes under fire conditions.

SAFE HANDLING INFORMATION

Storage and Transport

Storage Precautions	Classified as combustible liquid for storage and handling purposes. Store in a cool, dry, well-ventilated area, out of direct sunlight. Keep containers closed when not in use and securely sealed and protected against physical damage. Inspect regularly for deficiencies such as damage or leaks. Avoid sparks, flames and other ignition sources. Store away from incompatible materials. For information on the design of the storeroom reference should be made to Australian Standard AS1940 - The storage and handling of flammable and combustible liquids. Reference should also be made to all Local, State and Federal regulations.
Transport	Not classified as Dangerous Good according to Australian Code for the Transport of Dangerous Goods by Road and Rail (6th Edition).
Handling	Repeated or prolonged contact with this material should be avoided in order to lessen the possibility of skin disorders. It is essential that all who come into contact with this material, maintain high standards of personal hygiene i.e. washing hands prior to eating, drinking, smoking or going to the toilet. Build-up of mist in the working atmosphere must be prevented. Ensure ventilation is adequate. Prevent concentration in hollows or sumps. DO NOT enter confined spaces where vapour may have collected. Keep containers closed when not in use.
Proper Shipping Name	None Allocated

Spills and Disposal

Accidental Release Measures	Remove all sources of ignition. Increase ventilation. Evacuate all unnecessary personnel. Wear full protective equipment including air supplied respirator, and clothing to minimise exposure. If possible contain the spill. Place inert absorbent material such as vermiculite, sand onto spillage. Use clean non-sparking tools to collect the material and place into a suitable labelled container. Prevent contamination of groundwater or surface water. If large quantities of this material

	enter the waterways contact the Environmental Protection Authority, or your local Waste Management Authority.
Disposal Considerations	Dispose of waste according to federal, E.P.A, State and local regulations. Assure conformity with all applicable regulations.

Fire/Explosion Hazard

Fire / Explos. Hazard	Combustible liquid. Avoid all sources of ignition, heat and open flame. May emit toxic fumes under fire conditions. Fire-exposed containers may rupture/explode.
Hazardous Combustion Products	Oxides of carbon.
Fire Fighting Precautions	Self-contained breathing apparatus (S.C.B.A) and full protective clothing should be worn to reduce the risk from exposure to combustion products and oxygen deficiency.
Extinguishing Media	Use carbon dioxide, dry chemical or foam. DO NOT use water spray directly on the fire as this may spread the fire. Water or foam may cause frothing. Use water spray to cool fire exposed containers.
Hazchem Code	None Allocated

OTHER INFORMATION

Toxicology	Middle distillates have caused skin cancer in laboratory animals following lifetime application to the skin. Brief or intermittent skin contact is not expected to cause adverse effects if it is washed thoroughly. Avoid prolonged or repeated contact or breathing of vapour or mist. U.S. NIOSH has recommend whole diesel exhaust be regarded as a potential occupational carcinogen, based on findings of carcinogenic response in laboratory animals exposed to whole diesel exhaust. The excess risk has not been estimated. Avoid exposure to diesel. NOTE: Exhaust from fuel oils and gas oils may present similar exposure potential and should also be avoided. This product has been classed as a Carcinogen Category 3 Substance- R40 Possible risk of irreversible effects. That is, substances which cause concern for humans owing to possible carcinogenic effects but in respect of which the available information is not adequate for making a satisfactory assessment. A substance is included in Category 3 if there is some evidence from appropriate animal studies that human exposure can result in the development of cancer, but this evidence is insufficient to place the substance in Category 2.
Environment Protection Risk Statement	Prevent the material from entering the environment. This substance may present environmental risks common to oil spills.
	R65 Harmful: may cause lung damage if swallowed. R40(3) Possible risk of irreversible effects.
Safety Statement	S2 Keep out of reach of children. S16 Keep away from sources of ignition - No smoking. S23 Do not breathe gas/fumes/vapour/spray S24/25 Avoid contact with skin and eyes. S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
Pkg. & Labelling	Labelling requirements of the Standard for Uniform Scheduling of Drugs and Poisons do not apply to a poison that is packed and sold solely for industrial, laboratory or manufacturing purposes; however is labelled in accordance with the National Occupational Health and Safety Commission's 'National Code of Practice

	for the Labelling of Workplace Substances'.
Hazard Category	Harmful
Ecotoxicity	Not available
Persistence / Degradability	Not available
Mobility	Not available
SDS History	MSDS Review: March 2005 MSDS Superseded: November 2002

CONTACT POINT

Contact	CHEMICAL EMERGENCIES: 1 800 033 111 TECHNICAL ADVICE: 1300 364 169 Health & Safety Advisor Tel: (02) 9695 3607 or (02) 9250 5900 PLEASE NOTE that although every care has been taken in compiling the above information, it is solely reliant upon data available to us at the date hereof. We believe the data to be correct, however for the reason just stated we are not in a position to warrant its accuracy. With that in mind and given that the full range of possibilities and conditions under which the information may be applied simply cannot be anticipated, YOU ARE CAUTIONED to make your own determinations as to the veracity and the suitability of the information to the particular circumstances that apply, or may apply, to you from time to time. Consistent with that approach it is recommended that where you have a particular purpose which would necessitate a reliance on information of the nature herein you obtain your own independent expert advice particularly structured to the relevant purpose. If this material is printed, circulated, distributed or copied in any manner, it is not to be modified without prior written permission, and further, it is to include the wording of the above disclaimer.

End of MSDS

SAFETY DATA SHEET

1 . Identification of the substance/preparation and company/undertaking

Product name **Perfecto HT 12**

SDS no. 453226

Use of the substance/mixture Heat transfer fluid.
For specific application advice see appropriate Technical Data Sheet or consult our company representative.

Supplier Castrol India Ltd.,
Technopolis Knowledge Park Office,
P. O. Box No. 19411
Mahakali Caves Road
Chakala, Andheri (E)
Mumbai - 400 093
India

Telephone Number: +91 22 6698 4100
Fax Number: +91 22 66984543

EMERGENCY TELEPHONE NUMBER Toll free: 000800 100 7479 (for use in India only - 24 hours)
Carechem Singapore: +65 3158 1198 (24 hours)

E-mail address MSDSadvice@bp.com

2 . Hazards identification

This substance is not classified as dangerous according to Directive 67/548/EEC as amended and adapted.

Additional hazards Contact with hot product may cause burns.

See sections 11 and 12 for more detailed information on health effects and symptoms and environmental hazards.

3 . Composition/information on ingredients

Highly refined base oil (IP 346 DMSO extract < 3%).

This product does not contain any hazardous ingredients at or above regulated thresholds.

4 . First-aid measures

Eye contact Cold product - Wash eye thoroughly with copious quantities of water, ensuring eyelids are held open. Obtain medical advice if any pain or redness develops or persists.
Hot product - Flood with water to dissipate heat. In the event of any product remaining, do not try to remove it other than by continued irrigation with water. Obtain medical attention immediately.

Skin contact Cold Product - Wash contaminated skin with soap and water. Remove contaminated clothing and wash underlying skin as soon as reasonably practicable.
Hot Product - Flood skin with cold water to dissipate heat, cover with clean cotton or gauze, obtain medical advice immediately.

Inhalation If inhaled, remove to fresh air. Get medical attention if symptoms appear.

Ingestion Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Notes to physician Treatment should in general be symptomatic and directed to relieving any effects.

5 . Fire-fighting measures

Extinguishing media

Suitable In case of fire, use foam, dry chemical or carbon dioxide extinguisher or spray.

Not suitable Do not use water jet.

Hazardous decomposition products Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Unusual fire/explosion hazards In a fire or if heated, a pressure increase will occur and the container may burst. Oil soaked lagging may spontaneously ignite and should be replaced by fresh lagging as soon as possible. During use heat transfer oils may be thermally degraded leading to the formation of volatile hydrocarbons with flash points considerably lower than the original product. It is therefore essential that the system is not drained while hot unless an inert gas system is used to displace flammable gaseous residues. Adequate ventilation is essential during draining operations as hot oil will fume.
The temperature at which spent product is drained is a compromise between the need to have the oil sufficiently hot to facilitate drainage, the need to avoid fuming and the dangers of fire from degraded oil with a low flash point. It is recommended therefore that spent oil is drained at a temperature of less than

100°C. During system filling and venting, care should be taken to ensure that hot oil is not pumped through the expansion tank. A failure to prevent this could, under certain conditions, lead to the creation of a flammable atmosphere in the expansion tank. As the expansion tank is being filled it is essential that the gases and vapours formed should be free to vent to an open atmosphere where they can quickly disperse. Product contaminated rags, paper or material used to absorb spillages, represent a fire hazard, and should not be allowed to accumulate. Dispose of safely immediately after use.

Special fire-fighting procedures — No action shall be taken involving any personal risk or without suitable training. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire.

Protection of fire-fighters — Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

6 . Accidental release measures

Personal precautions - For non-emergency personnel — No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Floors may be slippery; use care to avoid falling. Put on appropriate personal protective equipment.

Personal precautions - For emergency responders — If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions — Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Large spill — Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor.

Small spill — Stop leak if without risk. Move containers from spill area. Absorb with an inert material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Reference to other sections — See Section 1 for emergency contact information.
See Section 5 for firefighting measures.
See Section 8 for information on appropriate personal protective equipment.
See Section 12 for environmental precautions.
See Section 13 for additional waste treatment information.

7 . Handling and storage

Handling - Protective measures — Put on appropriate personal protective equipment.

Handling - Advice on general occupational hygiene — Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Wash thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Storage — Store and use only in equipment/containers designed for use with this product. Keep away from heat and direct sunlight. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10).

Not suitable — Prolonged exposure to elevated temperature

8 . Exposure controls/personal protection

Ingredient name	Occupational exposure limits
ACGIH TLVs	
Base oil - unspecified	**ACGIH (United States).** TWA: 5 mg/m³ 8 hour(s). Form: Mineral oil, mist

For information and guidance, the ACGIH values are included. For further information on these please consult your supplier.

Whilst specific OELs for certain components may be shown in this section, other components may be present in any mist, vapour or dust produced. Therefore, the specific OELs may not be applicable to the product as a whole and are provided for guidance only.

Exposure controls

Occupational exposure controls — Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective occupational exposure limits.
All activities involving chemicals should be assessed for their risks to health, to ensure exposures are adequately controlled. Personal protective equipment should only be considered after other forms of control measures (e.g. engineering controls) have been suitably evaluated. Personal protective equipment should conform to appropriate standards, be suitable for use, be kept in good condition and properly maintained.
Your supplier of personal protective equipment should be consulted for advice on selection and appropriate standards. For further information contact your national organisation for standards.
The final choice of protective equipment will depend upon a risk assessment. It is important to ensure that all items of personal protective equipment are compatible.

Hygiene measures — Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protective equipment

Respiratory protection

Respiratory protective equipment is not normally required where there is adequate natural or local exhaust ventilation to control exposure.
In case of insufficient ventilation, wear suitable respiratory equipment.
Respiratory protective equipment must be checked to ensure it fits correctly each time it is worn.
Provided an air-filtering/air-purifying respirator is suitable, a filter for particulates can be used. Use filter type P or comparable standard.
Air-filtering respirators, also called air-purifying respirators, will not be adequate under conditions of oxygen deficiency (i.e. low oxygen concentration), and would not be considered suitable where airborne concentrations of chemicals with a significant hazard are present. In these cases air-supplied breathing apparatus will be required.
A combination filter for particles, organic gases and vapours (boiling point >65°C) may be required if mist or fume is present as well as vapour. Use filter type AP or comparable standard.
Approved air-supplied breathing apparatus must be worn where there is a risk of exceeding the exposure limit of carbon monoxide
Approved air-supplied breathing apparatus must be worn where there is a risk of exposure to hazardous combustion and thermal decomposition products.
Entry into a confined space or poorly ventilated area contaminated with vapour, mist or fume is extremely hazardous without the correct respiratory protective equipment and a safe system of work.
The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Hand protection

Wear protective gloves if prolonged or repeated contact is likely.
Cold material: Wear chemical resistant gloves. Recommended: nitrile gloves.
Hot material: to prevent thermal burns wear heat resistant and impervious gauntlets/gloves.
The correct choice of protective gloves depends upon the chemicals being handled, the conditions of work and use, and the condition of the gloves (even the best chemically resistant glove will break down after repeated chemical exposures). Most gloves provide only a short time of protection before they must be discarded and replaced. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Gloves should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions.

Eye protection

Cold material: wear safety glasses with side shields.
Hot material: to prevent thermal burns wear a helmet, full face visor and heat resistant neck flap / apron.

Skin and body

Use of protective clothing is good industrial practice.
Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
Cotton or polyester/cotton overalls will only provide protection against light superficial contamination that will not soak through to the skin. Overalls should be laundered on a regular basis. When the risk of skin exposure is high (e.g. when cleaning up spillages or if there is a risk of splashing) then chemical resistant aprons and/or impervious chemical suits and boots will be required.

Thermal hazards

Cotton or polyester/cotton overalls will only provide protection against light superficial contamination that will not soak through to the skin. Overalls should be laundered on a regular basis. When the risk of skin exposure is high (e.g. when cleaning up spillages or if there is a risk of splashing) then chemical resistant aprons and/or impervious chemical suits and boots will be required. Wear impervious and heat resistant coveralls covering the full body and limbs.

Personal protective equipment (Pictograms)

9 . Physical and chemical properties

General information

Appearance

Physical state Liquid.

Colour Yellow.

Odour Mild

Important health, safety and environmental information

Flash point Closed cup: 245°C (473°F) [Pensky-Martens.]

Viscosity Kinematic: 100 to 120 mm^2/s (100 to 120 cSt) at 40°C
Kinematic: 11 mm^2/s (11 cSt) at 100°C

Pour point -9 °C

Density 887 kg/m^3 (0.887 g/cm^3) at 15°C

Solubility insoluble in water.

Partition coefficient (LogKow) >3

10 . Stability and reactivity

Stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous polymerisation will not occur. Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	No specific data.
Materials to avoid	Reactive or incompatible with the following materials: oxidising materials.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11 . Toxicological information

Acute toxicity

Effects and symptoms

Eyes	Will cause burns if hot material contacts eyes.
Skin	Will cause burns if hot material contacts skin.
Inhalation	Vapour inhalation under ambient conditions is not normally a problem due to low vapour pressure. Overexposure to the inhalation of airborne droplets or aerosols may cause irritation of the respiratory tract.
Ingestion	Ingestion of large quantities may cause nausea and diarrhoea.

12 . Ecological information

Persistence/degradability	Biodegradable
Mobility	Spillages may penetrate the soil causing ground water contamination.
Bioaccumulative potential	This product is not expected to bioaccumulate through food chains in the environment.
Environmental hazards	Not classified as dangerous.
Other ecological information	Spills may form a film on water surfaces causing physical damage to organisms. Oxygen transfer could also be impaired.

13 . Disposal considerations

Disposal considerations / Waste information

The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Unused product

Waste code	Waste designation
13 03 07*	mineral-based non-chlorinated insulating and heat transmission oils

However, deviation from the intended use and/or the presence of any potential contaminants may require an alternative waste disposal code to be assigned by the end user.

14 . Transport information

Not classified as hazardous for transport (ADR/RID, ADNR, IMDG, ICAO/IATA)

15 . Regulatory information

Classification and labelling have been performed according to EU directives 1999/45/EC and 67/548/EEC as amended and adapted.

Label requirements

Risk phrases	This product is not classified according to EU legislation.

Other regulations

REACH Status	The company, as identified in Section 1, sells this product in the EU in compliance with the current requirements of REACH.
United States inventory (TSCA 8b)	All components are listed or exempted.
Australia inventory (AICS)	All components are listed or exempted.
Canada inventory	All components are listed or exempted.
China inventory (IECSC)	All components are listed or exempted.
Japan inventory (ENCS)	All components are listed or exempted.
Korea inventory (KECI)	All components are listed or exempted.

Philippines inventory (PICCS)	All components are listed or exempted.

16 . Other information

History

Date of issue/ Date of revision	16/09/2011.
Date of previous issue	No previous validation.
Prepared by	Product Stewardship

Notice to reader

Indicates information that has changed from previously issued version.

All reasonably practicable steps have been taken to ensure this data sheet and the health, safety and environmental information contained in it is accurate as of the date specified below. No warranty or representation, express or implied is made as to the accuracy or completeness of the data and information in this data sheet.

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APPENDIX B. REFERENCES

1 Request for Secretary's Environmental Assessment Requirements, Timber Panel Processing Facility (7 April 2014)

2 NSW Government Planning: Hazardous and Offensive Development Application Guidelines – Applying SEPP 33 (January 2011).

3. Borg Manufacturing: On Site Chemical List including DG (January 2016).

4. NSW Government, Work Cover: Borg Panels Pty Ltd – Acknowledgement of Notification of Dangerous Goods on Premises (November 2014).

BORG PANELS

TIMBER PANEL PROCESSING FACILITY

OBERON NSW

Noise and Vibration Impact Assessment

May 2016

Prepared for

Borg Manufacturing

Global Acoustics

Noise and Vibration Analysis and Solutions

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Noise and Vibration Impact Assessment
May 2016

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Report date: 17 May 2016

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Global Acoustics Pty Ltd ~ Environmental noise modelling and impact assessment ~ Sound power testing ~ Noise control advice ~ Noise and vibration monitoring ~ OHS noise monitoring and advice ~ Expert evidence in Land and Environment and Compensation Courts ~ Architectural acoustics ~ Blasting assessments and monitoring ~ Noise management plans (NMP) ~ Sound level meter and noise logger sales and hire

EXECUTIVE SUMMARY

Global Acoustics was engaged by Borg Manufacturing Pty Ltd (Borg) to carry out a noise and vibration impact assessment for a proposed expansion of their panel manufacturing facility, located approximately 1.5kms from the centre of Oberon at 124 Lowes Mount Road. This assessment considered impacts associated with noise emission from the existing site, and, the proposed expansion. Potential impact from operational noise, low frequency noise, sleep disturbance, cumulative noise, construction noise and road traffic noise were assessed. A model validation assessment was undertaken to provide an estimate of model prediction accuracy.

Validation Assessment

A model of the existing site was developed, and refined to represent the operational configuration in effect during attended monitoring on the night of 14 October 2015. Results of attended monitoring at Oberon Caravan Park were compared with model predictions for the same location under meteorological conditions in effect at the time of monitoring. An exact correlation resulted, indicating the model of the existing site provides a good estimate of actual noise emission. Compliance with the current EPL night period operational noise criterion was demonstrated.

Operational Noise

Modelling of the existing situation indicated the site currently operates close to EPL criteria during periods of enhancing meteorological conditions. Management measures and noise control for some plant were recommended to both manage and reduce noise emission from the existing site. Compliance with existing EPL criteria was predicted for the existing site for all receivers during non-enhancing meteorological conditions, and all receivers during the evening and night periods during prevailing (enhancing) meteorological conditions. Minor to moderate exceedances were predicted for receivers south of site for the day period when mobile chipping plant is operational during prevailing (enhancing) meteorological conditions.

A model of the proposed expansion was developed, which included all existing plant (with noise control where required) and proposed infrastructure. Mobile chipping plant will be phased out from permanent use and replaced with three enclosed electric chippers (one of which currently exists). Sound power data was not available for plant proposed for the expansion; Borg provided sound pressure level (SPL) data at 1 metre for acoustically significant plant. Sound power for proposed infrastructure was estimated using a relationship derived for each item between the SPL provided by Borg, SPL measured by Global Acoustics for similar plant items at 1 metre, and calculated sound power for similar plant items. Initial model iterations indicated noise control will be required for some plant. For critical plant, limiting sound powers were derived to reduce model predictions to within compliance levels. In some cases, a significant degree of noise control may be required. Full details regarding sound power derivation and recommendations are included in Section 3.4 of this report.

Model predictions indicate the proposed expansion could generally comply with existing EPL operational noise criteria, when recommended management strategies are implemented, and if limiting sound powers for proposed infrastructure and recommended noise controls for existing plant are achieved. The exception is 15-19 Albion Street, for which a minor 1 dB exceedance is predicted for the day period during enhancing meteorological conditions if a mobile chipper is operational. Compliance was predicted for all receivers for 'normal' operations when no mobile chipping plant is operated.

A low frequency noise assessment was undertaken in accordance with INP guidelines. Low frequency modifying factor penalties were applicable in some instance; however, none caused an exceedance of operational noise criteria not previously indicated in the operational noise assessment. Total C-weighted noise predictions remained within desirable limits suggested in *A Simple Method for Low Frequency Noise Emission Assessmen*t (Broner, 2010).

A sleep disturbance assessment was undertaken for the proposed expansion, considering maximum impact noise generated by mobile plant. The current license does not include sleep disturbance criteria. Maximum noise level increases above predicted steady state noise emissions were considered acceptable, and not likely to cause sleep disturbance.

Predictions for the proposed expansion are typically the same as, or slightly lower than, predictions for the existing site. As no significant change is predicted relative to the existing situation, no significant change to cumulative noise levels should result.

Construction Noise

A construction period of approximately 24 months is proposed. Construction activities will be undertaken in conjunction with regular operation of the existing site. Borg propose to generally restrict site noise emission from both construction and operational tasks combined to comply with operational noise criteria conditioned in EPL 3035.

Rock or concrete breaking, earthworks, and, infrastructure installation were assessed. Model predictions for the earthworks and installation scenarios indicate general compliance with the day period operational noise criterion at all receivers, with the exception of 15-19 Albion Street. At this location, exceedances were predicted during prevailing wind conditions if a mobile chipper is operated concurrently with construction plant. Exceedance of the evening period operational noise criterion is predicted at R02, R03, R06, R08, R09 and R10. These exceedances are predicted during calm and prevailing wind conditions when a mobile chipper is operated concurrently with construction plant. Construction noise can be managed through monitoring weather conditions, restricting use of the mobile chipper during enhancing conditions if a large amount of construction plant is operating, and restricting construction activities to the standard ICNG construction hours where possible.

Rock breaking was assessed against the "highly affected" construction noise criterion of $L_{Aeq,15minute}$ 75 dB, as the duration would be relatively short compared with other construction tasks, and few options are available to mitigate noise from this activity. Predictions were well below this criterion.

Vibration

Due to the distance to sensitive receivers from operational and construction areas, no vibration impact is expected.

Road Traffic Noise

Construction and operational road traffic noise impacts were assessed for North Street and Albion Street, the roads indicated in the Traffic Impact Assessment report to receive the greatest traffic flows. The majority of both construction and operational project traffic generated by the project will occur outside of general peak hour traffic flows. Increases to road traffic noise relative to the existing situation were found to be insignificant, and less than 1 dB. Such an increase is unlikely to be either measurable, or perceptible to the human ear.

Closure

In general, operation of both the existing site and the proposed expansion are predicted to comply with current EPL operational noise criteria when recommended management strategies are implemented. A minor 1 dB exceedance is predicted at R09 when a mobile chipper is operated during enhancing meteorological conditions. Operation of mobile chippers does not form part of 'normal' operations, as they will typically be only used during breakdown of electric plant. Exceedances can be avoided through monitoring weather and restricting use of mobile chipping plant during periods of meteorological enhancement.

Results of this assessment are dependent upon limiting sound powers for proposed infrastructure, and recommended noise controls for existing plant, being achieved. Borg has committed to including sound power limits in tender documents to ensure required targets are achieved.

Global Acoustics Pty Ltd

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1 INTRODUCTION

1.1 Background

Global Acoustics was engaged by Borg Manufacturing Pty Ltd (Borg) to carry out a noise and vibration impact assessment for a proposed expansion of their panel manufacturing facility, located approximately 1.5kms from the centre of Oberon at 124 Lowes Mount Road.

The subject land is currently developed for the purpose of manufacturing Medium Density Fibre board (MDF). This existing development includes:

- A number of large industrial scale buildings which contain various processes involved with the manufacture of MDF and MDF products;
- Concrete hard stand areas between the buildings;
- An existing two-storey administration/amenities building with associated staff car parking;
- Various necessary items of infrastructure including venting and conveyors;
- Other facilities/buildings associated with the use of the land (including maintenance areas, security entry/exit gates and weigh bridges; and
- Fencing, landscaping and other site facilities.

The proposed expansion (the Project) involves enlargement of the existing timber manufacturing and processing facility. The major change to the existing approval for the site is to provide for a facility to manufacture particle board. Particle board manufacturing involves both the processing of virgin wood, residual wood waste from sawmills, and the recycling and processing of appropriate used wood to create suitable sized particles. These are then processed to form particle board. In addition to this, expansion to existing MDF and laminating operations are to be undertaken. These are largely to be located within existing structures on site.

The primary objectives of the Project are to:

- Allow for the construction of a dedicated particle board manufacturing line;
- Provide additional capacity within existing buildings to expand production capacity;
- Modernise the existing facility;
- Allow for expansion to Lot 1 and 2 DP 1085563 and consolidation into Lot 26 DP1200697 for the purposes of processing and storage;
- Rationalise the current Conditions of Consent that apply to a number of different lots, all under

fragmented ownership and operation; and

- Allow for an increase in production, with a commensurate increase in staff levels.

The works associated with the Project will run in parallel with existing MDF processing lines, laminating building (including press and paper treatment) and ancillary cranes, storage and administration building which are to be retained. No changes to these existing approved facilities, with the exception of demolition of the administration block, are proposed. Existing and proposed infrastructure are illustrated in Figure 1.

This assessment has been prepared in accordance with the relevant guidelines contained in the NSW Industrial Noise Policy (INP), NSW Interim Construction Noise Guideline (ICNG), NSW Road Noise Policy (RNP) and NSW Assessing Vibration: a Technical Guideline.

The primary purpose of this assessment is to determine potential noise and vibration impact at the nearest residential receptors to the site, and considers construction, operational and transport noise impacts. This assessment has been based on plans and information provided by Borg.

Figure 1: Existing and Proposed Infrastructure (Source: Borg Panels, 16 May 2016)

1.2 Terminology & Abbreviations

Some definitions of terminology and abbreviations, which may be used in this report, are provided in Table 1.

Table 1: TERMINOLOGY & ABBREVIATIONS

Descriptor	Definition
L_A	The A-weighted root mean squared (RMS) noise level at any instant
L_{A10}	The noise level which is exceeded for 10 percent of the time, which is approximately the average of the maximum noise levels
L_{A90}	The level exceeded for 90 percent of the time, which is approximately the average of the minimum noise levels. The L_{A90} level is often referred to as the "background" noise level and is commonly used to determine noise criteria for assessment purposes
L_{Aeq}	The average noise energy during a measurement period
dB(A)	Noise level measurement units are decibels (dB). The "A" weighting scale is used to describe human response to noise
SPL	Sound pressure level (SPL), fluctuations in pressure measured as 10 times a logarithmic scale, the reference pressure being 20 micropascals
SEL	Sound exposure level (SEL), the A-weighted noise energy during a measurement period normalised to one second
ABL	Assessment background level (ABL), the 10^{th} percentile background noise level for a single period (day, evening or night) of a 24 hour monitoring period
RBL	Rating background level (RBL), the background noise level for a period (day, evening or night) determined from ABL data
Hertz (Hz)	Cycles per second, the frequency of fluctuations in pressure, sound is usually a combination of many frequencies together
VTG	Vertical temperature gradient in degrees Celsius per 100 metres altitude. Estimated from wind speed and sigma theta data
SC	Stability Class. Estimated from wind speed and sigma theta data
Day	This is the period 7:00am to 6:00pm
Evening	This is the period 6:00pm to 10:00pm
Night	This is the period 10:00pm to 7:00am
VPH	Vehicles per hour; the number of vehicles travelling on a section of road per hour.

2 CRITERIA

2.1 Existing Environment

The subject land is located on the northern outskirts of Oberon, to the east of Lowes Mount Road. As per the Oberon Council Local Environmental Plan (LEP) 2013, the land zone classification of the subject site is IN1 General Industrial. The Borg operations are part of a larger industrial precinct operated by a number of separate companies, which generally involve timber product manufacture. Land use north, east and west of the subject site is generally agricultural.

2.2 Unattended Monitoring

An unattended noise monitoring survey was undertaken around the subject site from 14 October 2015 to 21 October 2015 inclusive. Monitoring was undertaken at three locations, as listed in Table 2. Logging locations are shown in Figure 5.

Table 2: UNATTENDED MONITORING LOCATIONS

Location ID	Monitoring Location
NM1	Oberon Caravan Park, adjacent reception building
NM2	Corner of O'Connell Road and Albion Street
NM3	127 Hazelgrove Road

2.2.1 Unattended Monitoring Equipment

The equipment used to measure and record environmental noise levels are listed in Table 3, copies of calibration certificates are provided in Appendix A. The loggers were configured to provide a statistical noise data summary every 15 minutes.

Table 3: MONITORING EQUIPMENT

Model	Serial Number	Calibration Due Date
ARL Ngara Noise Data Logger	878017	28/11/2016
ARL Ngara Noise Data Logger	878041	20/01/2016
ARL Ngara Noise Data Logger	87801F	13/12/2015
Pulsar Sound Level Calibrator	57813	08/07/2017

2.2.2 Background Monitoring Results

Table 4 to Table 6 provide summaries of noise logger data. Graphs are provided in Appendix B. Bureau of Meteorology (BOM) data from the Mount Boyce AWS was used for processing logger data.

Table 4: AVERAGE LOGGED NOISE LEVELS – NM1

Site	Period	L_{Aeq} dB	L_{A10} dB	L_{A90} dB	RBL dB[1]
Location NM1	Day	57	60	47	39
	Evening	49	50	41	39
	Night	47	48	44	41

Notes *1: Rating Background Level(RBL).*
2: L_{Aeq} are logarithmic average; and
3: Day: 7:00am to 6:00pm ~ Evening: 6:00pm to 10:00pm ~ Night: 10:00pm to 7:00am

Table 5: AVERAGE LOGGED NOISE LEVELS – NM2

Site	Period	L_{Aeq} dB	L_{A10} dB	L_{A90} dB	RBL dB[1]
Location NM2	Day	55	58	43	39
	Evening	52	55	46	40
	Night	53	54	47	44

Notes *1: Rating Background Level(RBL).*
2: L_{Aeq} are logarithmic average; and
3: Day: 7:00am to 6:00pm ~ Evening: 6:00pm to 10:00pm ~ Night: 10:00pm to 7:00am

Table 6: AVERAGE LOGGED NOISE LEVELS – NM3

Site	Period	L_{Aeq} dB	L_{A10} dB	L_{A90} dB	RBL dB[1]
Location NM3	Day	53	55	41	36
	Evening	44	45	39	35
	Night	44	46	40	36

Notes *1: Rating Background Level(RBL).*
2: L_{Aeq} are logarithmic average; and
3: Day: 7:00am to 6:00pm ~ Evening: 6:00pm to 10:00pm ~ Night: 10:00pm to 7:00am

2.3 Attended Noise Monitoring

Attended noise monitoring was conducted at three locations during the night period to determine noise levels from existing site operations. These measurements were used to determine compliance with current licence criteria, and also to calibrate the noise model used to predict post expansion noise levels.

Measurements were performed in accordance with the Environment Protection Authority (EPA) 'Industrial Noise Policy' (INP) guidelines and Australian Standard AS1055 ' Acoustics, Description and Measurement of Environmental Noise'. Atmospheric condition measurement was also undertaken during attended monitoring. The duration of each measurement was 15 minutes.

Attended measurement results are included in the following sections. Meteorological conditions on the night of monitoring were generally consistent with the prevailing wind condition used for the modelling assessment. Compliance with licence criteria resulted at all three locations.

2.3.1 NM1 – Oberon Caravan Park

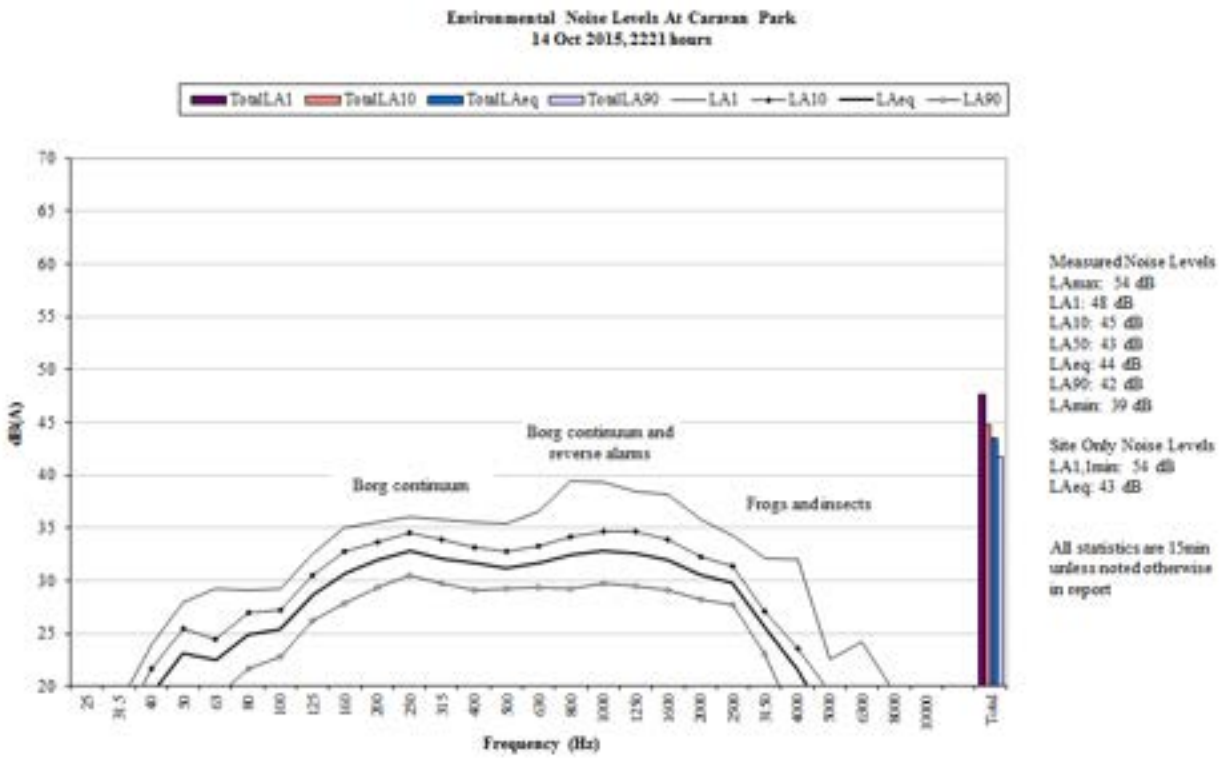


Figure 2: Environmental Noise Levels - NM1

A relatively continuous level continuum from Borg was audible throughout the measurement. Reverse alarms (quacker style) were audible at regular intervals. The resulting site only L_{Aeq} was 43 dB.

Wind direction was from the ENE, with a speed ranging from 1.0 to 1.9 metres/second at 1.8 metres above

ground level. This wind direction is consistent with the prevailing wind direction used for the modelling assessment, and wind speeds were in the noise enhancing range.

Other noise sources including frogs, insects, a flagpole and road traffic noise were noted, but did not contribute significantly to measured levels. No other industrial noise was audible at this location.

2.3.2 NM2 - O'Connell Road

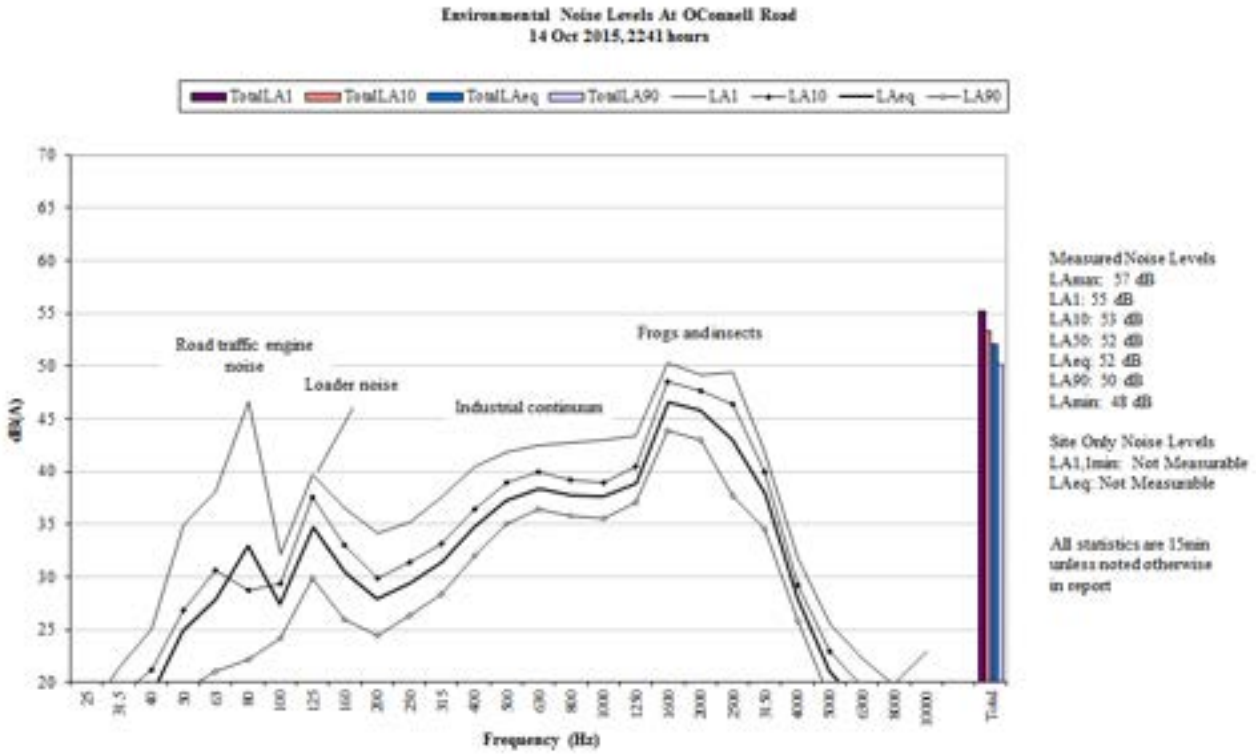


Figure 3: Environmental Noise Levels - NM2

Industrial noise from another site dominated the acoustic environment at frequencies less than 1.6 kHz at this location. Borg may have contributed to some degree, but was not discernible due to the continuum generated by the other site. Front end loader noise was regularly audible from the other site. The measured L_{Aeq} from this site was 47 dB.

Frogs and insects dominated the higher frequencies, with a measured L_{Aeq} exceeding 50 dB.

Other noise sources including bats, breeze in foliage, and road traffic noise were noted, but did not contribute significantly to measured levels.

2.3.3 NM3 - Hazelgrove Road

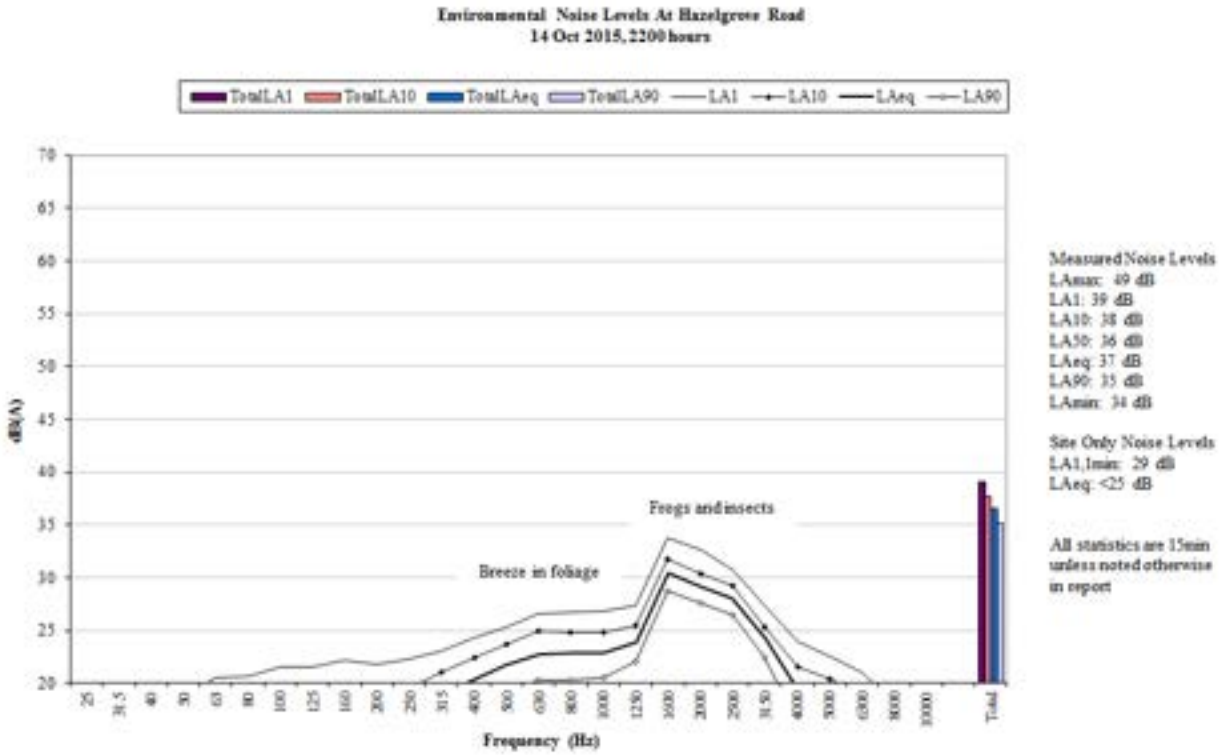


Figure 4: Environmental Noise Levels - NM3

A very low level continuum from Borg was audible at times during the measurement. However, the site was typically inaudible.

Frogs, insects and breeze in foliage primarily generated measured levels.

Birds, an aircraft and distant road traffic noise were also noted.

2.4 Operational Noise Criteria

The existing manufacturing facility, located on Lot 26 DP 1200697 operates under Environment Protection Licence (EPL) 3035. A variation to the EPL was issued by the NSW Environment Protection Authority (EPA) on 25 February 2015. Condition L4 of the EPL provides noise conditions, which are reproduced below:

L4 Noise limits

L4.1 Noise from the premises must not exceed:
a) 55 dB(A) $L_{Aeq(15\ minute)}$ during the day (7am to 6pm); and
b) 50 dB(A) $L_{Aeq(15\ minute)}$ during the evening (6pm to 10pm); and
c) at all other times 45 dB(A) $L_{Aeq\ (15\ minute)}$, except as expressly provided by this licence.

Where L_{Aeq} means the equivalent continuous noise level – the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

L4.2 To determine compliance with condition L4.1, noise must be measured or computed at for at Oberon High School or an other noise sensitve locations (such as a residence/school). A modifying factor correction must be applied for tonal, impulsive or intermittent noise in accordance with the "Environmental Noise Management - NSW Industrial Noise Policy (January 2000)".

L4.3 The noise emission limits identified in this licence apply under all meteorological conditions except:
a) during rain and wind speeds (at 10m height) greater than 3m/s; and
b) under "non-significant weather conditions".

Note Field meteorological indicators for non-significant weather conditions are described in the NSW Industrial Noise Policy, Chapter 5 and Appendix E in relation to wind and temperature inversions.

Borg propose to operate the Project with continuation of these existing noise limits.

2.5 Construction Noise Criteria

The NSW Interim Construction Noise Guideline (ICNG, July 2009), prepared by the NSW Environment Protection Authority (EPA), specifically relates to construction, maintenance and renewal activities. The guideline suggests that for short-term construction (not more than three weeks), a qualitative assessment will suffice and for longer-term construction, a quantitative assessment is required, with comparison to relevant criteria.

The anticipated duration of construction for the Project will exceed 18 months. As the proposed construction period exceeds three weeks, a quantitative assessment is required.

The ICNG recommended noise levels for the nearest residences in relation to work undertaken during standard construction hours are shown in Table 7.

Table 7: CONSTRUCTION NOISE AT RESIDENCES AND OTHER LAND USES, L_{Aeq} dB

Time of Day	$L_{Aeq,15minutes}$	Notes
Residential premises Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays and public holidays	Noise affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq,15minutes}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. time identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences). 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.
Commercial premises	70 dB(A)	External noise level at most affected point of the premises.

Construction of proposed infrastructure will occur concurrently with operation of the existing facility. All construction will generally be undertaken during standard construction hours, with the exception of 6pm – 7pm Monday to Friday. The operational noise criterion for the evening period would apply during these hours, as conditioned in EPL 3035. Only unforeseen circumstances would require work to continue outside of these hours. When construction work outside of these hours is required, the operational noise criterion for the relevant period would apply, as conditioned in EPL 3035.

Borg propose to generally restrict site noise emission from both construction and operational tasks combined to comply with the day period operational noise criterion of $L_{Aeq,15minute}$ 55 dB and the evening period operational noise criterion of $L_{Aeq,15minute}$ 50 dB, conditioned in EPL 3035. The exception will be for short duration high noise emitting tasks as such as rock/concrete breaking, for which the "highly noise affected" construction noise criterion of $L_{Aeq,15minute}$ 75 dB is deemed appropriate. Such construction tasks should be restricted to the least noise sensitive times of day. It is recommended all potentially affected receivers are notified in advance of any construction tasks where the operational day period criterion is likely to be

exceeded.

2.6 Traffic Noise Criteria

An assessment of additional traffic associated with operational activities has been considered. There will be additional vehicle movements resulting from the transport of logs and product material to and from site.

In 2011 the NSW state government department responsible for the environment (the Department of Environment, Climate Change and Water) released the NSW Road Noise Policy (RNP). The RNP outlines traffic noise criteria applicable to this project. The policy applies different noise limits dependent upon the road category and type of project/land use.

Table 8 presents noise criteria from the RNP for various road categories.

Table 8: ROAD TRAFFIC NOISE CRITERIA - dB

Road Category	Type of Project/Land use	Day	Night
Local roads	Existing residences affected by additional traffic on existing local roads generated by land use developments	$L_{Aeq,1hour}$ 55 (external)	$L_{Aeq,1hour}$ 50 (external)
Sub-arterial roads	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,15hour}$ 60	$L_{Aeq,9hour}$ 55

The RNP also includes relative increase criteria, which are primarily intended to protect existing quiet areas from excessive changes in amenity due to noise from a road project or from additional traffic generated by land use developments.. EPA application notes state:

- *...for existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level as a result of the development should be limited to 2 dB above that of the noise level without the development. This limit applies wherever the noise level without the development is within 2 dB of, or exceeds, the relevant day or night noise assessment criterion.*

In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person. A relative increase in road traffic noise levels has been considered in this assessment.

2.7 Vibration Criteria

Vibration criteria in NSW are outlined in the guideline Assessing Vibration: A Technical Guideline (RNP), published by the NSW Department of Environment and Conservation (2006).

Vibration generated by short term works such as construction tasks, including vibrating roller compaction and rock/concrete breaking, are assessed as intermittent activities.

When assessing vibration for intermittent activities, the guideline recommends use of the vibration dose value (VDV). The VDV is given by the fourth root of the integral with respect to time of the fourth power of the acceleration after it has been weighted. This is the root-mean-quad approach.

VDV criteria are included in Table 2.4 of the guideline, and are reproduced below:

Table 2.4 Acceptable vibration dose values for intermittent vibration ($m/s^{1.75}$)

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas[2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

1 Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am.
2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas.
Source: BS 6472–1992

The manufacturing operations are not anticipated to produce any measurable vibration impact to surrounding residences due to the following factors:

- The equipment and processing of material does not involve blasting or generate any vibration of significance; and
- The separation distance from the plant to residences being significantly large enough for any vibrations to be damped out.

During construction of proposed infrastructure, vibrating equipment such as rollers and rock breakers may be utilised. Due to the distance to sensitive receivers from construction areas, no vibration impact is expected. Vibration is not discussed further in this report.

3 NOISE MODEL PARAMETERS

Noise levels were calculated using DataKustik CadnaA noise modelling software to determine the acoustic impact of operational and construction activities at noise sensitive receiver (NSR) locations.

3.1 Receivers

Ten NSR were included in the assessment, representing the nearest and potentially most affected residences to the site, and Oberon High School. Attended monitoring was undertaken adjacent Oberon Caravan Park (reception building) and Oberon High School. This point was included in the models as a receiver location. Modelled NSR are listed in Table 9, and shown in Figure 5.

Table 9: MODELLED RECEIVER LOCATIONS

Receiver ID	Receiver Location
V01	Attended Validation Monitoring Location
R01	32 O'Connell Road
R02	6 Herborn Street
R03	Oberon High School
R04	10 Tasman Street
R05	127 Hazelgrove Road
R06	26 Cunyngham Street
R07	131 Hazelgrove Road
R08	2 Herborn Street
R09	15-19 Albion Street
R10	Oberon Caravan Park

Figure 5: Modelled Receiver and Logging Locations

3.2 Topography

Borg provided topographical data for the site and surrounding area. These were input to the models, with modifications as required to account for changes in ground elevation through the proposed expansion area.

3.3 Atmospheric Conditions

Section 5 of the INP provides procedures for considering meteorological effects. The effects of gradient winds, drainage flow winds and temperature inversions need to be considered. Wind effects need to be assessed when wind is considered to be a feature of the area. Wind is considered a feature of the area when source-to-receiver wind speeds (at 10m height) of 3 m/s or less occur for more than 30 percent of the time in any time period, in any season.

The analysis of wind data included the following steps:

1. All wind speed data greater than 5 m/s was discarded, as higher wind speeds cause extraneous noise and, tend to drown out industrial noise;

2. All wind speed data less than 0.5 m/s was discarded, as these conditions are considered calm, or neutral;

3. Remaining data was sorted into data sets representing each time period (day, evening and night), and each season; and

4. For each time period, and for each season, the percentage occurrence of the vector component of each of the sixteen standard compass directions was determined for wind speed ranges of 0.5 to 3 m/s and 0.5 to 2.25 m/s. Vector components with a resulting direction component more than 45 degrees from each compass direction were excluded.

Borg provided meteorological data for the Oberon area for one full year (2014). Data provided did not include temperature inversion data. Stability class F, combined with calm winds was assessed for the night period to represent inversion conditions. The area around the site is relatively flat and drainage flow winds are not considered applicable.

Based on the analysis of meteorological data, the conditions listed in Table 10 are included in this assessment as prevailing meteorological conditions.

Table 10: PREVAILING METEOROLOGICAL CONDITIONS

Condition	Temperature ^{0}Celsius	Humidity %	Stability Class	Wind Speed m/s	Wind Direction Degrees
Neutral Atmosphere	10	70	D	0	-
Temperature Inversion	10	70	F	0	-

Condition	Temperature ^{0}Celsius	Humidity %	Stability Class	Wind Speed m/s	Wind Direction Degrees
Prevailing Wind	10	70	D	3	67.5

3.4 Equipment Sound Power

3.4.1 Existing Plant

Global Acoustics undertook a sound power survey of the existing site during October 2015. Acoustically significant noise sources were identified and, where possible, measured directly. The exception was existing enclosed electric debarker and chipping plant, which was measured in April 2016. Production hall and warehouse noise levels were found to be insignificant compared to external sources; therefore only external noise sources were modelled.

Modelled sound power data for existing plant are listed in Table 11.

Table 11: 15 MINUTE SOUND POWER DATA – EXISTING PLANT

Plant Item		Octave Band Sound Power Spectrum, L_{eq} dB									Total L_{eq} dB	
ID	Description	31.5	63	125	250	500	1k	2k	4k	8k	Lin	A wt
EF001	Conti 1 Drier fan	122	117	116	113	116	114	116	111	98	**126**	**121**
EF002	Fan 1	107	109	105	105	106	106	102	94	87	**115**	**110**
EF003	Fan 2	97	97	95	94	89	89	88	81	77	**103**	**94**
EF004	Bag Filter Fan Drive	104	106	104	104	100	99	94	87	83	**111**	**103**
EF005	Staged Fan Motor Drive	-	105	105	99	100	96	97	93	85	**110**	**103**
EF006	Extraction Fan	110	110	109	102	99	99	96	89	80	**115**	**104**
EF007	Filter Fan Drive	106	108	103	102	98	96	97	95	90	**112**	**103**
EF008	Fibre Transport 1 (230M1)	102	102	104	103	104	106	105	97	88	**113**	**110**
EF009	Fibre Transport 2 (Fibre Supply)	99	102	108	101	100	99	98	93	87	**111**	**104**
EF010	Fibre Transport 3 (Reject Fibre)	102	102	108	102	99	99	98	92	85	**111**	**104**
EF011	Fibre Transport 4 (Matt Trim Saw)	99	102	109	103	99	98	97	92	85	**112**	**104**
EF012	Fibre Transport 8 (Vacuum)	94	97	101	101	97	93	90	86	81	**106**	**99**
EF013	Fibre Transport 10 (Vacuum)	94	98	99	95	97	92	88	85	80	**104**	**98**
EF014	Fibre Transport 11 (Total Air)	94	98	99	95	103	93	90	90	88	**107**	**102**
EF015	Booster Fan Drive	112	113	111	114	112	111	109	104	99	**121**	**116**
EF016	Induct Draft Fan	106	105	103	100	98	97	94	91	83	**111**	**102**
EF017	Exhaust Stack 1	106	103	104	109	99	93	86	81	77	**112**	**103**
EF018	Blower Fan	99	104	103	101	105	103	101	96	84	**111**	**108**
EF019	Formaldehyde Plant	106	108	102	100	105	104	100	97	99	**113**	**108**
EF020	Exhaust Stack 2	106	103	105	104	97	92	86	80	76	**111**	**100**

Plant Item		Octave Band Sound Power Spectrum, L_{eq} dB									Total L_{eq} dB	
ID	**Description**	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
EF021	Exhaust Stack 3	104	102	102	105	96	90	84	81	75	**110**	**99**
EF022	Exhaust Stack 4	101	101	104	99	92	87	80	77	71	**108**	**95**
EM023	Mobile chipper	118	127	123	119	122	121	118	115	121	**131**	**126**
EM024	Front end loader	95	98	108	103	94	95	91	86	80	**110**	**100**
ED025	Enclosed debarker/chipper	109	108	107	107	104	99	97	92	83	**114**	**106**

Modelling of the existing site indicated it currently operates close to EPL criteria during periods of enhancing meteorological conditions. To allow additional noise sources to be added to the site (the proposed expansion), a sound power reduction for primary noise emitters currently on site was required. Existing plant items Borg propose to attenuate include:

- The Conti 1 dryer fan. A sound power reduction from L_{Aeq} 121 dB to 114 dB or better is required;
- The booster fan drive. A sound power reduction from L_{Aeq} 116 dB to 109 dB or better is required and
- The main fibre transport fan. A sound power reduction from L_{Aeq} 110 dB to 104 dB or better is required.

Borg is committed to achieving these reductions to reduce noise emission from the existing operation. Modelled sound power data for these plant after attenuation are listed in Table 12.

Table 12: 15 MINUTE SOUND POWER DATA – EXISTING PLANT WITH NOISE CONTROL

Plant Item		Octave Band Sound Power Spectrum, L_{eq} dB									Total L_{eq} dB	
ID	Description	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
EF001	Conti 1 Drier Fan	112	107	106	103	106	104	106	111	98	**117**	**114**
EF008	Fibre Transport 1 (230M1)	96	96	98	97	98	100	99	89	88	**107**	**104**
EF015	Booster Fan Drive	102	103	101	104	102	101	99	104	99	**112**	**109**

3.4.2 Proposed Plant

Sound power data was not available for plant proposed for the expansion. Borg provided SPL data at 1 metre for significant plant items. However, insufficient information was available for most plant items to directly calculate sound power using provided SPL. Instead, a relationship was derived for each item between the SPL provided for proposed plant, SPL measured by Global Acoustics for similar plant items at 1 metre, and calculated sound power for similar plant items. Sound power spectra for similar plant items currently on site were adjusted as required to match derived sound power totals in order to obtain representative sound power spectra for proposed plant. Whilst this approach is not ideal, Global Acoustics

feel it is the best method available given the limited information.

Initial model iterations indicated noise control will be required for some plant. For critical plant, limiting sound powers were derived so that model predictions were within compliance levels. In some cases a significant degree of noise control may be required. Borg is aware that noise control is required, and is committed to achieving the limiting sound powers adopted in this assessment. Sound power limits (both linear and A-weighted) are included in tender documents for new plant. It is recommended compliance testing is undertaken upon commissioning, and any non-compliance identified should require an update of the site noise model to establish whether compliance with relevant noise criteria can be maintained. Actions required to maintain compliance, such as further noise control to the non-compliant item, or other plant items, should be suitably documented.

The noisiest plant associated with the proposal are the dry mills, flakers, screens, debarker and chipping plant. Borg propose to provide noise control for these plant as follows:

- Proposed debarker and chipping plant will be constructed to the south and east of the existing production hall in a similar fashion as existing enclosed electric plant. The chippers will be contained in concrete enclosures and acoustic panelling (see below for details) will be used for the building cladding. Sound power calculated for existing enclosed debarker and chipping plant was adopted for proposed plant, as the construction and performance are expected to be similar;

- A screening area will be constructed to the west of the proposed production hall. A limiting sound power for this area was derived, and is listed in Table 13;

- A mill building with dimensions 19 x 10 metres will be constructed to the west of the proposed production hall. The building is to be fully enclosed with acoustic panelling (see below for details). An opening for a conveyor of 1.2 x 0.6 metres has been allowed for on the southern side. A building acoustics model was developed to calculate the external sound power of each facade, which were in turn included in the environmental noise model for the site. Three mills were modelled within the building; sound power data used in the building acoustics model are listed in Table 13; and

- A flaker and mill building with dimensions 61 x 33 metres will be constructed to the west of the proposed production hall. The building is to be fully enclosed with acoustic panelling (see below for details). An opening for a conveyor of 1.4 x 0.6 metres has been allowed for on the southern side. A building acoustics model was developed to calculate the external sound power of each facade, which were in turn included in the environmental noise model for the site. Six flakers, twelve cyclones and two mills were modelled within the building; sound power data used in the building acoustics model are listed in Table 13.

Borg has advised the acoustic panelling to be used for the above buildings will consist of ISOFIRE acoustic panel with 150mm rockwool insulation. This material consists of a perforated metal internal lining, sheet metal external lining, and rockwool insulation filling.

Other proposed plant of significance includes the drier main fan, drier combustion air fan, and an associated exhaust stack known as the WESP.

- Limiting sound powers were derived for the drier main fans and drier combustion air fan. Modelled sound powers are listed in Table 13; and

- The WESP stack may require noise mitigation work to reduce noise emission from the stack outlet based on preliminary sound power data provided by a potential supplier. A limiting sound power was determined and is listed in Table 13. Directivity corrections were applied to account for the angle of view to sensitive receivers. Borg are aware of the limiting sound power required, and will investigate mitigation options should the limiting sound power not be achievable in the supplied state.

Table 13: 15 MINUTE SOUND POWER DATA – PROPOSED PLANT

Plant Item		Octave Band Sound Power Spectrum, L_{eq} dB									Total L_{eq} dB	
ID	**Description**	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
PD1901	Chipper building 1	109	108	107	107	104	99	97	92	83	**114**	**106**
PD1902	Chipper building 2	109	108	107	107	104	99	97	92	83	**114**	**106**
PF1070	Fresh chips silo 1	89	88	86	83	81	80	77	74	66	**94**	**85**
PF1903	Cyclones	101	100	98	95	93	92	89	86	78	**106**	**97**
PF2125	Roller screen (same as row 1)	89	88	86	83	81	80	77	74	66	**94**	**85**
PF2135	Air grader	97	97	95	94	89	89	88	81	77	**103**	**94**
PF2205	Saw dust air grader	104	103	101	98	96	95	92	89	81	**109**	**100**
PF3005	Flaker dynascreen	89	88	86	83	81	80	77	74	66	**94**	**85**
PF3020	Flaker Wet chips silo	89	88	86	83	81	80	77	74	66	**94**	**85**
PF3135	Wet flakes silo	89	88	86	83	81	80	77	74	66	**94**	**85**
PF3240	Dry waste flakes silo	89	88	86	83	81	80	77	74	66	**94**	**85**
PF3505	Conidur Mills	104	103	101	98	96	95	92	89	81	**109**	**100**
PF3510	Flaker building wall 1 (external)	-	101	95	86	80	70	60	53	47	**103**	**84**
PF3511	Flaker building wall 2 (external)	-	101	95	84	77	67	57	51	45	**102**	**82**
PF3512	Flaker building wall 3 (external)	-	98	92	81	74	63	53	47	42	**99**	**80**
PF3513	Flaker building wall 4 (external)	-	99	93	83	77	66	56	50	44	**100**	**81**
PF3514	Flaker building opening (external)	-	99	95	89	92	91	90	89	84	**102**	**97**
PF3520	Flakers cyclones	104	103	101	98	96	95	92	89	81	**109**	**100**
PF3550	Pneumatic extraction	104	103	101	98	96	95	92	89	81	**109**	**100**
PF4050	Dust silo	89	88	86	83	81	80	77	74	66	**94**	**85**
PF4220	Drier combustion air fan	105	100	99	96	99	97	99	94	91	**109**	**104**
PF4600	Drier Drum Area	89	88	86	83	81	80	77	74	66	**94**	**85**
PF4800	Drier main fans	105	100	99	96	99	97	99	94	81	**109**	**104**
PF4950	WESP stack	124	123	117	106	86	73	72	79	88	**127**	**104**
PF5135	Surface layer air grader	99	98	96	93	91	90	87	84	76	**104**	**95**
PF5140	Surface layer air grader fan	104	103	101	98	96	95	92	89	81	**109**	**100**
PF5155	Cyclones - Filter	99	98	96	93	91	90	87	84	76	**104**	**95**
PF5165	SL silo - rotating screw	89	88	86	83	81	80	77	74	66	**94**	**85**
PF5230	Core layer air grader	99	98	96	93	91	90	87	84	76	**104**	**95**
PF5235	Core layer air grader fan	104	103	101	98	96	95	92	89	81	**109**	**100**
PF5260	CL silo - rotating screw	89	88	86	83	81	80	77	74	66	**94**	**85**
PF5330	Overs air Grader Cyclone	96	95	93	90	88	87	84	81	73	**101**	**92**
PF5340	Oversize silo - moving floor	89	88	86	83	81	80	77	74	66	**94**	**85**
PF5370	Pneumatic extraction	104	103	101	98	96	95	92	89	81	**109**	**100**
PF5385	Pneumatic extraction	104	103	101	98	96	95	92	89	81	**109**	**100**

Plant Item		Octave Band Sound Power Spectrum, L_{eq} dB									Total L_{eq} dB	
ID	**Description**	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
PF5400	Pneumatic extraction	104	103	101	98	96	95	92	89	81	**109**	**100**
PF5501	Mill building wall 1 (external)	-	98	92	81	74	64	54	48	42	**99**	**79**
PF5502	Mill building wall 2 (external)	-	102	95	85	77	66	57	51	45	**103**	**83**
PF5503	Mill building wall 3 (external)	-	98	92	82	75	65	55	48	43	**99**	**80**
PF5504	Mill building wall 4 (external)	-	102	96	86	79	69	59	53	47	**103**	**84**
PF5505	Mill building opening (external)	-	104	100	93	96	95	95	93	89	**107**	**101**
PF5509	Screen Area (all open side)	99	98	97	97	94	89	87	82	73	**104**	**96**
PF5510	Air graders baghouse filter	104	103	101	98	96	95	92	89	81	**109**	**100**
PF5520	Air grader Baghouse blower	101	100	98	95	93	92	89	86	78	**106**	**97**
PF7365	HP blower reject to fines building	106	105	103	100	98	97	94	91	83	**111**	**102**
PF7960	Reject mat cyclone	89	88	86	83	81	80	77	74	66	**94**	**85**
PF8910	Extraction forming line filter	104	103	101	98	96	95	92	89	81	**109**	**100**
PF8930	Extraction forming line filter	104	103	101	98	96	95	92	89	81	**109**	**100**
PF8940	Bag house filter extraction saw granulates	96	95	93	90	88	87	84	81	73	**101**	**92**
PF8941	Pneumatic extraction	104	103	101	98	96	95	92	89	81	**109**	**100**
PM1017	Front end loader	95	98	108	103	94	95	91	86	80	**110**	**100**
PM1018	Front end loader	95	98	108	103	94	95	91	86	80	**110**	**100**
PI5380	Dry mills (internal)	121	129	125	122	125	124	121	118	113	**134**	**128**
PI5365	Dry mills (internal)	121	129	125	122	125	124	121	118	113	**134**	**128**
PI5395	Dry mills (internal future)	121	129	125	122	125	124	121	118	113	**134**	**128**
PF3086	Flaker cyclone (Internal)	104	103	101	98	96	95	92	89	81	**109**	**100**
PF3106	Flaker cyclone (Internal)	104	103	101	98	96	95	92	89	81	**109**	**100**
PI3501	Flaker line 1 3065- 3105 (internal)	117	125	122	118	121	120	117	114	109	**130**	**124**
PI3502	Flaker building hammer mill (internal)	117	125	122	118	121	120	117	114	109	**130**	**124**

3.4.3 Construction Plant

Table 14 lists modelled sound power of plant included in the construction noise assessment. These were sourced from the Global Acoustics database of representative sound powers.

Table 14: 15 MINUTE SOUND POWER DATA – CONSTRUCTION PLANT

Plant Item		Octave Band Sound Power Spectrum, L_{eq} dB									Total L_{eq} dB	
ID	Description	**31.5**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**Lin**	**A wt**
CON01	Excavator	-	105	115	107	102	103	99	91	85	**117**	**107**
CON02	Loader	-	113	117	110	107	107	103	96	86	**120**	**111**
CON03	Road truck	-	102	99	96	93	95	94	88	86	**106**	**100**
CON04	Dozer	-	109	118	119	113	109	105	99	90	**123**	**116**
CON05	Grader	-	101	112	105	105	102	100	96	87	**114**	**108**
CON06	Roller	-	105	109	108	106	107	100	93	91	**114**	**110**
CON07	Mobile crane	-	112	108	100	98	93	91	92	82	**114**	**101**
CON09	Concrete truck	-	107	101	99	103	100	95	87	78	**110**	**104**
CON10	Bobcat	-	96	100	101	99	97	97	95	88	**107**	**103**
CON11	Articulated truck	-	103	113	107	101	99	98	93	86	**115**	**106**
CON12	Rock breaker	-	-	-	-	-	122	-	-	-	**122**	**122**

4 VALIDATION ASSESSMENT

A model validation assessment was undertaken to provide an estimate of model prediction reliability. Comparison was made between attended monitoring results, and model predictions for the existing site

4.1 Attended Measurement

Attended monitoring results from the night of 14 October 2015 was used for model validation. Details of attended monitoring are included in Section 2.3. Of the three measurement taken that night, only the measurement at Oberon Caravan Park was deemed suitable for model validation. At the O'Connell Road location, masking by another industrial site made determination of Borg only levels not measurable, and measured levels at Hazelgrove Road were too low to be utilised.

The resulting site only L_{Aeq} measured at the validation point adjacent the Oberon Caravan Park reception building was 43 dB.

4.2 Scenario Description

A model of the existing site was developed. Debarking and chipping plant was not operating on the night of attended measurement, therefore these sources were omitted from the model. All other significant existing fixed plant noise sources and two front end loaders were included in the scenario. Modelled sound power data for existing plant are listed in Table 11.

4.3 Meteorological Conditions

Weather conditions at a height of 1.8 metres above ground level, recorded by the operator at the time of monitoring, indicated wind speeds ranging from 1.0 to 1.9 m/s, with a direction of 60 to 70 degrees magnetic. The temperature was 14 degrees Celsius, and the cloud cover was six octas. Weather conditions recorded at the BOM Mount Boyce weather station indicated a wind speed of 3 m/s from the east-northeast.

Wind direction between the two locations was consistent, so a wind direction of 65 degrees was used for model input. Wind speed for model input is typically based on a 10 metre above ground level (agl) wind speed. As the Mount Boyce weather station is located in an exposed location, it is considered likely the wind speed measured there may overstate the wind speed at 10 metres agl in Oberon. Therefore, a wind speed of 2 metres per second was used for model input, which is mid way between the average wind speed measured at each location, and is consistent with the maximum wind speed measured at 1.8 metres agl at the monitoring location.

4.4 Results

The model prediction for the modelled scenario was L_{Aeq} 43 dB, which correlates exactly with the attended measured level. This correlation indicates the model of the existing site provides a good estimate of actual noise emission. Increasing the wind speed in the model to 3 m/s provides a prediction of L_{Aeq} 44 dB, indicating the model may slightly over predict should the 10 metre wind speed have been slightly higher than assumed.

5 OPERATIONAL NOISE ASSESSMENT

5.1 Existing Site

A model of the existing site was developed. Sound power of significant noise sources was measured by Global Acoustics during October 2015. The site has some equipment that operates with restricted operating hours; therefore a series of scenarios were developed representing different modes of operation according to time period.

Borg currently operate two mobile wood chipper plant, which are restricted to day period operation. An enclosed electric debarker and chipper unit was recently installed on site (approved under Modification 7). Mobile chipping plant are the highest noise emitters on site by a significant margin. Borg propose to install two additional enclosed electric debarker and chipper units to reduce reliance on mobile plant. Chipping will be restricted to the day and evening periods. Use of mobile chipping plant will not form part of normal operations, although they may be utilised during periods of maintenance or breakdown of electric chipping plant.

5.1.1 Scenarios

Plant included in each of the time period scenarios are outlined in Table 15.

Table 15: EXISITNG SITE SCENARIOS – PLANT INCLUSIONS

Plant Category	Day 1	Day 2	Evening	Night
Existing fixed plant	yes	yes	yes	yes
1st mobile chipper	yes	yes	no	no
2nd mobile chipper	no	yes	no	no
Existing front end loaders (2)	yes	yes	yes	yes
Existing enclosed chipper/debarker	yes	yes	yes	yes

Plant included in the existing fixed plant category are listed in Table 11 with "EF" as the first two letters in the plant ID. Sound power for plant was based on measured sound power of existing equipment.

Source locations figures are included in Appendix C.

5.1.2 Results

Table 16 and Table 17 present model predictions for the existing site (prior to noise control) for neutral atmospheric and worst case prevailing meteorological conditions respectively. Results that exceed the relevant time period criterion are shown in bold type (where applicable).

Table 16: EXISTING SITE RESULTS, NEUTRAL ATMOSPHERE - $L_{Aeq,15MINUTE}$ dB

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R01	55	50	45	40	42	36	36
R02	55	50	45	45	47	38	38
R03	55	50	45	49	51	38	38
R04	55	50	45	46	49	36	36
R05	55	50	45	45	47	36	36
R06	55	50	45	46	48	37	37
R07	55	50	45	46	48	38	38
R08	55	50	45	45	48	39	39
R09	55	50	45	51	54	40	40
R10	55	50	45	49	51	40	40

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 17: EXISTING SITE RESULTS, PREVAILING CONDITIONS - $L_{Aeq,15MINUTE}$ dB

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R01	55	50	45	46	48	42	42
R02	55	50	45	50	53	44	44
R03	55	50	45	53	**56**	43	43
R04	55	50	45	48	51	38	41
R05	55	50	45	45	47	36	41
R06	55	50	45	51	54	42	42
R07	55	50	45	46	48	38	43
R08	55	50	45	51	53	44	44
R09	55	50	45	**56**	**59**	44	44
R10	55	50	45	53	**56**	44	44

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

5.1.3 Discussion

Model predictions for the existing site indicate:

- Compliance with existing EPL criteria is predicted for all receivers during non-enhancing meteorological conditions;
- Compliance with existing EPL criteria is predicted for all receivers for the evening and night periods during prevailing (enhancing) meteorological conditions;
- At R09, a minor 1 dB exceedance is predicted for the day period during enhancing meteorological conditions when one mobile chipper is operational; and
- A minor 1 dB exceedance is predicted for R03 and R10, and a moderate exceedance of 4 dB for R09 for the day period during enhancing meteorological conditions if two mobile chippers are operated concurrently.

The following management measures are recommended:

- Mobile chipping plant should be restricted to the day period;
- Two mobile chippers should not operate concurrently during enhancing meteorological conditions;
- During periods of strong meteorological enhancement to the south, neither mobile chipper should operate; and
- Plant listed in Table 12 should be provided with further noise control (attenuation).

5.2 Existing Site with Noise Controls

Modelling of the existing situation indicated the site currently operates close to EPL criteria during periods of enhancing meteorological conditions. A model of the existing site with key plant items attenuated was developed (refer Section 3.4.1). Modelled sound power spectra for these items, pre and post attenuation, are presented in Table 11 and Table 12.

5.2.1 Scenarios

The scenarios assessed were the same as for the existing site (per Table 15). Modelled sound power included the reduced sound power for the items listed above.

5.2.2 Results

Table 18 and Table 19 present model predictions for the existing site, with noise control implemented, for neutral atmospheric and worst case prevailing meteorological conditions respectively. Results that exceed the relevant time period criterion are shown in bold type (where applicable).

Table 18: EXISTING SITE WITH NOISE CONTROL RESULTS, NEUTRAL ATMOSPHERE - $L_{Aeq,15MINUTE}$ dB

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R01	55	50	45	39	42	30	30
R02	55	50	45	44	47	34	34
R03	55	50	45	49	51	37	37
R04	55	50	45	46	49	35	35
R05	55	50	45	44	47	34	34
R06	55	50	45	45	48	34	34
R07	55	50	45	45	48	35	35
R08	55	50	45	44	47	34	34
R09	55	50	45	51	53	37	37
R10	55	50	45	48	51	37	37

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 19: EXISTING SITE WITH NOISE CONTROL RESULTS, PREVAILING CONDITIONS - $L_{Aeq,15MINUTE}$ dB

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R01	55	50	45	45	47	36	36
R02	55	50	45	50	52	39	39
R03	55	50	45	53	**56**	41	42
R04	55	50	45	48	51	36	40
R05	55	50	45	44	47	34	39
R06	55	50	45	51	54	39	39
R07	55	50	45	45	48	35	40
R08	55	50	45	50	53	39	39
R09	55	50	45	**56**	**58**	42	42
R10	55	50	45	53	**56**	42	42

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

5.2.3 Discussion

Model predictions indicate reductions of up to 5 dB at receiver locations may result from implementation of noise control. Compliance is indicated for all receivers for the evening and night periods. Exceedances predicted for the day period remain unchanged, as these are caused by mobile chipping plant. Operation of mobile chippers will need to be managed during periods of meteorological enhancement as discussed previously.

5.3 Proposed Expansion

A description of the proposed expansion in included in Section 1.1. A description of acoustically significant plant associated with the proposed particle board manufacturing line is provided in Section 3.4.2.

A model of the proposed expansion was developed, which included all existing plant (with noise control recommended above) and proposed infrastructure. Mobile chipping plant will only be used during he day period, when required, due to breakdown or scheduled maintenance of electric chipping plant. Mobile chippers will generally be replaced with three enclosed electric chippers (one currently exists). Two day scenarios were assessed, one of which includes one mobile chipper (not considered normal operations), and another which included electric chipping plant only (normal operations).

5.3.1 Scenarios

Plant included in each of the time period scenarios are outlined in Table 20.

Table 20: EXISTING SITE SCENARIOS – PLANT INCLUSIONS

Plant Category	Day 1	Day 2	Evening	Night
Existing fixed plant	yes	yes	yes	yes
Existing front end loaders (2)	yes	yes	yes	yes
Mobile chipping plant	yes	no	no	no
Existing enclosed electric chipper/debarker	yes	yes	yes	no
Proposed fixed plant	yes	yes	yes	yes
Proposed enclosed electric chipper/debarker (2)	yes	yes	yes	no
Proposed front end loaders (2)	yes	yes	yes	yes

Plant included in the existing fixed plant category are listed in Table 12 with "PF" as the first two letters in the plant ID.

Sound power for proposed plant was based on assumed limiting sound powers as described in Section 3.4. Sound power for existing plant was based on measured sound power of existing equipment, but with attenuated sound power for the items listed in Section 5.2.

Source locations figures are included in Appendix C.

5.3.2 Results

Table 21 and Table 22 present model predictions for the existing site combined with the proposed expansion, with noise control implemented, for neutral atmospheric and worst case prevailing meteorological conditions respectively. Results that exceed the relevant time period criterion are shown in bold type (where applicable).

Table 21: PROPOSED EXPANSION RESULTS, NEUTRAL ATMOSPHERE - $L_{Aeq,15MINUTE}$ dB

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R01	55	50	45	39	34	34	33
R02	55	50	45	44	37	37	36
R03	55	50	45	49	41	41	39
R04	55	50	45	46	37	37	35
R05	55	50	45	45	35	35	34
R06	55	50	45	46	38	38	37
R07	55	50	45	45	36	36	35
R08	55	50	45	45	37	37	36
R09	55	50	45	51	43	43	41
R10	55	50	45	49	41	41	39

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 22: PROPOSED EXPANSION RESULTS, PREVAILING CONDITIONS - $L_{Aeq,15MINUTE}$ dB

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R01	55	50	45	45	39	39	38
R02	55	50	45	50	42	42	41
R03	55	50	45	53	44	44	43
R04	55	50	45	48	38	38	40
R05	55	50	45	45	35	35	39
R06	55	50	45	51	43	43	42

Receptor	Criteria			Predictions			
	Day	Evening	Night	Day 1	Day 2	Evening	Night
R07	55	50	45	45	36	36	40
R08	55	50	45	50	43	43	41
R09	55	50	45	**56**	47	47	45
R10	55	50	45	53	45	45	44

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

5.3.3 Discussion

Model predictions for the proposed site indicate:

- Compliance with existing EPL criteria is predicted for all receivers during non-enhancing meteorological conditions; and
- Compliance with existing EPL criteria is predicted for all receivers except R09, for which a minor 1 dB exceedance is predicted for the day period when a mobile chipper is operational.

The following management measures are recommended:

- Mobile chipping plant should be restricted to the day period, and should not be operated during periods of meteorological enhancement towards R09;
- No chipping plant should operate during the night period; and
- Plant listed in Table 12 should be provided with further noise control (attenuation).

Model predictions are dependent on limiting sound powers provided in Table 13 being achieved. Recommendations are provided in Section 3.4.2 regarding sound power specifications.

5.4 Low Frequency Noise

A low frequency noise assessment was undertaken in accordance with INP guidelines. Where the total C-weighted prediction exceeds the total A-weighted prediction by 15 dB or more, a 5 dB modifying factor penalty is applied to predicted L_{Aeq}.

5.4.1 Existing Site with Noise Controls

Table 23, Table 24 and Table 25 present low frequency noise assessment results for the existing site with noise controls implemented, for the day, evening and night periods respectively. Results are provided for meteorological conditions relevant for each time period.

Whilst low frequency modifying factor penalties are applicable in some instances, none cause an exceedance

of operational noise criteria not previously indicated in Section 5.2.

Table 23: EXISTING SITE LOW FREQUENCY NOISE RESULTS, DAY PERIOD - $L_{eq,15MINUTE}$ dB

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R01	Neutral	55	49	39	10	0	39	Nil
	ENE wind	55	53	45	8	0	45	Nil
R02	Neutral	55	53	44	9	0	44	Nil
	ENE wind	55	56	49	7	0	49	Nil
R03	Neutral	55	56	48	8	0	48	Nil
	ENE wind	55	59	53	6	0	53	Nil
R04	Neutral	55	54	46	8	0	46	Nil
	ENE wind	55	55	48	7	0	48	Nil
R05	Neutral	55	59	44	15	5	49	Nil
	ENE wind	55	56	36	20	5	41	Nil
R06	Neutral	55	54	45	9	0	45	Nil
	ENE wind	55	57	51	6	0	51	Nil
R07	Neutral	55	60	45	15	5	50	Nil
	ENE wind	55	56	37	19	5	42	Nil
R08	Neutral	55	53	44	9	0	44	Nil
	ENE wind	55	56	50	6	0	50	Nil
R09	Neutral	55	58	50	8	0	50	Nil
	ENE wind	55	61	56	5	0	**56**	**1**
R10	Neutral	55	56	48	8	0	48	Nil
	ENE wind	55	59	53	6	0	53	Nil

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 24: EXISTING SITE LOW FREQUENCY NOISE RESULTS, EVENING PERIOD - $L_{eq,15MINUTE}$ dB

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R01	Neutral	50	45	30	15	5	35	Nil
	ENE wind	50	48	36	12	0	36	Nil

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R02	Neutral	50	46	34	12	0	34	Nil
	ENE wind	50	49	39	10	0	39	Nil
R03	Neutral	50	48	37	11	0	37	Nil
	ENE wind	50	50	41	9	0	41	Nil
R04	Neutral	50	46	35	11	0	35	Nil
	ENE wind	50	46	36	10	0	36	Nil
R05	Neutral	50	50	34	16	5	39	Nil
	ENE wind	50	46	26	20	5	31	Nil
R06	Neutral	50	46	34	12	0	34	Nil
	ENE wind	50	49	39	10	0	39	Nil
R07	Neutral	50	51	35	16	5	40	Nil
	ENE wind	50	47	27	20	5	32	Nil
R08	Neutral	50	46	34	12	0	34	Nil
	ENE wind	50	49	39	10	0	39	Nil
R09	Neutral	50	49	37	12	0	37	Nil
	ENE wind	50	52	42	10	0	42	Nil
R10	Neutral	50	50	37	13	0	37	Nil
	ENE wind	50	52	42	10	0	42	Nil

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 25: EXISTING SITE LOW FREQUENCY NOISE RESULTS, NIGHT PERIOD - $L_{eq,15MINUTE}$ dB

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R01	Neutral	45	45	30	15	5	35	Nil
	Inversion	45	47	35	12	0	35	Nil
	ENE wind	45	48	36	12	0	36	Nil
R02	Neutral	45	46	34	12	0	34	Nil
	Inversion	45	48	38	10	0	38	Nil
	ENE wind	45	49	39	10	0	39	Nil

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R03	Neutral	45	48	37	11	0	37	Nil
	Inversion	45	51	41	10	0	41	Nil
	ENE wind	45	50	41	9	0	41	Nil
R04	Neutral	45	46	35	11	0	35	Nil
	Inversion	45	48	40	8	0	40	Nil
	ENE wind	45	46	36	10	0	36	Nil
R05	Neutral	45	50	34	16	5	39	Nil
	Inversion	45	52	39	13	0	39	Nil
	ENE wind	45	46	26	20	5	31	Nil
R06	Neutral	45	46	34	12	0	34	Nil
	Inversion	45	48	39	9	0	39	Nil
	ENE wind	45	49	39	10	0	39	Nil
R07	Neutral	45	51	35	16	5	40	Nil
	Inversion	45	52	40	12	0	40	Nil
	ENE wind	45	47	27	20	5	32	Nil
R08	Neutral	45	46	34	12	0	34	Nil
	Inversion	45	48	39	9	0	39	Nil
	ENE wind	45	49	39	10	0	39	Nil
R09	Neutral	45	49	37	12	0	37	Nil
	Inversion	45	51	41	10	0	41	Nil
	ENE wind	45	52	42	10	0	42	Nil
R10	Neutral	45	50	37	13	0	37	Nil
	Inversion	45	52	42	10	0	42	Nil
	ENE wind	45	52	42	10	0	42	Nil

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

5.4.2 Proposed Expansion

Table 27, Table 28 and Table 29 present low frequency noise assessment results for the existing site combined with the proposed expansion, for the day, evening and night periods respectively. Results are provided for meteorological conditions relevant for each time period.

Modifying factor penalties are applicable in some instances; however, none cause exceedance of relevant criteria.

Another method commonly adopted in contemporary noise impact assessments is the Broner method, which evaluates low frequency noise through comparison of total predicted C-weighted levels at receptor locations with an upper limit criterion. This method is in accordance with recommendations published in A Simple Method for Low Frequency Noise Emission Assessment (Broner, 2010), published in the Journal of Low Frequency Noise, Vibration and Active Control, Volume 29 Number 1 2010. The author of the document recommends outdoor criteria for LFN assessment; Table 26 presents criteria recommended in the document. If the total predicted C-weighted noise level at a receptor exceeds the relevant criterion a 5 dB penalty (modifying factor) is added to predicted levels.

Table 26: LOW FREQUENCY NOISE CRITERIA - BRONER METHOD

Land Use	Sensitive Receiver	Range	Criteria L_{Ceq} (dB)
Residential	Night time of plant operation 24/7	Desirable	60
		Maximum	65
	Daytime or Intermittent (1-2 hours)	Desirable	65
		Maximum	70
Commercial/Office	Night time or plant operation 24/7	Desirable	70
		Maximum	75
Industrial	Daytime or Intermittent (1-2 hours)	Desirable	75
		Maximum	80

Source: A Simple Method for Low Frequency Noise Emission Assessment by N. Broner.

Total C-weighted predictions meet the desirable limit for residential receptors of L_{Ceq} 60 dB for the night period, and L_{Ceq} 65 dB for the day and evening periods, and are 5 dB or more below suggested maximum limits.

Table 27: PROPOSED EXPANSION LOW FREQUENCY NOISE RESULTS, DAY PERIOD - $L_{eq,15MINUTE}$ dB

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R01	Neutral	55	50	34	16	5	39	Nil
	ENE wind	55	53	39	14	0	39	Nil
R02	Neutral	55	53	37	16	5	42	Nil
	ENE wind	55	56	42	14	0	42	Nil

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R03	Neutral	55	55	41	14	0	41	Nil
	ENE wind	55	56	44	12	0	44	Nil
R04	Neutral	55	50	37	13	0	37	Nil
	ENE wind	55	50	38	12	0	38	Nil
R05	Neutral	55	51	35	16	5	40	Nil
	ENE wind	55	48	27	21	5	32	Nil
R06	Neutral	55	53	38	15	5	43	Nil
	ENE wind	55	56	43	13	0	43	Nil
R07	Neutral	55	52	36	16	5	41	Nil
	ENE wind	55	49	28	21	5	33	Nil
R08	Neutral	55	53	37	16	5	42	Nil
	ENE wind	55	56	42	14	0	42	Nil
R09	Neutral	55	57	43	14	0	43	Nil
	ENE wind	55	59	47	12	0	47	Nil
R10	Neutral	55	56	41	15	5	46	Nil
	ENE wind	55	57	45	12	0	45	Nil

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 28: PROPOSED EXPANSION LOW FREQUENCY NOISE RESULTS, EVENING PERIOD - $L_{eq,15MINUTE}$ dB

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R01	Neutral	50	50	34	16	5	39	Nil
	ENE wind	50	53	39	14	0	39	Nil
R02	Neutral	50	53	37	16	5	42	Nil
	ENE wind	50	56	42	14	0	42	Nil
R03	Neutral	50	55	41	14	0	41	Nil
	ENE wind	50	56	44	12	0	44	Nil
R04	Neutral	50	50	37	13	0	37	Nil
	ENE wind	50	50	38	12	0	38	Nil

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R05	Neutral	50	51	35	16	5	40	Nil
	ENE wind	50	48	27	21	5	32	Nil
R06	Neutral	50	53	38	15	5	43	Nil
	ENE wind	50	56	43	13	0	43	Nil
R07	Neutral	50	52	36	16	5	41	Nil
	ENE wind	50	49	28	21	5	33	Nil
R08	Neutral	50	53	37	16	5	42	Nil
	ENE wind	50	56	42	14	0	42	Nil
R09	Neutral	50	57	43	14	0	43	Nil
	ENE wind	50	59	47	12	0	47	Nil
R10	Neutral	50	56	41	15	5	46	Nil
	ENE wind	50	57	45	12	0	45	Nil

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

Table 29: PROPOSED EXPANSION LOW FREQUENCY NOISE RESULTS, NIGHT PERIOD - $L_{eq,15MINUTE}$ dB

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R01	Neutral	45	49	33	16	5	38	Nil
	Inversion	45	51	38	13	0	38	Nil
	ENE wind	45	52	38	14	0	38	Nil
R02	Neutral	45	53	36	17	5	41	Nil
	Inversion	45	54	40	14	0	40	Nil
	ENE wind	45	55	41	14	0	41	Nil
R03	Neutral	45	54	39	15	5	44	Nil
	Inversion	45	56	43	13	0	43	Nil
	ENE wind	45	55	42	13	0	42	Nil
R04	Neutral	45	49	35	14	0	35	Nil
	Inversion	45	51	40	11	0	40	Nil
	ENE wind	45	49	36	13	0	36	Nil

Receptor	Met	Criterion	L_{Ceq}	L_{Aeq}	C-A	LFN penalty	Revised L_{Aeq}	Exceedance
R05	Neutral	45	50	34	16	5	39	Nil
	Inversion	45	52	39	13	0	39	Nil
	ENE wind	45	47	26	21	5	31	Nil
R06	Neutral	45	53	37	16	5	42	Nil
	Inversion	45	55	41	14	0	41	Nil
	ENE wind	45	55	42	13	0	42	Nil
R07	Neutral	45	51	35	16	5	40	Nil
	Inversion	45	53	40	13	0	40	Nil
	ENE wind	45	48	27	21	5	32	Nil
R08	Neutral	45	53	36	17	5	41	Nil
	Inversion	45	55	40	15	5	45	Nil
	ENE wind	45	55	41	14	0	41	Nil
R09	Neutral	45	56	40	16	5	45	Nil
	Inversion	45	58	44	14	0	44	Nil
	ENE wind	45	58	44	14	0	44	Nil
R10	Neutral	45	55	39	16	5	44	Nil
	Inversion	45	56	43	13	0	43	Nil
	ENE wind	45	56	43	13	0	43	Nil

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

5.5 Sleep Disturbance

A sleep disturbance assessment was undertaken for the proposed expansion. The current license does not include sleep disturbance criteria. Most sources on site operate with relatively constant noise output during the night period. However, front loaders and other mobile plant may operate at night. Impact noise from objects being dropped, or inadvertent impact of loader buckets are considered the most likely noise sources to generate short duration high level noise emission. A noise source with L_{Amax} sound power of 120 dB was added to the night period scenario. The source was located in a worst case location, near the southern site boundary (in the log yard).

Table 30 presents $L_{A1,1minute}$ predictions, and provides an indication of potential increase relative to the operational $L_{Aeq,15minute}$ prediction. Results are the worst case of modelled prevailing meteorological conditions. For many industries, where short duration maximum noise events are relatively frequent, sleep

disturbance $L_{A1,1minute}$ criteria are typically 10 dB higher than operational L_{Aeq} noise criteria. The maximum increase above the relatively steady state output of the site is 10 dB. Such increases are considered acceptable, and not likely to cause sleep disturbance. Further, with the exception of R09, all predictions are less than the EPA draft Industrial Noise Guideline (dING) maximum noise level screening criterion of L_{Amax} 52 dB, which, whilst not current policy, is the likely future method for assessing maximum noise events.

Table 30: SLEEP DISTURBANCE RESULTS - dB

Receptor	Operational $L_{Aeq,15minute}$	$L_{A1,1minute}$	Emergence
R01	38	45	7
R02	41	48	7
R03	43	48	5
R04	40	49	9
R05	39	49	10
R06	42	50	8
R07	40	50	10
R08	41	51	10
R09	45	54	9
R10	44	52	8

Notes 1: Bolded results exceed relevant operational noise criterion (if applicable).

5.6 Cumulative Noise

Predictions for the proposed expansion are typically the same as, or slightly lower than, predictions for the existing site. As no significant change is predicted relative to the existing situation, no significant change to cumulative noise levels should result.

6 CONSTRUCTION NOISE ASSESSMENT

A construction period of approximately 24 months is proposed, during which time modifications to the existing site and construction of proposed infrastructure will be undertaken. As described in Section 2.5, construction tasks will be generally undertaken within the following hours:

- Monday to Friday 7 am to 7 pm;
- Saturday 8 am to 1 pm; and
- No work on Sundays and public holidays.

Construction activities will be undertaken in conjunction with regular operation of the existing site. Borg propose to generally restrict site noise emission from both construction and operational tasks combined to comply with operational noise criteria conditioned in EPL 3035.

6.1 Construction Scenarios

Borg advised the noisiest construction activity is likely to be rock or concrete breaking. This activity was assessed, along with two additional construction scenarios considering earthworks, and, infrastructure installation.

Scenarios inclusions are outlined in Table 31. Plant quantities included in each scenario are listed in Table 32. Sound power of equipment is provided in Table 13. Conservatively, it was assumed all construction plant within each scenario would operate concurrently, at full power, for the entire 15 minute duration. In reality, such a scenario is unlikely to occur. Equipment was modelled in exposed locations, typically in the southern portion of the site.

All sources associated with the existing site were included in the construction models; it is assumed noise control proposed for existing plant will be implemented prior to commencement of construction activities. Each of the three construction scenarios was modelled with and without one mobile chipper operating.

Table 31: CONSTRUCTION SCENARIO INCLUSIONS

Scenario ID	Existing site	Mobile Chipper	Earthworks	Installation	Rock Breaking
V01	yes	no	yes	no	no
V02	yes	yes	yes	no	no
V03	yes	no	no	yes	no
V04	yes	yes	no	yes	no
V05	yes	no	no	no	yes
V06	yes	yes	no	no	yes

Table 32: CONSTRUCTION SCENARIOS – CONSTRUCTION EQUIPMENT INCLUSIONS

Equipment Type	Earthworks (V01/V02)	Installation (V03/V04)	Rock breaking (V05/V06)
Excavator	1	0	0
Loader	1	0	0
Dozer	1	0	0
Dump truck	2	0	0
Grader	1	0	0
Roller	1	0	0
Articulated Truck	2	0	0
Mobile Crane	0	2	0
Concrete Truck	0	1	0
Delivery Truck	0	2	0
Bobcat	0	1	0
Rock Breaker	0	0	1

6.2 Construction Results

Table 33 presents model results for six construction scenarios. Results are presented as a range showing the predicted variation from neutral atmospheric conditions (first value) to prevailing east-north-east winds (second value). Prevailing wind results are lower than for neutral atmospheric conditions for some receivers, as these conditions will tend to mitigate noise propagation towards those receivers. Construction was not assessed under temperature inversion conditions as these are unlikely to occur before 7pm. Results in bold type exceed the day period operational noise criterion.

Model predictions for the earthworks and installation scenarios (V01 to V04) indicate general compliance with the day period operational noise criterion at all receivers, with the exception of R09. At R09, exceedances up to 3 dB are predicted during prevailing wind conditions when a mobile chipper is operated concurrently with construction plant. Exceedance of the evening period operational noise criterion is predicted at R02, R03, R06, R08, R09 and R10. These exceedances are predicted during calm and prevailing wind conditions when a mobile chipper is operated concurrently with construction plant. Construction noise can be managed through monitoring weather conditions, restricting use of the mobile chipper during enhancing conditions if a large amount of construction plant is operating, and restricting construction activities to the standard ICNG construction hours where possible

Predictions for the rock breaking scenarios (V05 and V06) include a plus 5 dB modifying factor penalty to account for the intermittent nature of rock breaking works. It is recommended mobile chipping plant is not operated during rock breaking works; in that case V06 would not eventuate. As discussed in Section 2.5, it is considered reasonable to assess rock breaking against the "highly affected" construction noise criterion of $L_{Aeq,15minute}$ 75 dB, as the duration would be relatively short compared with other construction tasks, and few options are available to mitigate noise from this activity. Predictions for V05 are well below this criterion.

Table 33: CONSTRUCTION RESULTS - $L_{Aeq,15MINUTE}$ dB

Receptor	Criterion (day/evening)	V01	V02	V03	V04	V05	V06
R01	55/50	37-42	41-46	34-39	40-45	45-50	47-**53**
R02	55/50	44-49	47-**52**	39-44	45-50	**51-56**	**53-58**
R03	55/50	47-49	**51-55**	42-46	50-**54**	**55-58**	**57-61**
R04	55/50	41-41	47-49	38-40	46-48	50-49	**53-54**
R05	55/50	37-30	45-37	36-29	45-37	42-34	50-42
R06	55/50	43-48	47-**52**	39-44	46-**51**	**52-57**	**54-59**
R07	55/50	38-31	46-38	37-30	46-37	43-35	**51**-43
R08	55/50	42-47	46-**52**	38-44	45-**51**	**51-56**	**53-59**
R09	55/50	50-**54**	**54-58**	45-49	**52-57**	**59-63**	**60-65**
R10	55/50	46-49	50-**55**	42-46	49-**54**	**55-59**	**57-61**

Notes 1: Bolded results exceed the evening period operational noise criterion; and

2. Results for V05 and V06 include a plus 5 dB modifying factor penalty to account for the intermittent nature of rock breaking works.

6.3 Construction Recommendations

The ICNG provides options for work practices and community consultation to minimise and manage noise impact from construction activities. It is recommended construction managers review and implement noise reduction and management strategies outlined in Section 6 of the ICNG.

7 ROAD TRAFFIC ASSESSMENT

SMEC Australia Pty Ltd (SMEC) has undertaken a traffic impact assessment (TIA) for the Project. Road traffic flow volumes and distribution of traffic on the road network used for assessment of noise impact is based on data provided in the TIA.

7.1 Operational Road Traffic Noise

The TIA indicates the majority of operational road traffic generated by the development will travel on North Street (light vehicles) and Albion Street (heavy vehicles), to access/depart the site via Lowes Mount Road. The speed limit on both roads within the town of Oberon is 60 km/h. In accordance with RNP definitions, North Street is classified a local road, and Albion Street is classified a sub-arterial road due to the high proportion of heavy vehicles utilising the route, both to serve industry within Oberon, and through traffic between Bathurst and Sydney. The definition of a sub-arterial road in the RNP is:

- Provide connection between arterial roads and local roads;
- May support arterial roads during peak periods; and
- May have been designed as local streets but can serve major traffic-generating developments or support non-local traffic.

Road traffic noise models were developed for North Street and Albion Street using the FHWA methodology. Lowes Mount Road north of Albion Street was not assessed, as there are no residences between Albion Street and the site access, the section upon which the majority of traffic would travel. Only 5 percent of project generated light vehicle traffic would utilise Lowes Mount Road north of the site, which is considered significantly minor that any increase in noise levels would be insignificant.

Figure 6 to Figure 8 show existing and projected operational road traffic volumes at the Lowes Mount Road/North Street/Albion Street intersection for Years 2015, 2017 and 2027 respectively.

Site personnel undertake works as per the following shift times:

- Morning shift, 6:30am to 2:30pm;
- Day shift, 2:30pm to 10:30pm; and
- Night shift, 10:30pm to 6:30am.

Table 4.2 of the TIA provides existing and projected operational light vehicle volumes. This table is reproduced below.

Table 4-2: Operational traffic generation

Operational year	Number of personnel	Vehicle movements per day	
		One-way trip	Two-way trip
Existing (2015)	231	146	292
2017	291	184	368
2027	306	194	388

7.1.1 North Street

Data presented in the TIA indicates morning and afternoon traffic peaks on North Street occur between 8am and 9am, and, 3:15pm and 4:15pm respectively.

Table 34 presents peak hour model predictions for North Street at a distance of 20 metres from the road. Results indicate the day period criterion of $L_{Aeq,1hour}$ 55 dB would be exceeded during both morning and afternoon peak periods at this distance. However, the TIA indicates no change in peak hour traffic volumes will occur on North Street relative to the existing situation. As site shift changes occur outside of peak hours, no change to peak hour road traffic noise impact on North Street is predicted relative to the existing situation.

Table 34: NORTH STREET ROAD TRAFFIC ASSESSMENT RESULTS – $L_{Aeq,1hour}$ dB

Period	Speed	Light Vehicles	Heavy Vehicles	Prediction	Change relative to 2015
AM PEAK					
2015	60	172	20	61.8	-
2017	60	172	20	61.8	0
2027	60	172	20	61.8	0
PM PEAK					
2015	60	264	19	62.1	-
2017	60	264	19	62.1	0
2027	60	264	19	62.1	0

7.1.2 Albion Street

Data presented in the TIA indicates morning and afternoon traffic peaks on Albion Street occur between 8am and 9am, and, 3:15pm and 4:15pm respectively. The nearest residence on Albion Street, located off Tarana Crescent, is 23 metres from Albion Street at the nearest facade.

Albion Street is categorised as a sub-arterial road; therefore, road traffic noise criteria in the RNP are expressed in terms of $L_{Aeq,period}$. Road traffic volumes over the entire day and night periods was not available, however, Borg has advised the following in terms of heavy vehicles volumes generated by the site:

- Heavy vehicle movements will be relatively uniformly distributed between the hours of 6am and 6pm;
- Heavy vehicle movements for the base case (2015) are 6 per hour;
- Heavy vehicle movements projected for 2017 are 10 per hour; and
- Heavy vehicle movements projected for 2027 are 14 per hour.

Figures 4.3 and 4.4 of the TIA (reproduced in Figure 11) show all heavy vehicle traffic will use Albion Street; 72 percent will travel east of Lowes Mount Road, and 28 percent will travel west of Lowes Mount Road. The distribution remains unchanged over time.

Borg provided traffic count data for Duckmaloi Road, just south of the Albion Street/Duckmaloi Road intersection, and, traffic count data for the periods 6am to 9am and 3pm to 6pm on Albion Street. It is assumed traffic flows on Albion Street between the hours of 9am and 3pm, and after 6pm are proportionally similar to the distribution on Duckmaloi Road for the same periods. Hourly traffic flows for Albion Street were estimated by applying the percentage distribution of traffic from Duckmaloi Road to the total traffic counts of light and heavy vehicles for Albion Street. Data in the TIA indicates light vehicle traffic on Albion Street is projected to increase by 7 percent by 2027. To gain projected traffic flow data on Albion Street for 2027:

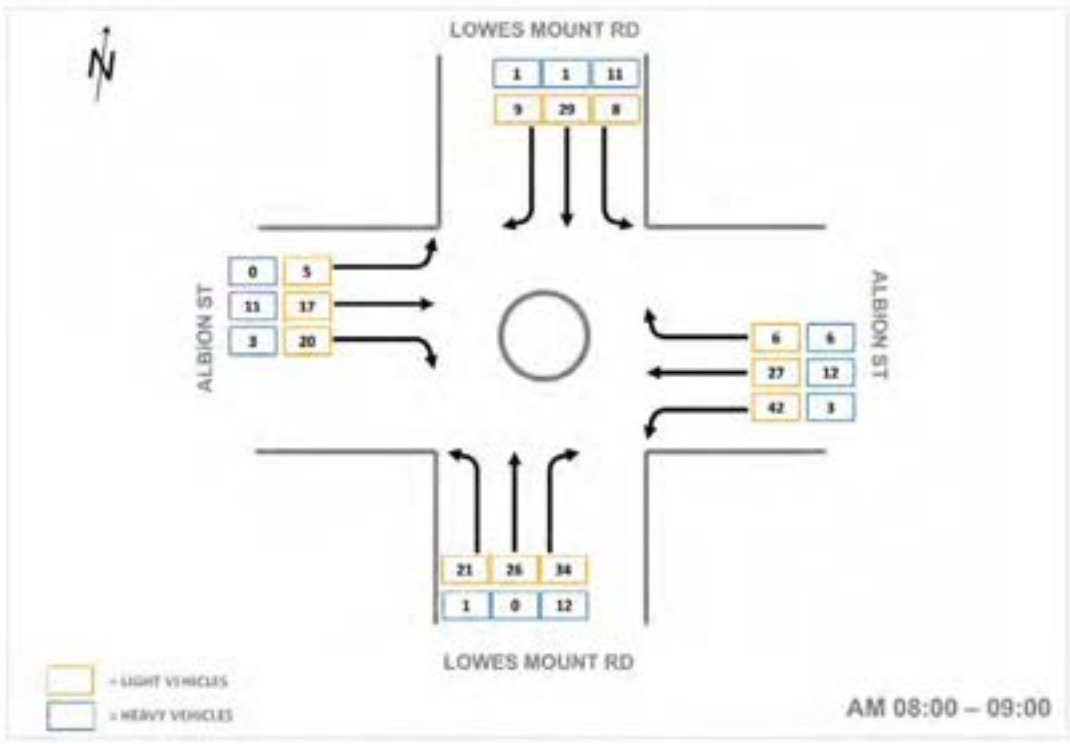
- Light vehicle counts calculated for 2015 were increase by 7 percent; and
- Heavy vehicle movements on Albion Street east of Lowes Mount Road were taken as 72 percent of the hourly average (0.72 x 14 = 10 per hour).

Table 35 presents the hourly distribution of traffic flows, corresponding $L_{Aeq,1hour}$ predictions, and the calculated $L_{Aeq,15hour}$ for both 2015 and 2027. Results indicate the day period criterion of $L_{Aeq,15hour}$ 60 dB would be exceeded at a distance of 23 metres from the road. However, the predicted increase is 0.8 dB, which is less than the relative increase criterion outlined in the RNP of 2 dB. An increase of 0.8 dB would be neither measurable, nor perceptible to the human ear.

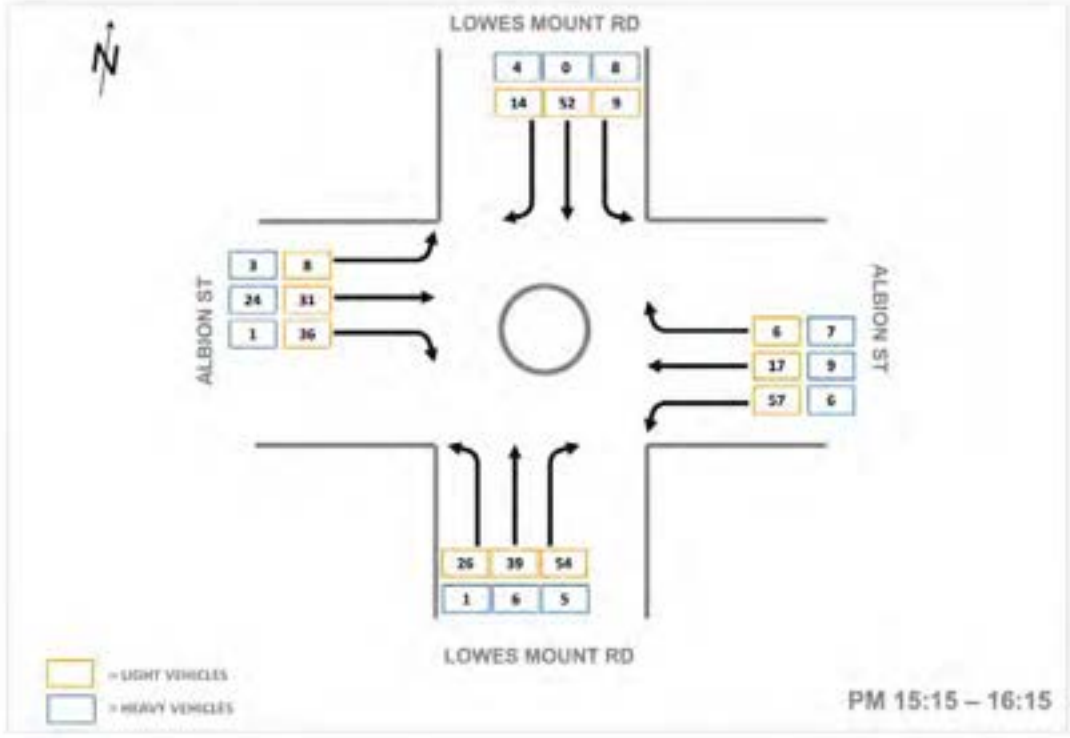
Table 35: ALBION STREET EAST ROAD TRAFFIC ASSESSMENT RESULTS – dB

Period end	Speed	Light Vehicles	Heavy Vehicles	$L_{Aeq,1hour}$ dB
		2015		
8:00	60	96	58	64.6
9:00	60	134	55	64.5
10:00	60	154	63	65.1
11:00	60	161	66	65.3
12:00	60	157	64	65.2
13:00	60	167	68	65.5
14:00	60	152	62	65.0
15:00	60	160	65	65.3
16:00	60	166	68	65.4
17:00	60	156	48	64.0
18:00	60	137	22	61.0
19:00	60	47	19	59.9
20:00	60	31	13	58.2
21:00	60	24	10	57.1
22:00	60	22	9	56.7
			$L_{Aeq,15hour}$	**63.8**
		2027		
8:00	60	103	68	65.3
9:00	60	143	65	65.2
10:00	60	164	73	65.7
11:00	60	172	76	65.9
12:00	60	168	74	65.8
13:00	60	179	78	66.0
14:00	60	162	72	65.7
15:00	60	171	75	65.9
16:00	60	178	78	66.0

Period end	Speed	Light Vehicles	Heavy Vehicles	$L_{Aeq,1hour}$ dB
17:00	60	167	58	64.8
18:00	60	147	32	62.4
19:00	60	50	29	61.7
20:00	60	33	23	60.6
21:00	60	26	20	60.0
22:00	60	24	19	59.8
			$L_{Aeq,15hour}$	**64.6**

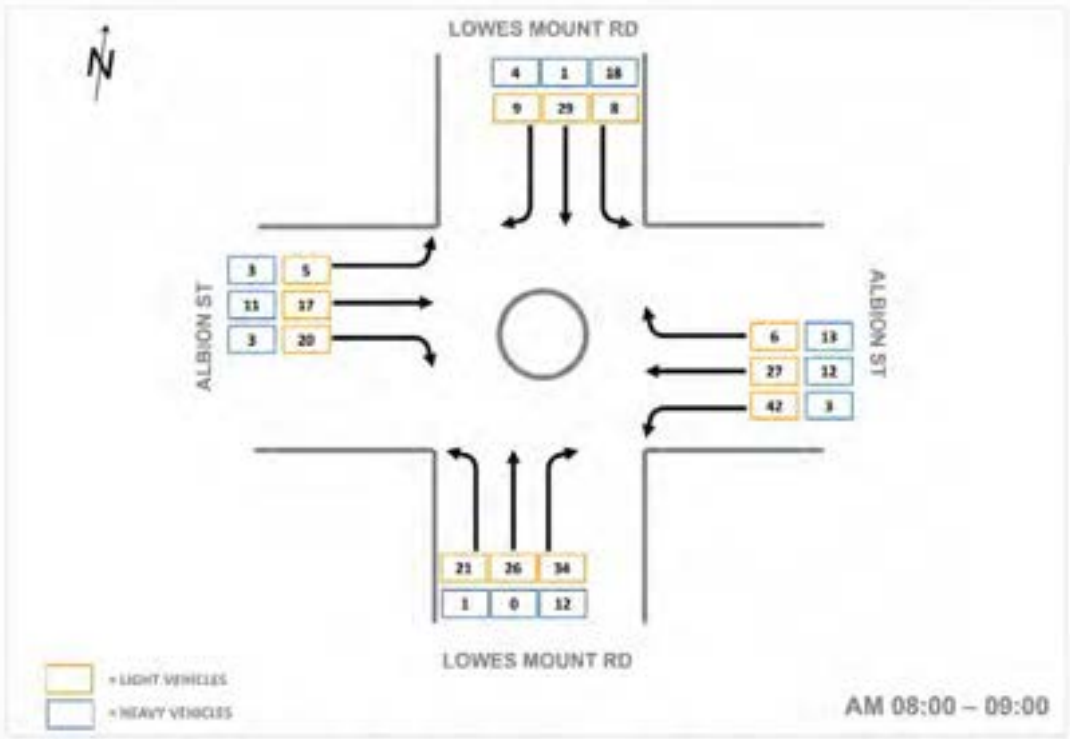


Site 3 – Lowes Mount Road and Albion Street, AM peak hour

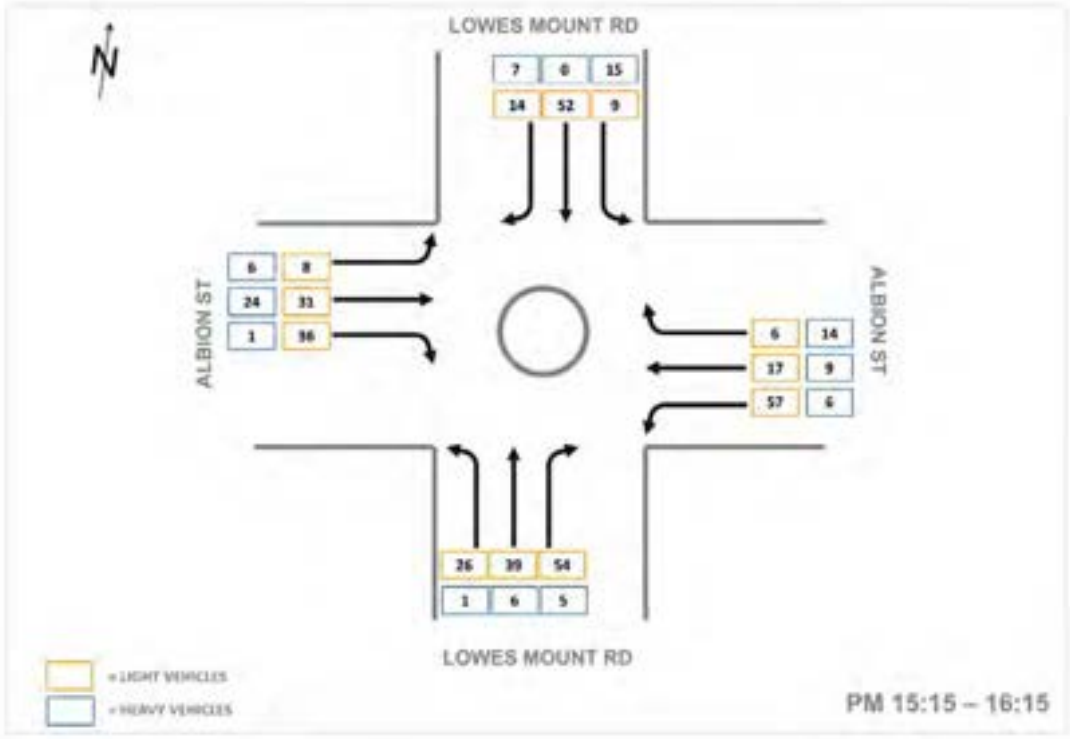


Site 3 – Lowes Mount Road and Albion Street, PM peak hour

Figure 6: Traffic Volumes, Lowes Mount Road and Albion Street - 2015

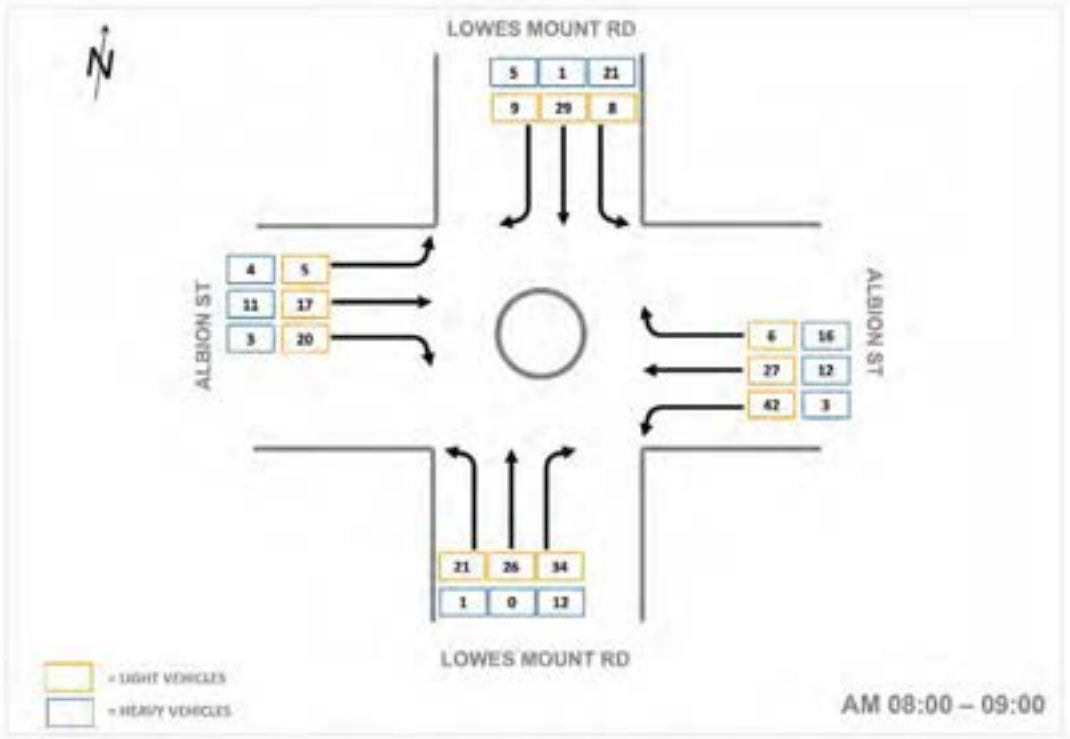


Site 3 – Lowes Mount Road and Albion Street, AM peak hour (Operational, 2017)

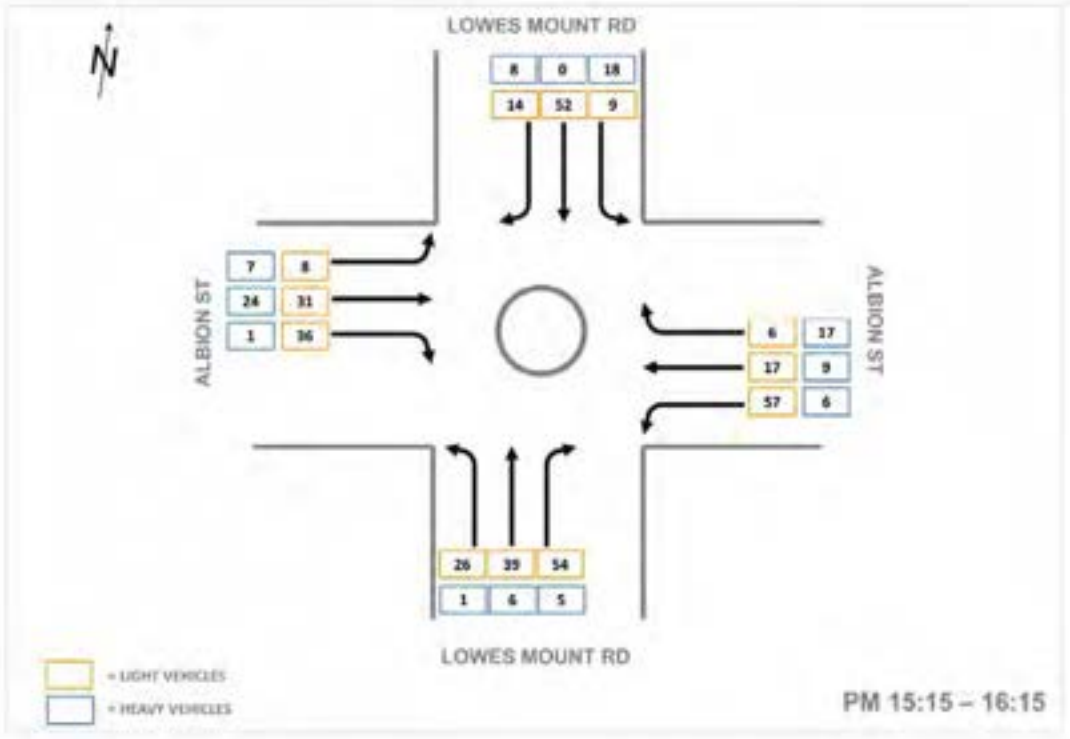


Site 3 – Lowes Mount Road and Albion Street, PM peak hour (Operational, 2017)

Figure 7: Traffic Volumes, Lowes Mount Road and Albion Street - 2017



Site 3 – Lowes Mount Road and Albion Street, AM peak hour (Operational, 2027)



Site 3 – Lowes Mount Road and Albion Street, PM peak hour (Operational, 2027)

Figure 8: Traffic Volumes, Lowes Mount Road and Albion Street - 2027

Figure 4-1: Light vehicle traffic distribution - AM peak period

Figure 4-2: Light vehicle traffic distribution - PM peak period

Figure 9: Light Vehicle Traffic Distribution (draft TIA)

Figure 4-3: Heavy vehicle traffic distribution - AM peak period

Figure 4-4: Heavy vehicle traffic distribution - PM peak period

Figure 10: Heavy Vehicle Traffic Distribution (draft TIA)

7.2 Construction Road Traffic Noise

Table 4.1 of the TIA (reproduced below) provides estimated vehicle movements associated with the construction phase of the project.

Phase	Duration of peak	Vehicle movements per day (two-way trip)	Number of personnel
Site establishment and construction	24 months	240 trips per day (light vehicles) 60 trips per day (heavy vehicles)	Maximum 120 per day

A key finding of the construction impact assessment in the TIA was:

The construction phase is likely to have minimal impact on the existing transport network, with the majority of the vehicle movements occurring outside of the general peak periods.

As the majority of construction vehicle movements are expected to occur outside of general peak periods, no change to peak period noise impact should result. A minor increase to $L_{Aeq,period}$ levels may result; however, when the projected construction traffic movements are averaged out over the day period, the resulting increase is considered insignificant relative to total existing road volumes. Any resulting increase is considered unlikely to be either measurable, or perceptible to the human ear.

8 MONITORING AND MEASUREMENT MEASURES

8.1 Noise Control

Noise control is proposed for some existing plant, as described in Section 3.4.1.

For critical plant, associated with the proposal, limiting sound powers were derived to reduce model predictions to within compliance levels. In some cases, a significant degree of noise control may be required. Sound power limits (both linear and A-weighted) are included in tender documents for new plant. It is recommended compliance testing is undertaken upon commissioning, and any non-compliance identified should require an update of the site noise model to establish whether compliance with relevant noise criteria can be maintained. Actions required to maintain compliance, such as further noise control to the non-compliant item, or other plant items, should be suitably documented.

8.2 Management Measures

The following management measures are recommended for the existing site:

- Mobile chipping plant should be restricted to the day period;
- Two mobile chippers should not operate concurrently during enhancing meteorological conditions;
- During periods of strong meteorological enhancement to the south, neither mobile chipper should operate; and
- Plant listed in Table 12 should be provided with further noise control (attenuation).

The following management measures are recommended for the proposed expansion:

- Mobile chipping plant should be phased out from permanent use. When required, mobile chipping plant should be restricted to the day period, and should not be operated during periods of meteorological enhancement towards R09;
- No chipping plant should operate during the night period; and
- Plant listed in Table 12 should be provided with further noise control (attenuation).

The ICNG provides options for work practices and community consultation to minimise and manage noise impact from construction activities. It is recommended construction managers review and implement noise reduction and management strategies outlined in Section 6 of the ICNG.

Additionally, the following management measures are recommended for construction activities:

- The proponent should inform potentially noise affected residents of the nature of works to be carried out, the expected noise levels and duration, as well as relevant contact details;

- All feasible and reasonable work practices should be implemented where possible to meet EPL operational noise criteria; and

- Construction personnel should be aware of the requirement to minimise noise impact, and to implement best practice operating techniques to minimise noise. Consideration should be given to operating low noise emission plant where possible.

8.3 Monitoring

The following compliance monitoring, to be undertaken by a suitably qualified acoustic consultant, is recommended for the project:

- Periodic attended noise monitoring at the potentially most affected residences during the day period, with a frequency of once per quarter, during the construction phase of the Project;

- Periodic attended noise monitoring at the potentially most affected residences during the noise sensitive night period, with a frequency of one night per quarter; and

- If non-compliance is demonstrated, additional monitoring should be undertaken within one week following implementation of additional mitigation controls.

Attended compliance noise monitoring results and a description of actions taken to reduce noise levels in response to non-compliances should be reported internally quarterly, and externally annually in an annual report.

Off site noise monitoring by suitably trained site personnel should be undertaken regularly, particularly during periods of meteorological enhancement, to ensure relevant noise criteria are adhered to. Operations should be modified accordingly as required when exceedance, or potential exceedances are measured.

Development of a noise management plan, covering both construction and operational phases of the project is recommended. The noise management plan should formalise monitoring locations, relevant criteria, monitoring programs, roles and responsibilities, complaint response protocols and reporting requirements.

9 SUMMARY

Global Acoustics was engaged by Borg Manufacturing Pty Ltd (Borg) to carry out a noise and vibration impact assessment for a proposed expansion of their panel manufacturing facility, located approximately 1.5 kilometres from the centre of Oberon at 124 Lowes Mount Road. This assessment considered impacts associated with noise emission from the existing site, and, the proposed expansion. Potential impact from operational noise, low frequency noise, sleep disturbance, cumulative noise, construction noise and road traffic noise were assessed. A model validation assessment was undertaken to provide an estimate of model prediction reliability.

9.1 Validation Assessment

A model of the existing site was developed, and refined to represent a scenario of operations in progress on the night of 14 October 2015. Results of attended monitoring at Oberon Caravan Park were compared with model predictions for the same location under meteorological conditions in effect at the time of monitoring. The model prediction for the modelled scenario was L_{Aeq} 43 dB, which correlated exactly with the attended measured level. This correlation indicates the model of the existing site provides a good estimate of actual noise emission. Compliance with the current EPL night period operational noise criterion was demonstrated.

9.2 Operational Noise

A model of the existing site was developed. Sound power of significant noise sources was measured by Global Acoustics during October 2015 and April 2016. The site has some equipment that operates with restricted operating hours; therefore a series of scenarios were developed representing different modes of operation according to time period.

Model predictions for the existing site indicate:

- Compliance with existing EPL criteria is predicted for all receivers during non-enhancing meteorological conditions;
- Compliance with existing EPL criteria is predicted for all receivers for the evening and night periods during prevailing (enhancing) meteorological conditions;
- At R09, a minor 1 dB exceedance is predicted for the day period during enhancing meteorological conditions when one mobile chipper is operational; and
- A minor 1 dB exceedance is predicted for R03 and R10, and a moderate exceedance of 4 dB for R09 for the day period during enhancing meteorological conditions if two mobile chippers are operated concurrently.

Modelling of the existing situation indicated the site currently operates close to EPL criteria during periods of enhancing meteorological conditions. Management measures and noise control for some plant were

recommended to both manage and reduce noise emission from the existing site.

A model of the proposed expansion was developed, which included all existing plant (with noise control as required) and proposed infrastructure. Mobile chipping plant will only be used during breakdown or scheduled maintenance of electric chipping plant, and will generally be replaced with three enclosed electric chippers (one of which currently exists). Sound power data was not available for plant proposed for the expansion; Borg provided sound pressure level (SPL) data at 1 metre. Sound power for proposed infrastructure was estimated using a relationship derived for each item between the SPL provided by Borg, SPL measured by Global Acoustics for similar plant items at 1 metre, and calculated sound power for similar plant items. Initial model iterations indicated noise control will be required for some plant. For critical plant, limiting sound powers were derived to reduce model predictions to within compliance levels. In some cases, a significant degree of noise control may be required. Full details regarding sound power derivation and recommendations are included in Section 3.4 of this report.

Model predictions for the proposed site indicate:

- Compliance with existing EPL criteria is predicted for all receivers during non-enhancing meteorological conditions; and
- Compliance with existing EPL criteria is predicted for all receivers except R09, for which a minor 1 dB exceedance is predicted for the day period when a mobile chipper is operational. Compliance was predicted for all receivers for 'normal' operations when no mobile chipping plant is operated.

Model predictions are dependent on limiting sound powers provided being attained, and may be lower than currently predicted if higher levels of acoustic performance are achieved.

A low frequency noise assessment was undertaken in accordance with INP guidelines. Low frequency modifying factor penalties were applicable in some instances; however, none caused an exceedance of operational noise criteria not previously indicated in the operational noise assessment.

Total C-weighted noise predictions remained within desirable limits suggested in *A Simple Method for Low Frequency Noise Emission Assessmen*t (Broner, 2010).

A sleep disturbance assessment was undertaken for the proposed expansion. The current license does not include sleep disturbance criteria. Maximum noise level increases above predicted steady state noise emissions were considered acceptable, and not likely to cause sleep disturbance.

Predictions for the proposed expansion are typically the same as, or slightly lower than, predictions for the existing site. As no significant change is predicted relative to the existing situation, no significant change to cumulative noise levels should result.

9.3 Construction Noise

A construction period of approximately 24 months is proposed, during which time modifications to the

existing site and construction of proposed infrastructure will be undertaken. Construction activities will be undertaken in conjunction with regular operation of the existing site. Borg propose to generally restrict site noise emission from both construction and operational tasks combined to comply with operational noise criteria conditioned in EPL 3035.

Borg advised the noisiest construction activity is likely to be rock or concrete breaking. This activity was assessed, along with two additional construction scenarios considering earthworks, and, infrastructure installation.

Model predictions for the earthworks and installation scenarios indicate general compliance with the day period operational noise criterion at all receivers, with the exception of R09. At R09, exceedances up to 3 dB were predicted during prevailing wind conditions if a mobile chipper is operated concurrently with construction plant. Exceedance of the evening period operational noise criterion is predicted at R02, R03, R06, R08, R09 and R10. These exceedances are predicted during calm and prevailing wind conditions when a mobile chipper is operated concurrently with construction plant. Construction noise can be managed through monitoring weather conditions, restricting use of the mobile chipper during enhancing conditions if a large amount of construction plant is operating, and restricting construction activities to the standard ICNG construction hours where possible.

Rock breaking predictions included a 5 dB modifying factor penalty for intermittency. This activity was assessed against the "highly affected" construction noise criterion of $L_{Aeq,15minute}$ 75 dB, as the duration would be relatively short compared with other construction tasks, and few options are available to mitigate noise from this activity. Predictions were well below this criterion.

It is recommended construction managers review and implement noise reduction and management strategies outlined in Section 6 of the Interim Construction Noise Guideline.

9.4 Vibration

The manufacturing operations are not anticipated to produce any measurable vibration impact to surrounding residences due to the following factors:

- The equipment and processing of material does not involve blasting or generate any vibration of significance; and
- The separation distance from the plant to residences being significantly large enough for any vibrations to be damped out.

During construction of proposed infrastructure, vibrating equipment such as rollers and rock breakers may be utilised. Due to the distance to sensitive receivers from construction areas, no vibration impact is expected.

9.5 Road Traffic Noise

Construction and operational road traffic noise impacts were assessed for North Street and Albion Street, the roads indicated in the Traffic Impact Assessment report to receive the greatest traffic flows. The majority of both construction and operational project generated traffic will occur outside of general peak hour traffic flows. Increases to road traffic noise relative to the existing situation were found to be insignificant, and less than 1 dB. Such an increase is unlikely to be either measurable, or perceptible to the human ear.

9.6 Closure

In general, operation of both the existing site and the proposed expansion are predicted to comply with current EPL operational noise criteria when recommended management strategies are implemented. A minor 1 dB exceedance is predicted at R09 when a mobile chipper is operated during enhancing meteorological conditions. Operation of mobile chippers does not form part of 'normal' operations, as they will typically be only used during breakdown of electric plant. Exceedances can be avoided through monitoring weather and restricting use of mobile chipping plant during periods of meteorological enhancement.

Results of this assessment are dependent upon limiting sound powers for proposed infrastructure, and recommended noise controls for existing plant, being achieved. Borg has committed to including sound power limits in tender documents to ensure required targets are achieved.

Global Acoustics Pty Ltd

APPENDIX

A CALIBRATION CERTIFICATES

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Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C14643

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
THORNTON NSW 2322

Equipment Tested/ Model Number : ARL Ngara
Instrument Serial Number : 878017
Microphone Serial Number : 316087
Pre-amplifier Serial Number : 27806

Atmospheric Conditions
Ambient Temperature : 22.8°C
Relative Humidity : 50.2%
Barometric Pressure : 100.22kPa

Calibration Technician : Corey Stewart
Calibration Date : 28/11/2014
Secondary Check: Sandra Minto
Report Issue Date : 01/12/2014
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	*Pass*	10.3.4: Inherent system noise level	*Pass*
10.2.3: Frequency weighting	*Pass*	10.4.2: Time weighting characteristic F and S	*Pass*
10.3.2: Overload indications	*Pass*	10.4.3: Time weighting characteristic I	*Pass*
10.3.3: Accuracy of level range control	*Pass*	10.4.5: R.M.S performance	*Pass*
8.9: Detector-indicator linearity	*Pass*	9.3.2: Time averaging	*Pass*
8.10: Differential level linearity	*Pass*	9.3.5: Overload indication	*Pass*

Least Uncertainties of Measurement -

Acoustic Tests
31.5 Hz to 8kHz: ±0.120dB
12.5kHz: ±0.165dB
16kHz: ±0.245dB
Electrical Tests
31.5 Hz to 20 kHz: ±0.098dB

Environmental Conditions
Temperature: ±0.3°C
Relative Humidity: ±1.5%
Barometric Pressure: ±0.1kPa

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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Accredited for compliance with ISO/IEC 17025

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

Page 1 of 1

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C13713

Client Details : Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : **ARL Ngara**
Instrument Serial Number : 878041
Microphone Serial Number : 320464
Preamplifier Serial Number : 28168

Ambient Temperature : 22°C
Relative Humidity : 53%
Barometric Pressure : 100.7 kPa

Calibration Technician : Adrian Walker
Calibration Date : 20-January-2014
Secondary Check by : Tim Williams
Report Issue Date : 20-January-2014
Approved Signatory :

Tested To : AS1259.1:1990
AS1259.2:1990

Comments : All tests passed for type 1

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.5: R.M.S performance	Pass
10.2.3: Frequency weighting	Pass	9.3.2: Time averaging	Pass
10.3.2: Overload indications	Pass	9.3.5: Overload indication	Pass
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		

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Calibration Certificate

Number : C13689

Client Details : Global Acoustics Pty Ltd
12/16 Huntingdale Drive
Thornton NSW 2322

Equipment Tested/ Model Number : **ARL Ngara**
Instrument Serial Number : 87801F
Microphone Serial Number : 316671
Preamplifier Serial Number : 27809

Ambient Temperature : 24°C
Relative Humidity : 51%
Barometric Pressure : 100.8 kPa

Calibration Technician : Adrian Walker
Calibration Date : 13-December-2013
Secondary Check by : Tim Williams
Report Issue Date : 16-December-2013
Approved Signatory :

Tested To : AS1259.1:1990
AS1259.2:1990

Comments : All tests passed for type 1

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.5: R.M.S performance	Pass
10.2.3: Frequency weighting	Pass	9.3.2: Time averaging	Pass
10.3.2: Overload indications	Pass	9.3.5: Overload indication	Pass
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		

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www.acousticresearch.com.au

Sound Calibrator
IEC 60942-2004

Calibration Certificate

Calibration Number C15325

Client Details Global Acoustics Pty Ltd
12/16 Huntingdale Drive
THORNTON NSW 2322

Equipment Tested/ Model Number : Pulsar Model 106
Instrument Serial Number : 74813

Atmospheric Conditions
Ambient Temperature : 21.9°C
Relative Humidity : 44%
Barometric Pressure : 100.6kPa

Calibration Technician : Dennis Kim
Calibration Date : 08/07/2015
Secondary Check: Sandra Minto
Report Issue Date : 13/07/2015
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
5.2.2: Generated Sound Pressre Level	*Pass*	5.3.2: Frequency Generated	*Pass*
5.2.3: Short Term Fluctuation	*Pass*	5.5: Total Distortion	*Pass*

The sound calibrator has been shown to conform to the class 2 requirements for periodic testing, described in Annex B of IEC 60942:2004 for the sound pressure level(s) and frequency(ies) stated, for the environmental conditions under which the tests were performed.

Least Uncertainties of Measurement -

Specific Tests		Environmental Conditions	
Generated SPL	±0.09dB	*Temperature*	±0.3°C
Short Term Fluct	±0.02dB	*Relative Humidity*	±4.1%
Frequency	±0.01%	*Barometric Pressure*	±0.1kPa
Distortion	±0.26%		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA
ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

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Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

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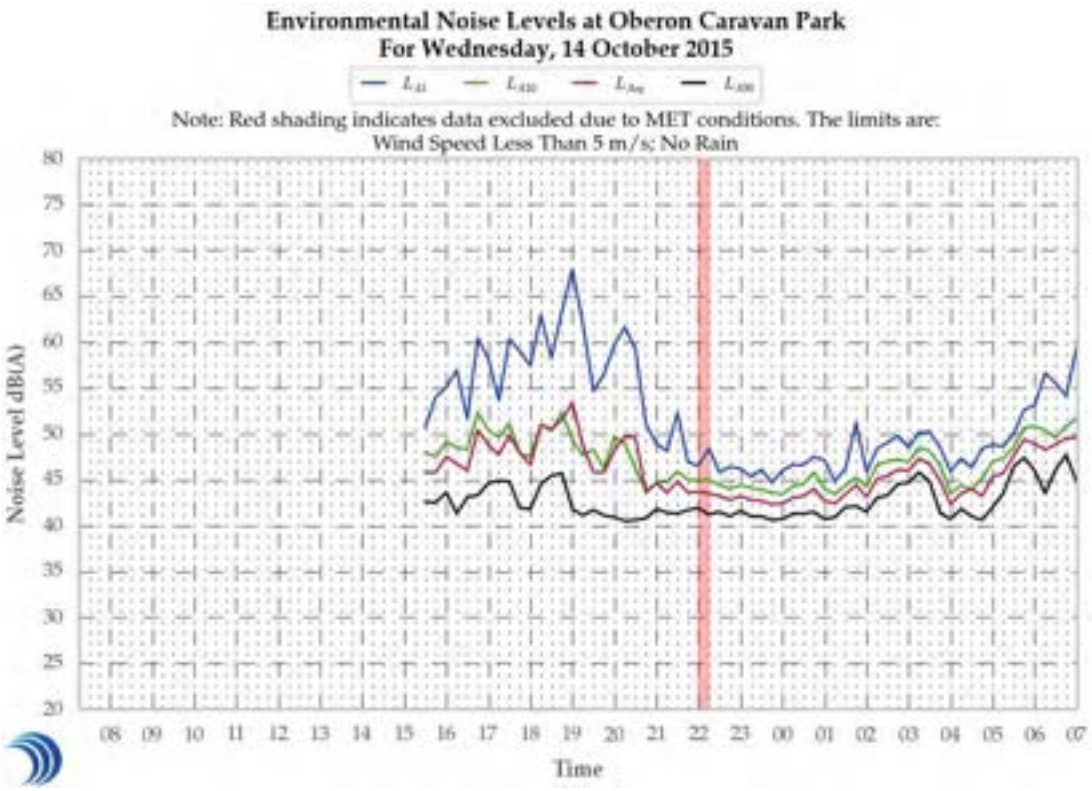
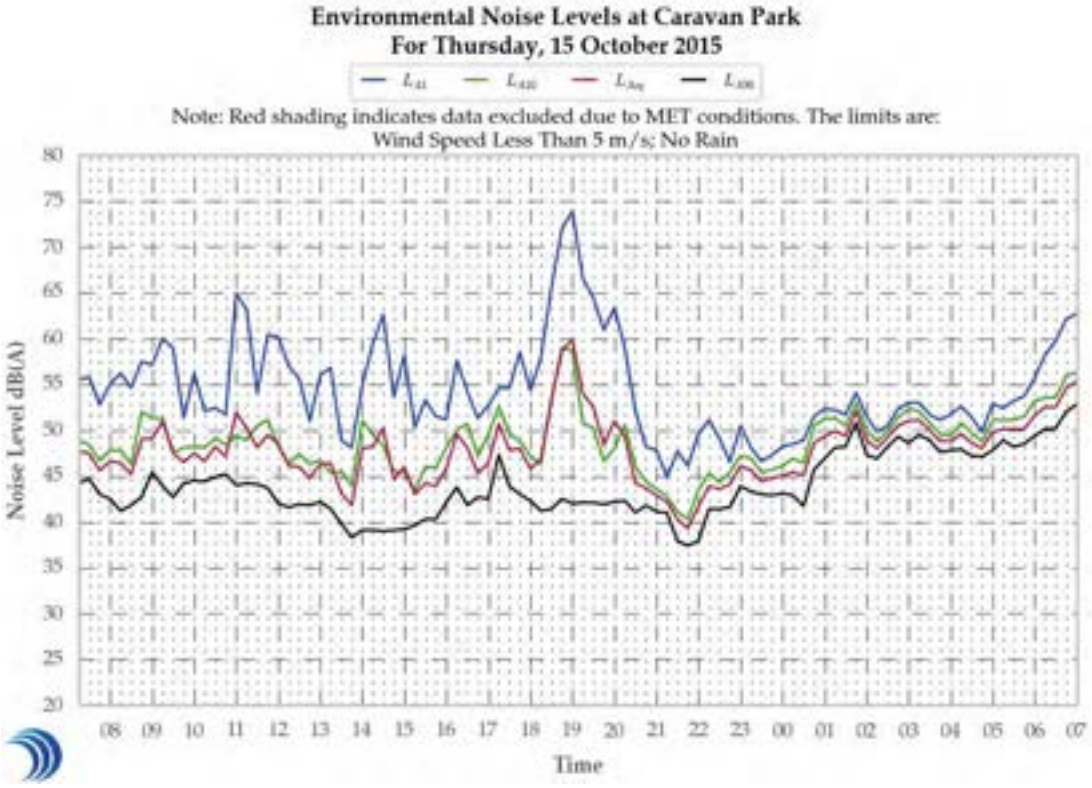
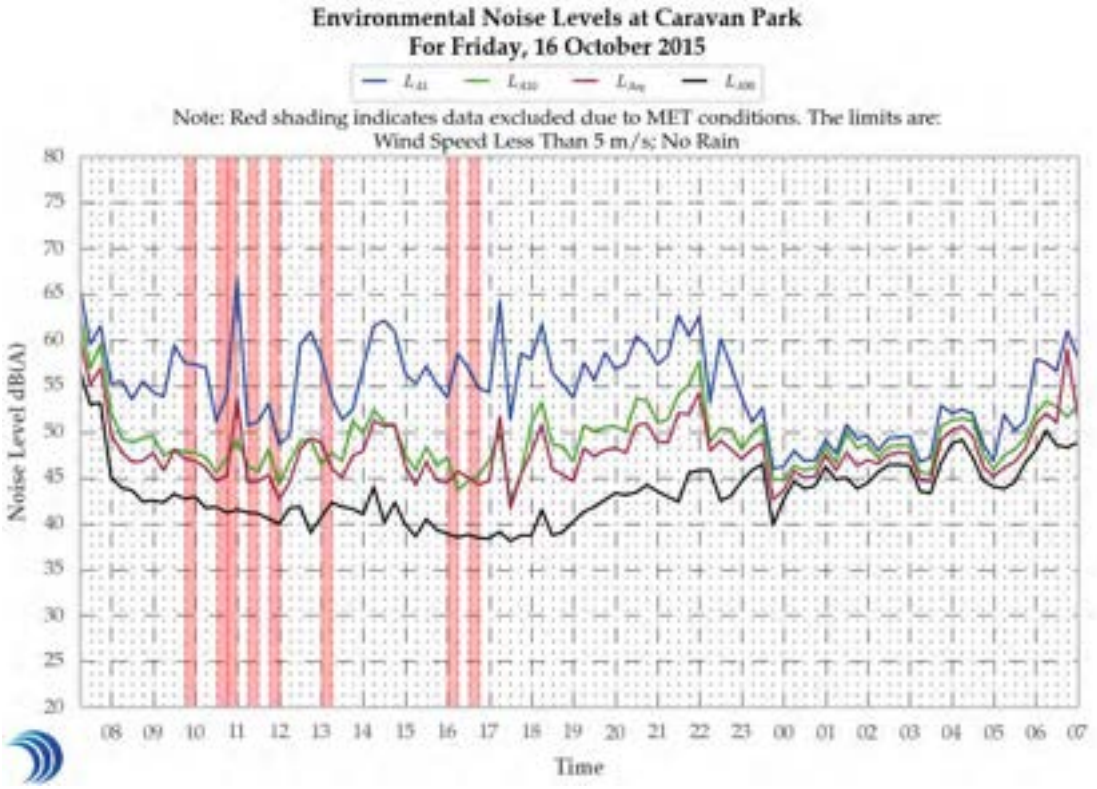
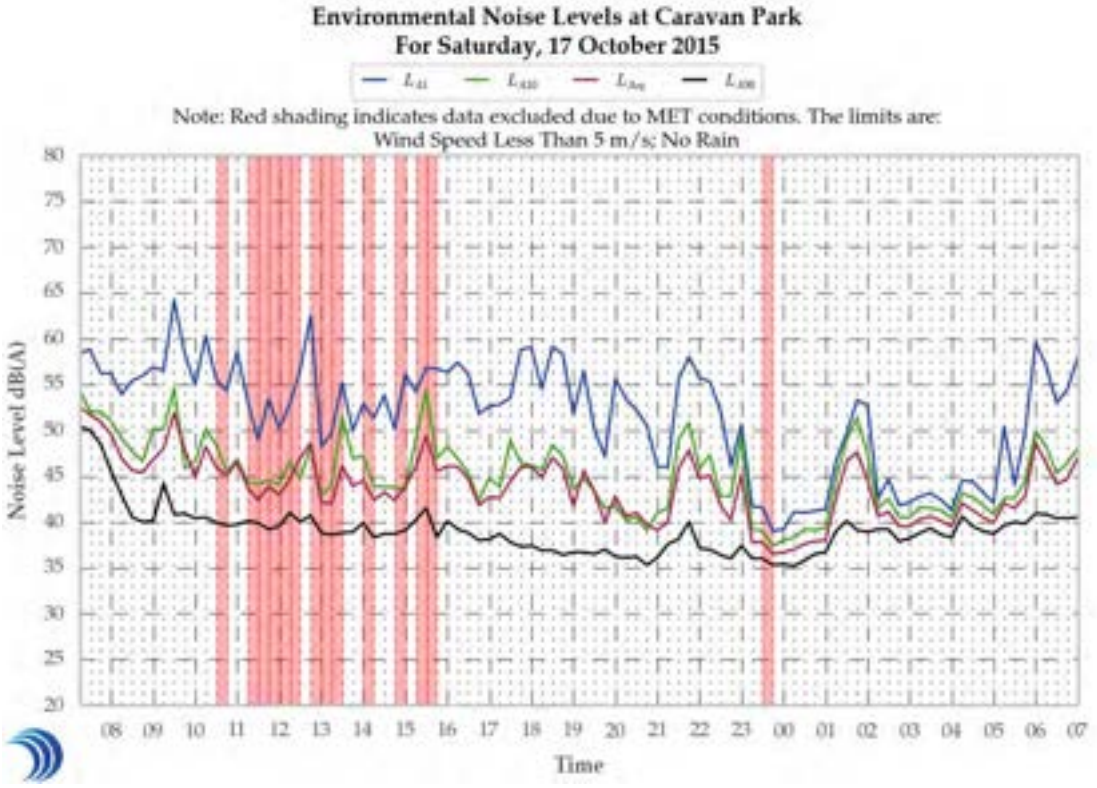
APPENDIX

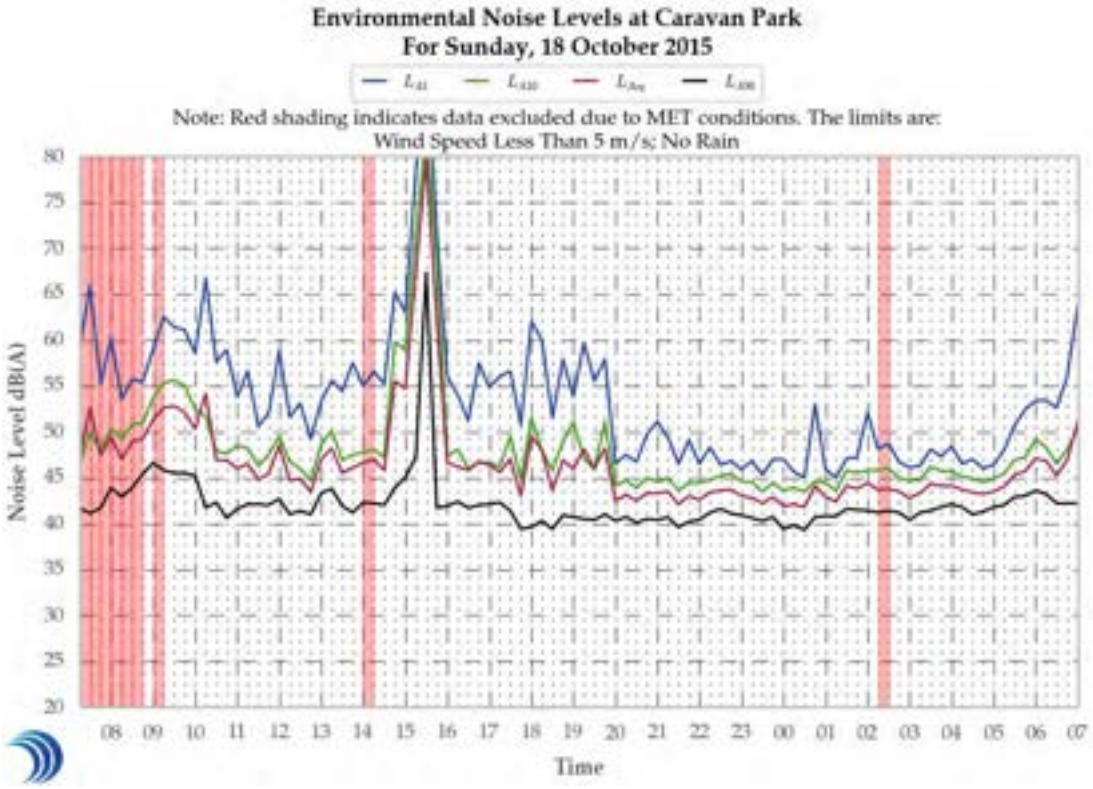
B LOGGER GRAPHS

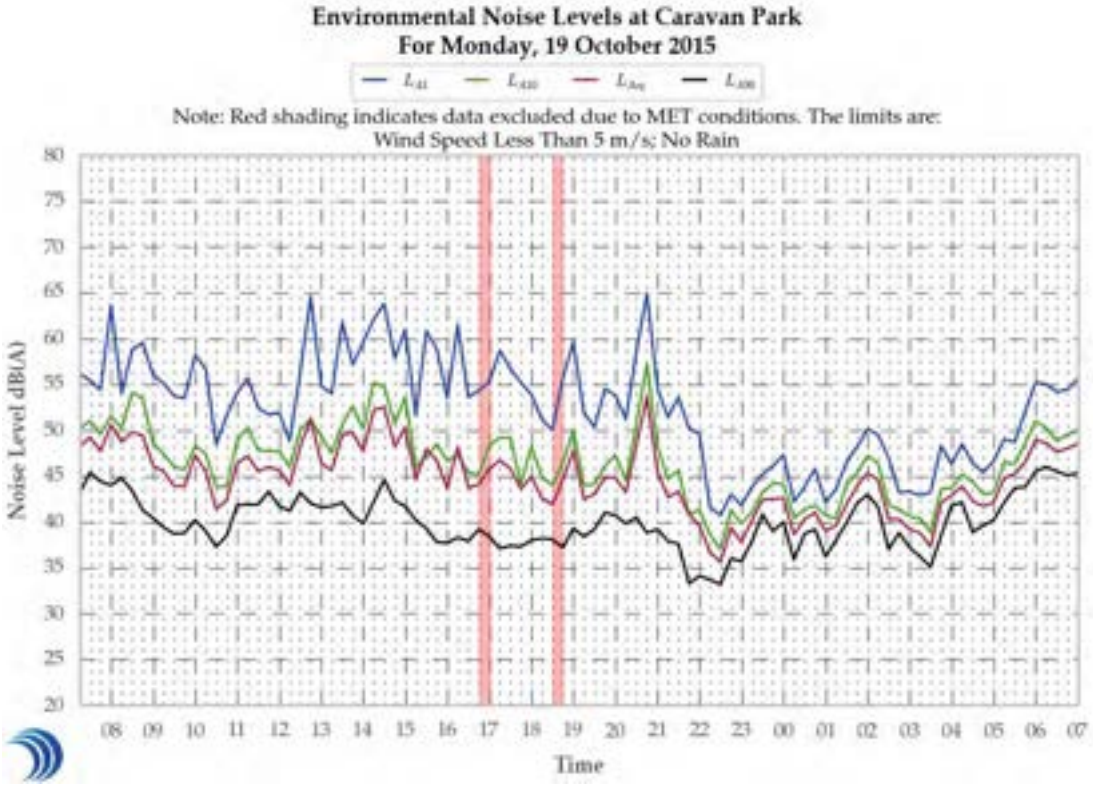

Environmental Noise Levels at Oberon Caravan Park
For Wednesday, 14 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

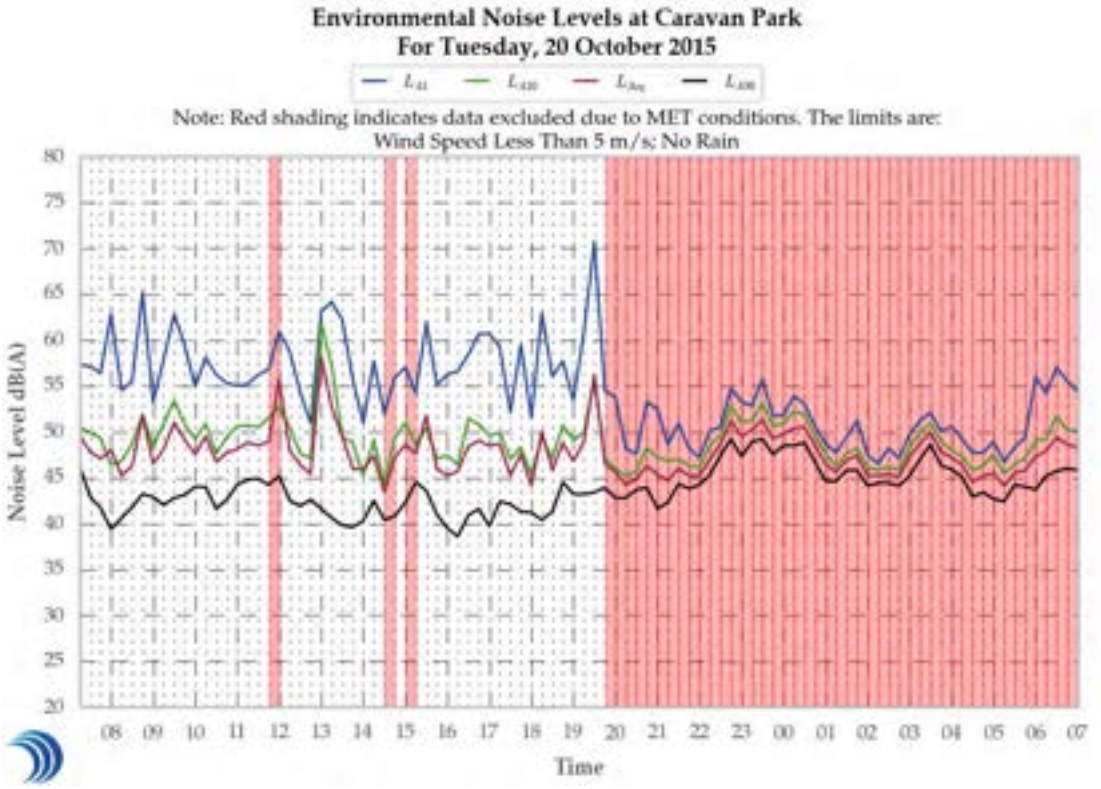

Environmental Noise Levels at Caravan Park
For Thursday, 15 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

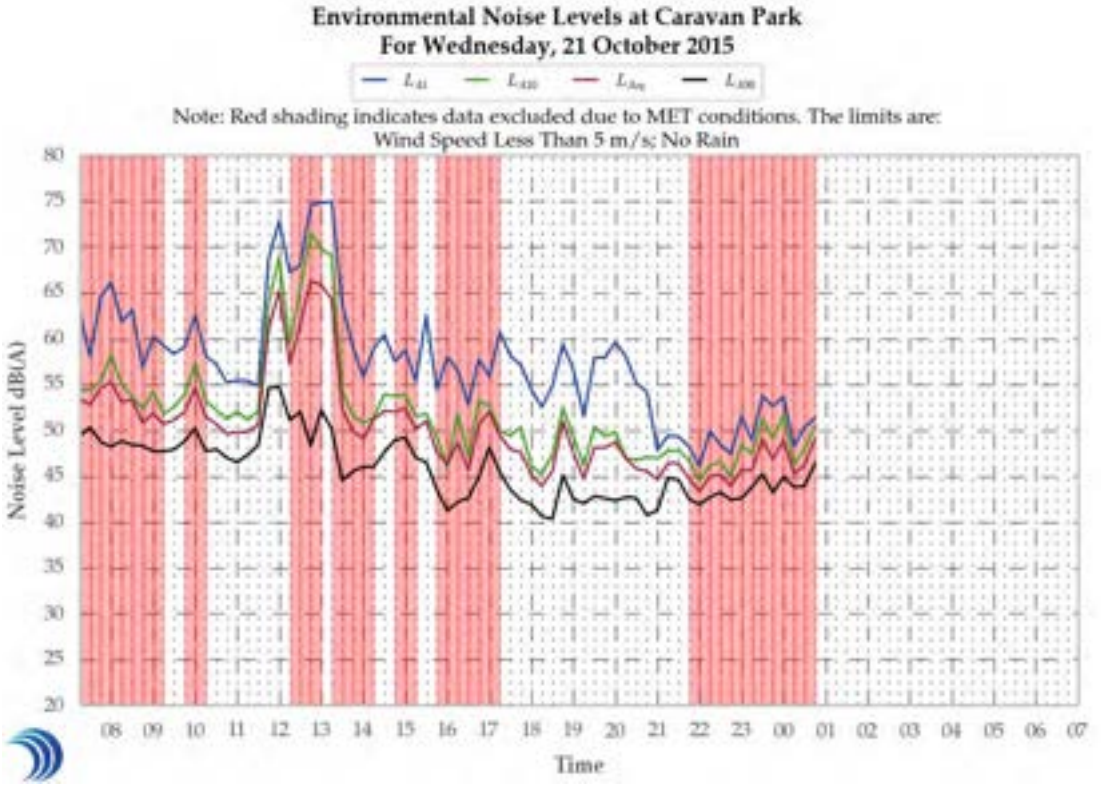

Environmental Noise Levels at Caravan Park
For Friday, 16 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

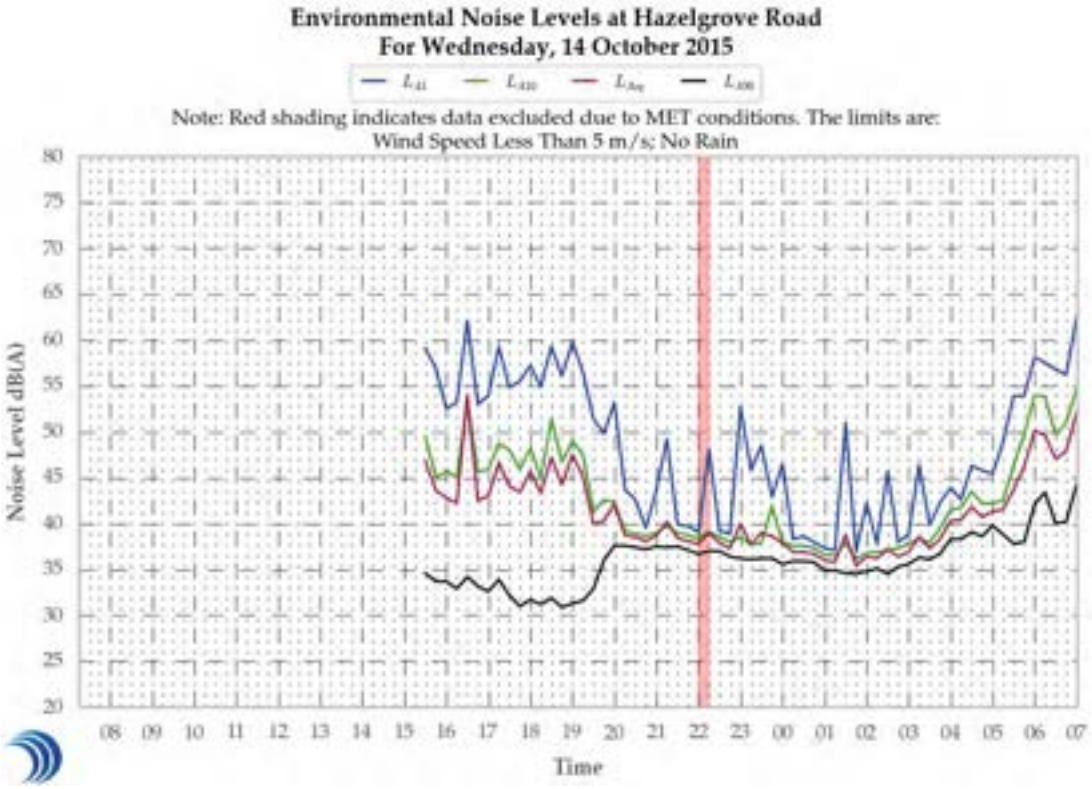

Environmental Noise Levels at Caravan Park
For Saturday, 17 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

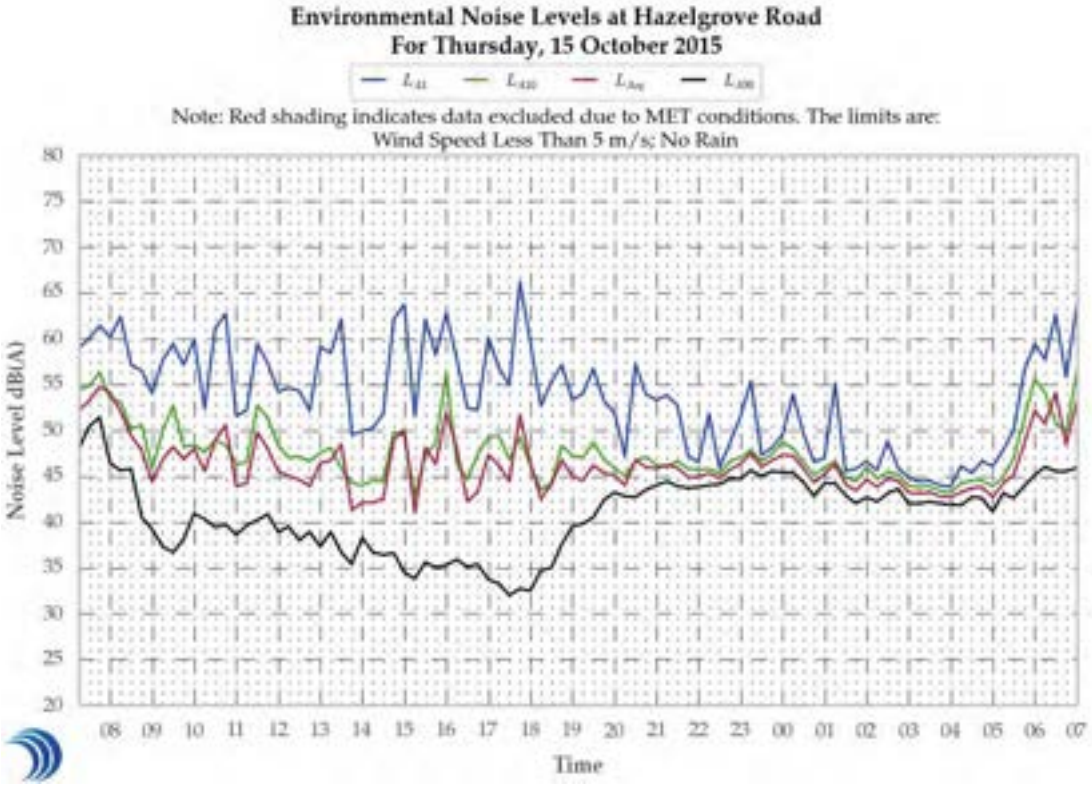

Environmental Noise Levels at Caravan Park
For Sunday, 18 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

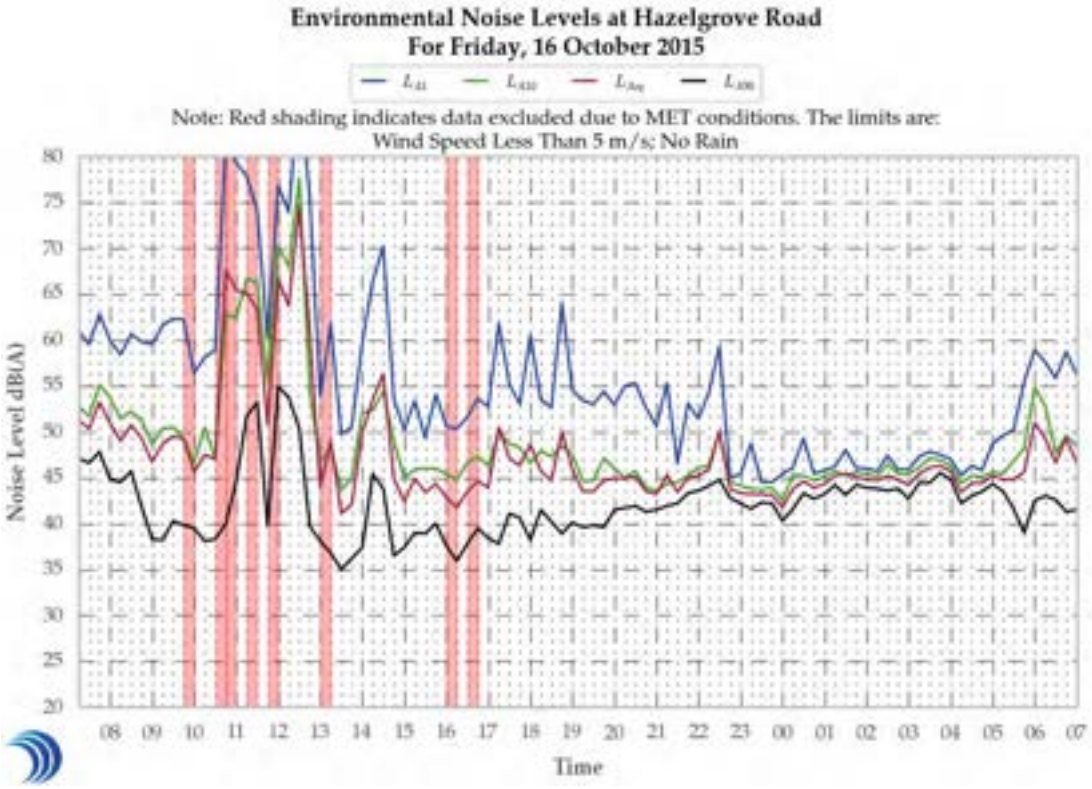

Environmental Noise Levels at Caravan Park
For Monday, 19 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

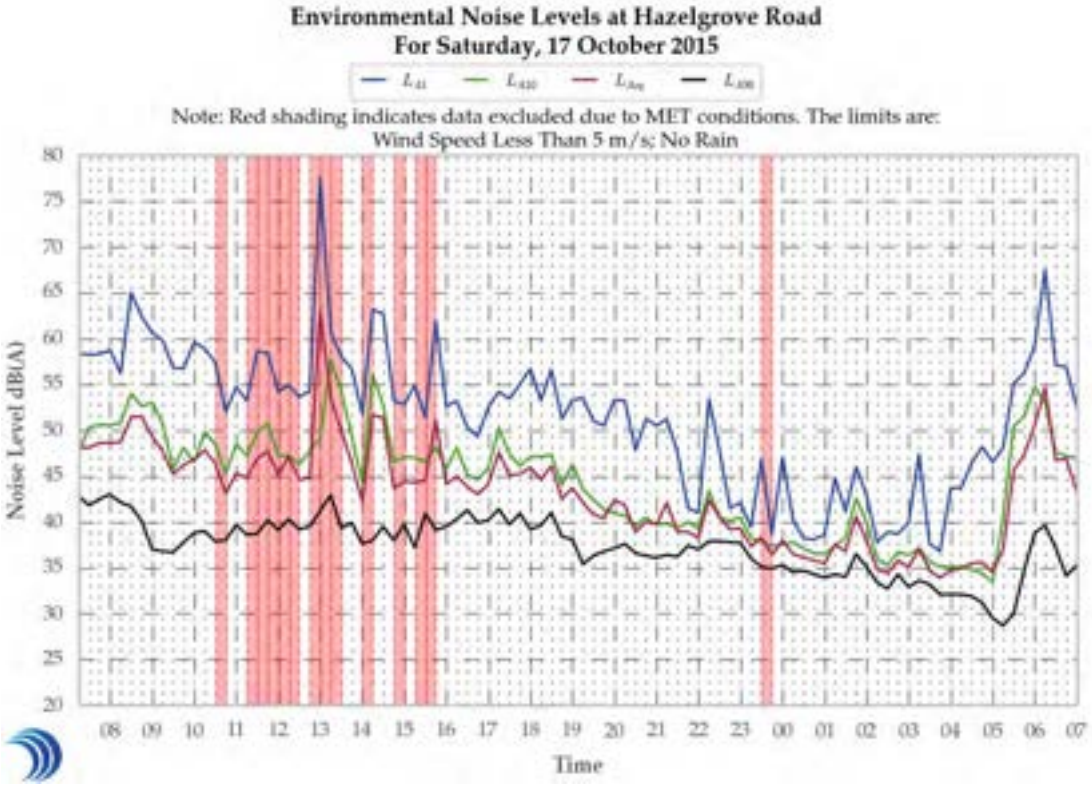

Environmental Noise Levels at Caravan Park
For Tuesday, 20 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

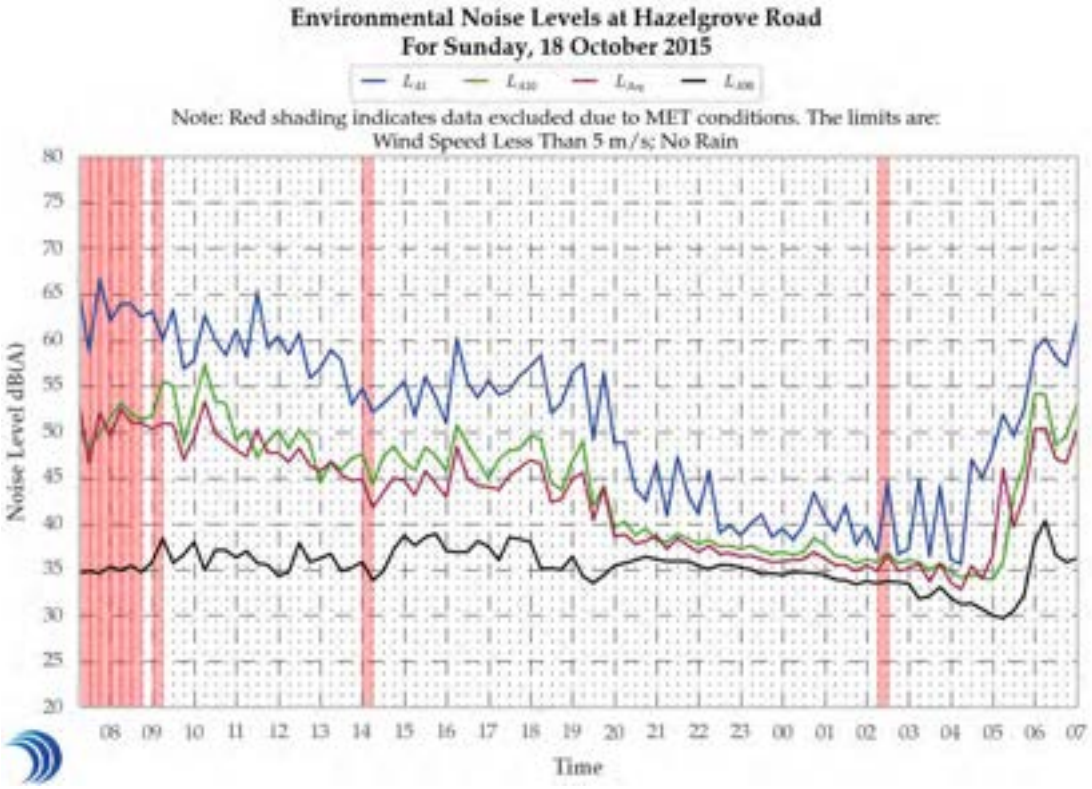

Environmental Noise Levels at Caravan Park
For Wednesday, 21 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

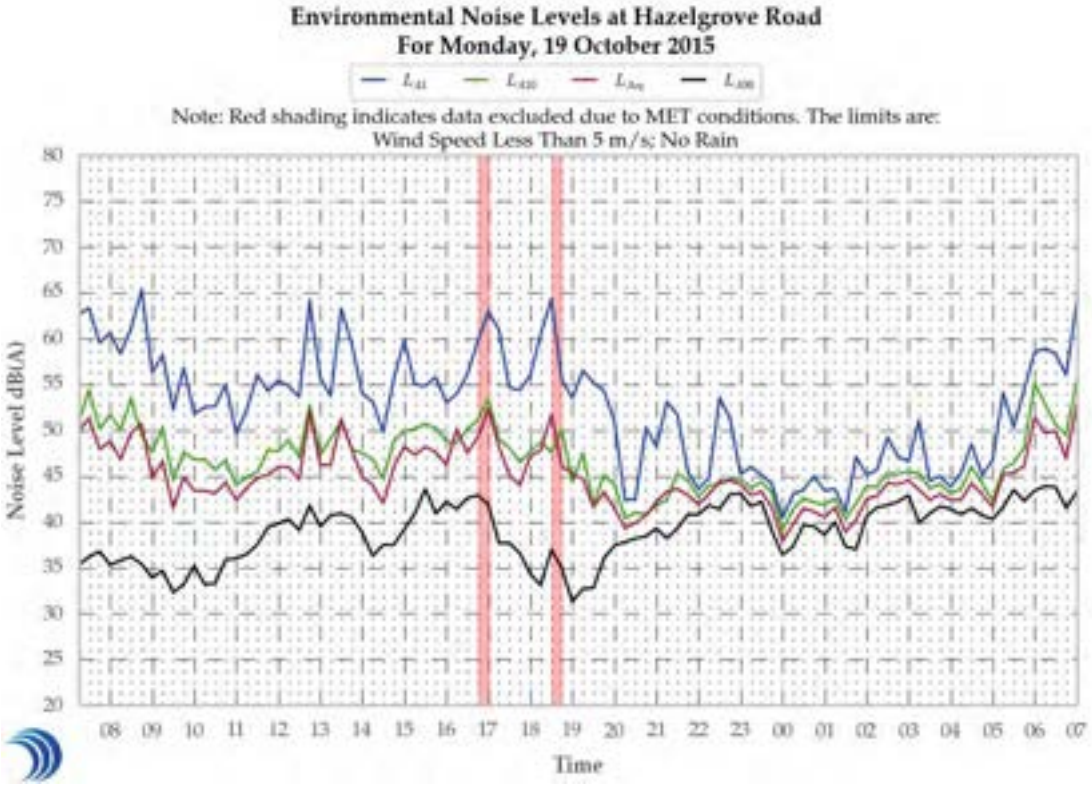

Environmental Noise Levels at Hazelgrove Road
For Wednesday, 14 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at Hazelgrove Road
For Thursday, 15 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

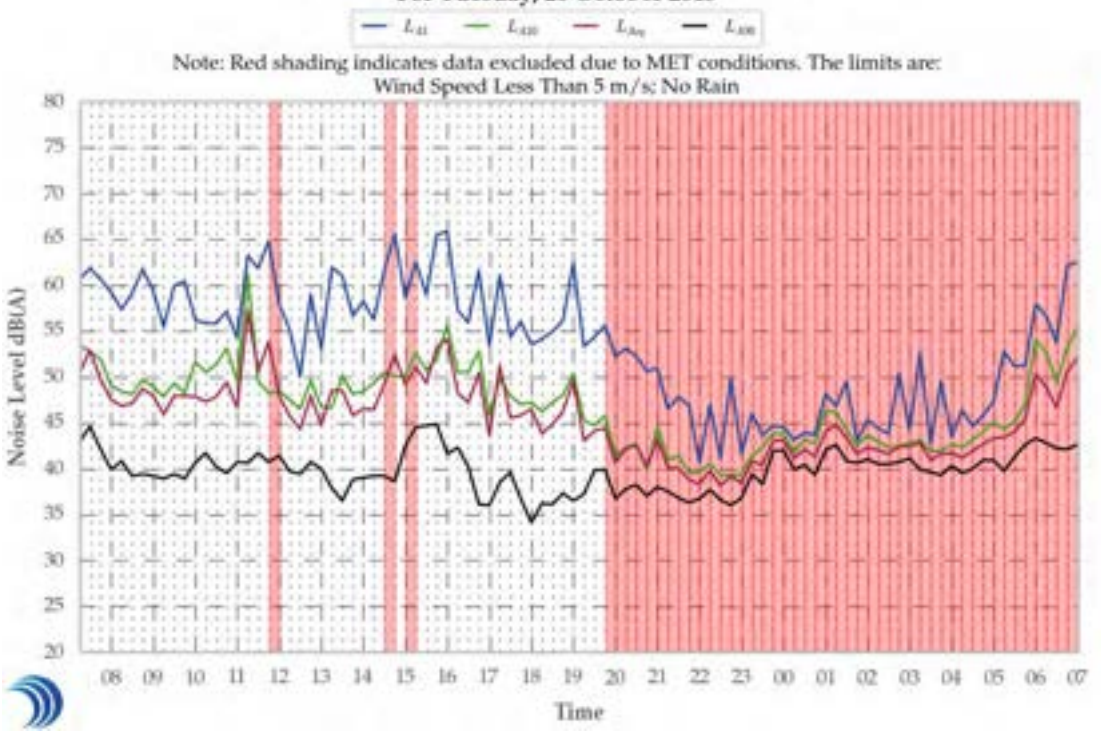

Environmental Noise Levels at Hazelgrove Road
For Friday, 16 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at Hazelgrove Road
For Saturday, 17 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

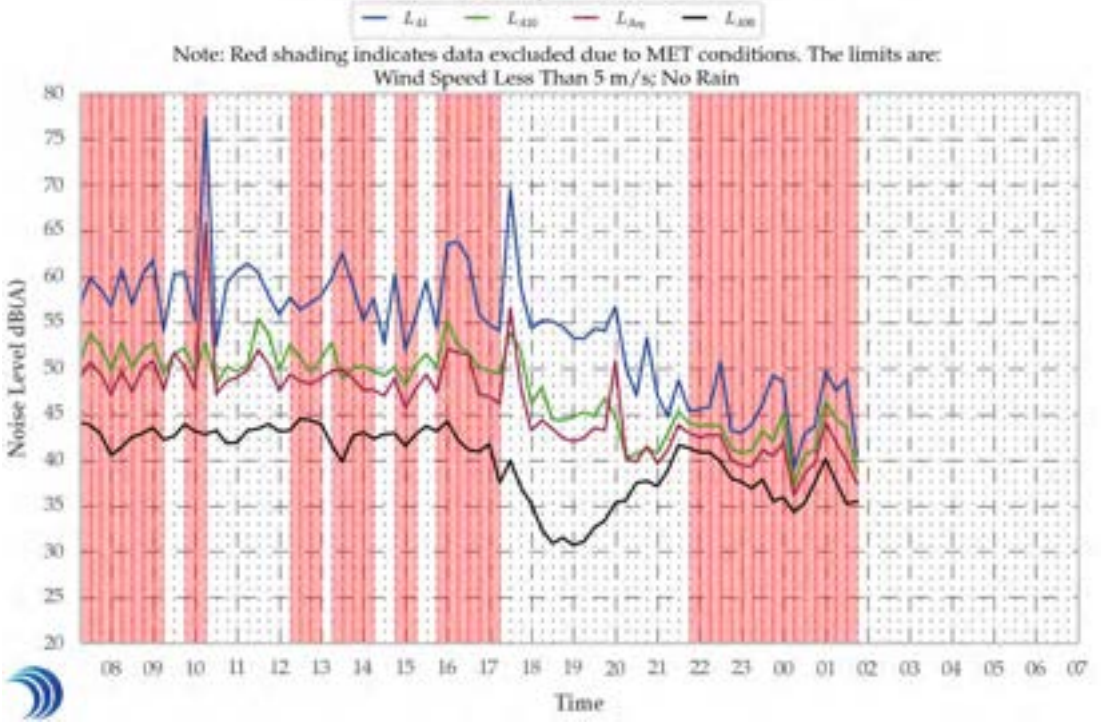

Environmental Noise Levels at Hazelgrove Road
For Sunday, 18 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at Hazelgrove Road
For Monday, 19 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

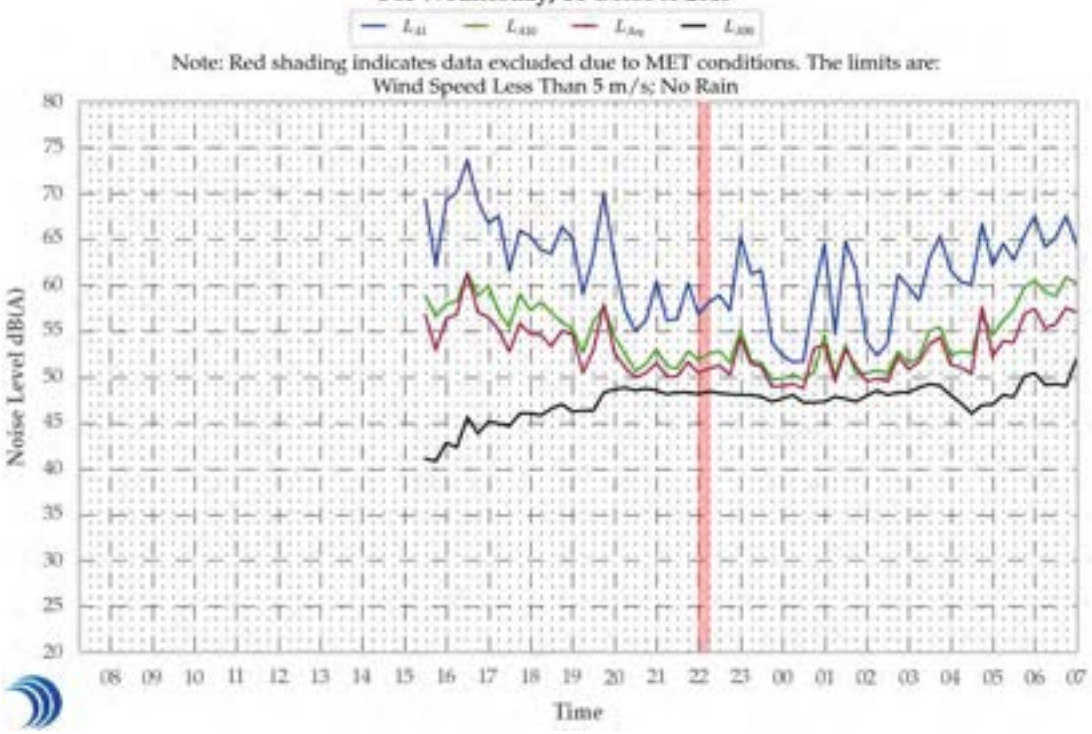
Environmental Noise Levels at Hazelgrove Road
For Tuesday, 20 October 2015



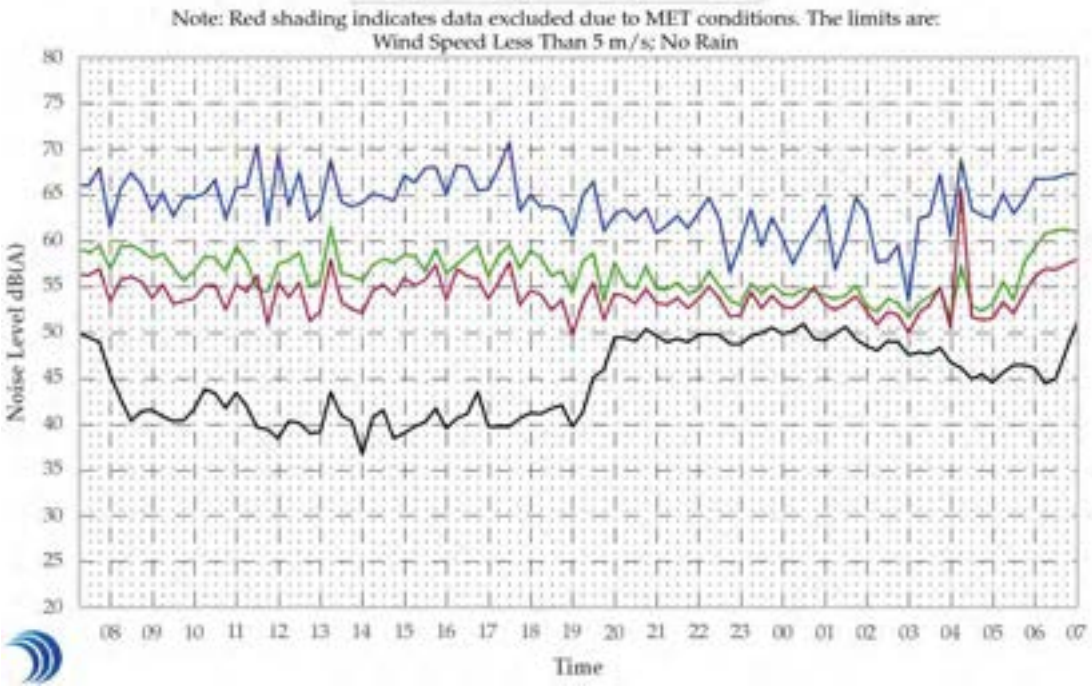
Environmental Noise Levels at Hazelgrove Road
For Wednesday, 21 October 2015

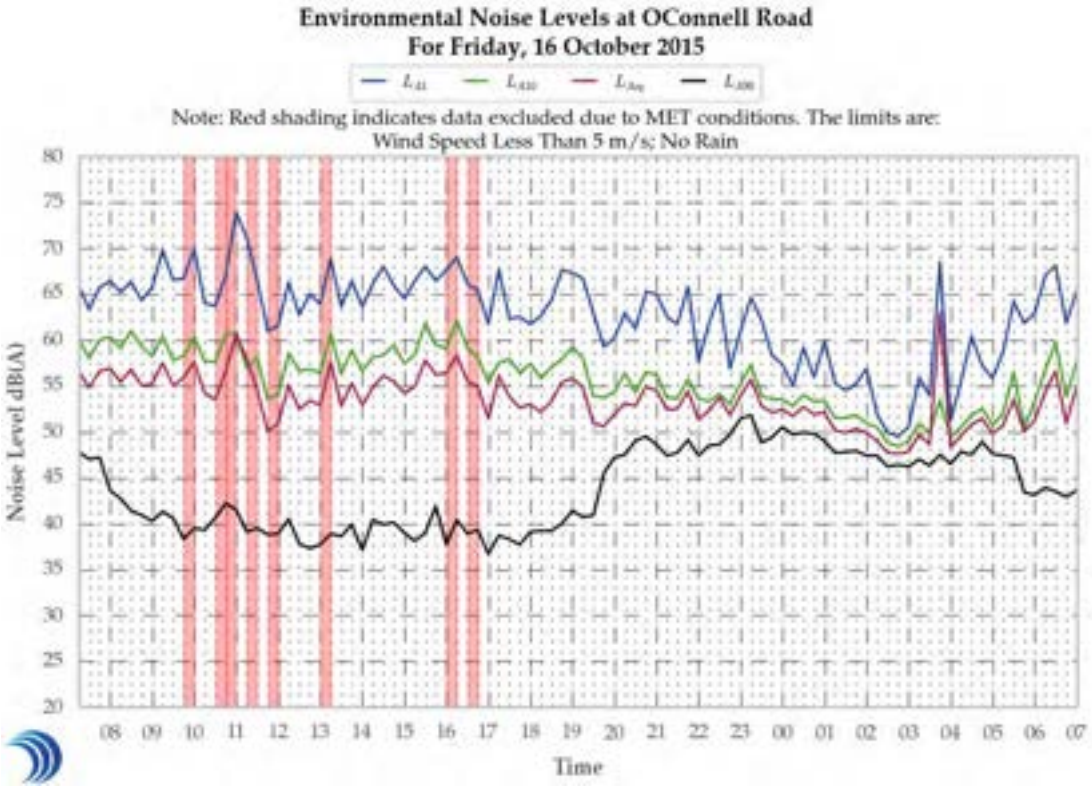


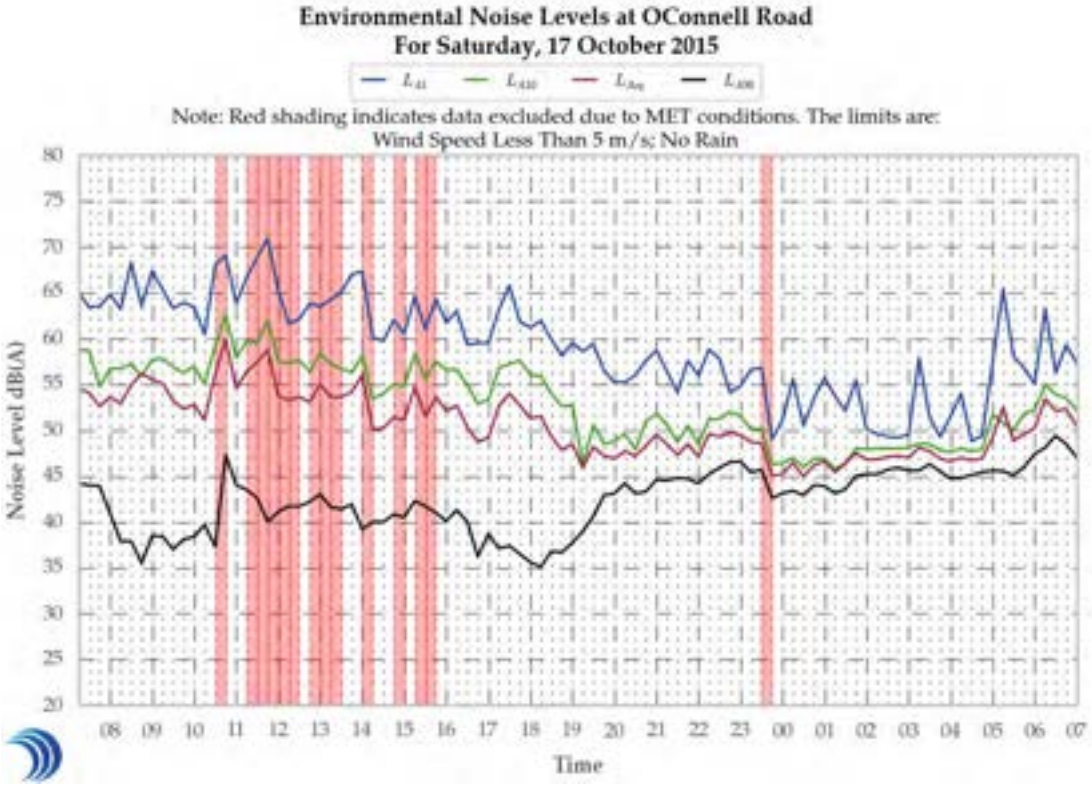
Environmental Noise Levels at O'Connell Road
For Wednesday, 14 October 2015

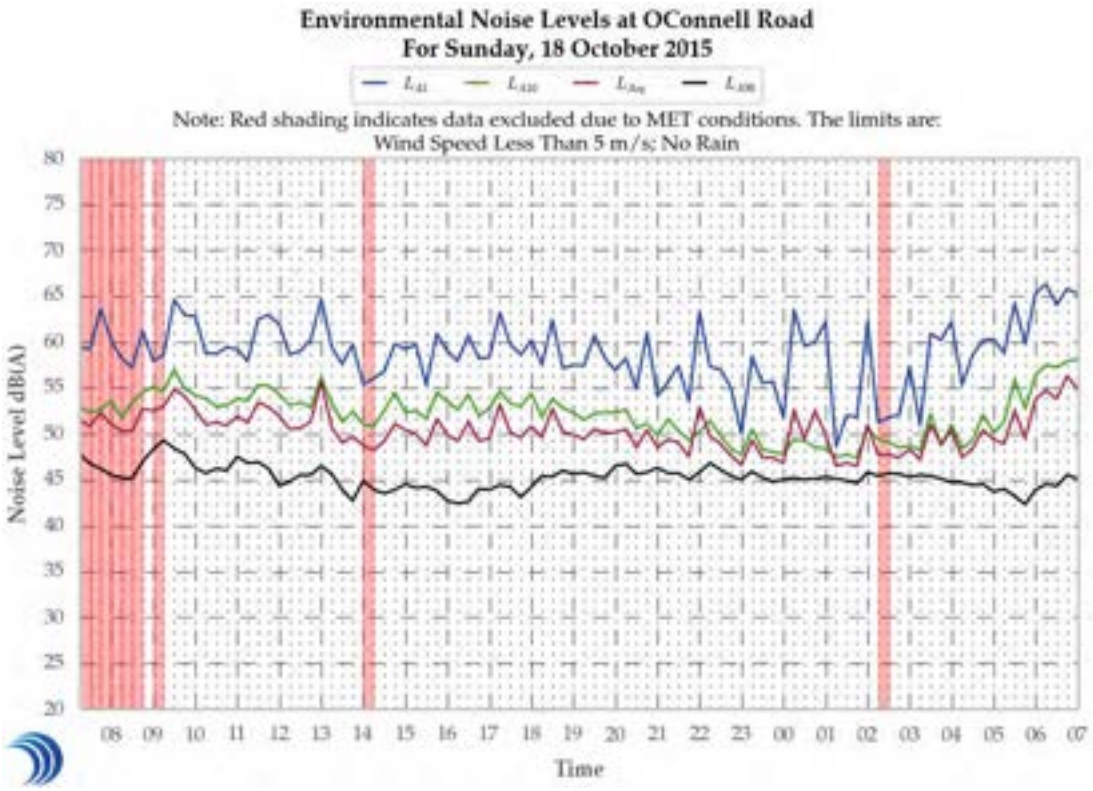


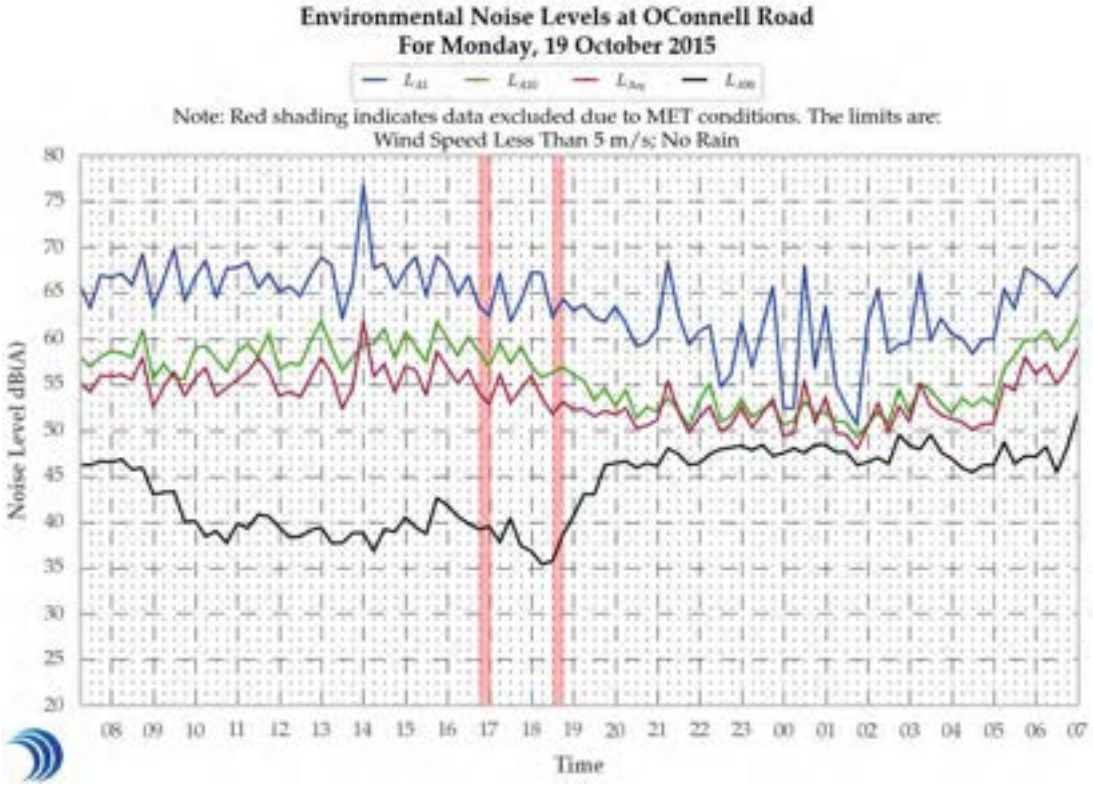
Environmental Noise Levels at OConnell Road
For Thursday, 15 October 2015

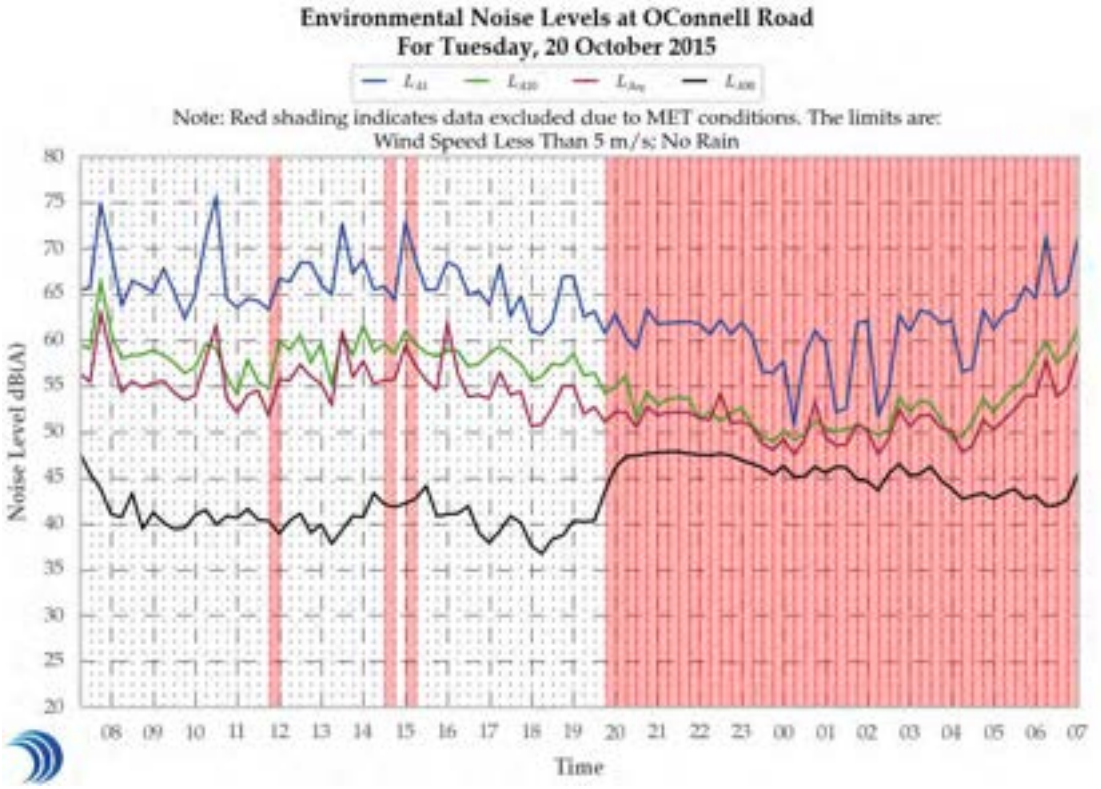


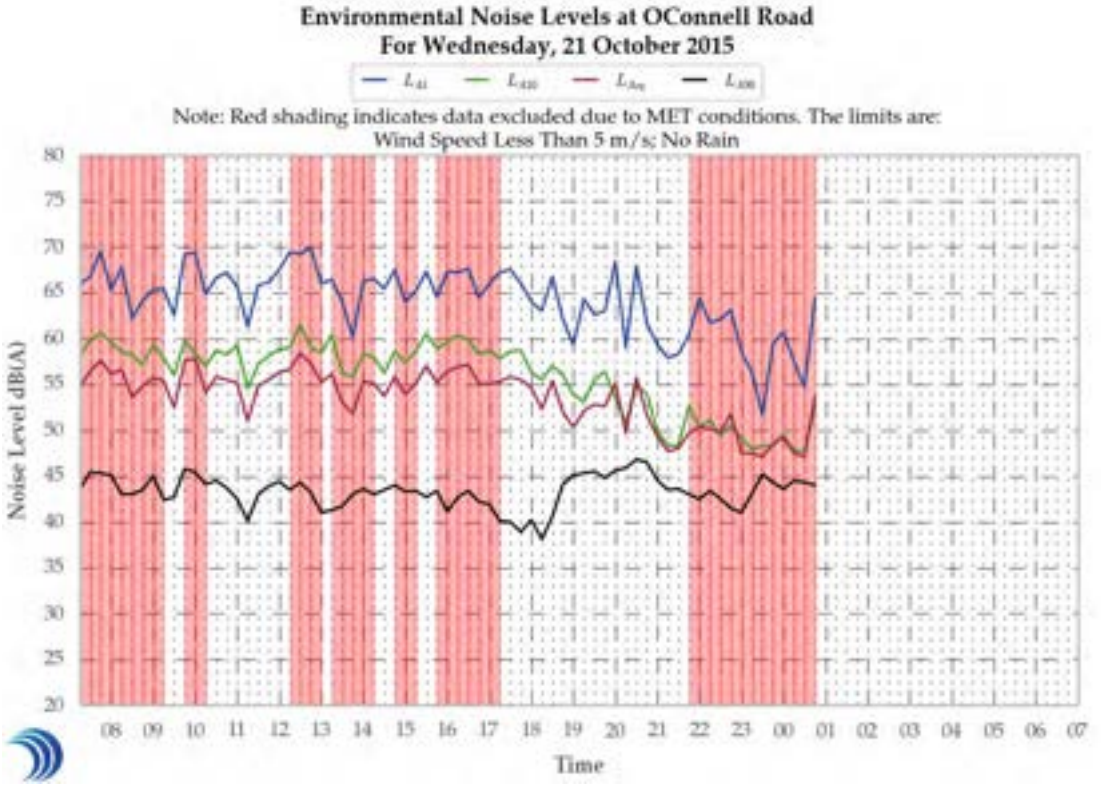

Environmental Noise Levels at OConnell Road
For Friday, 16 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time

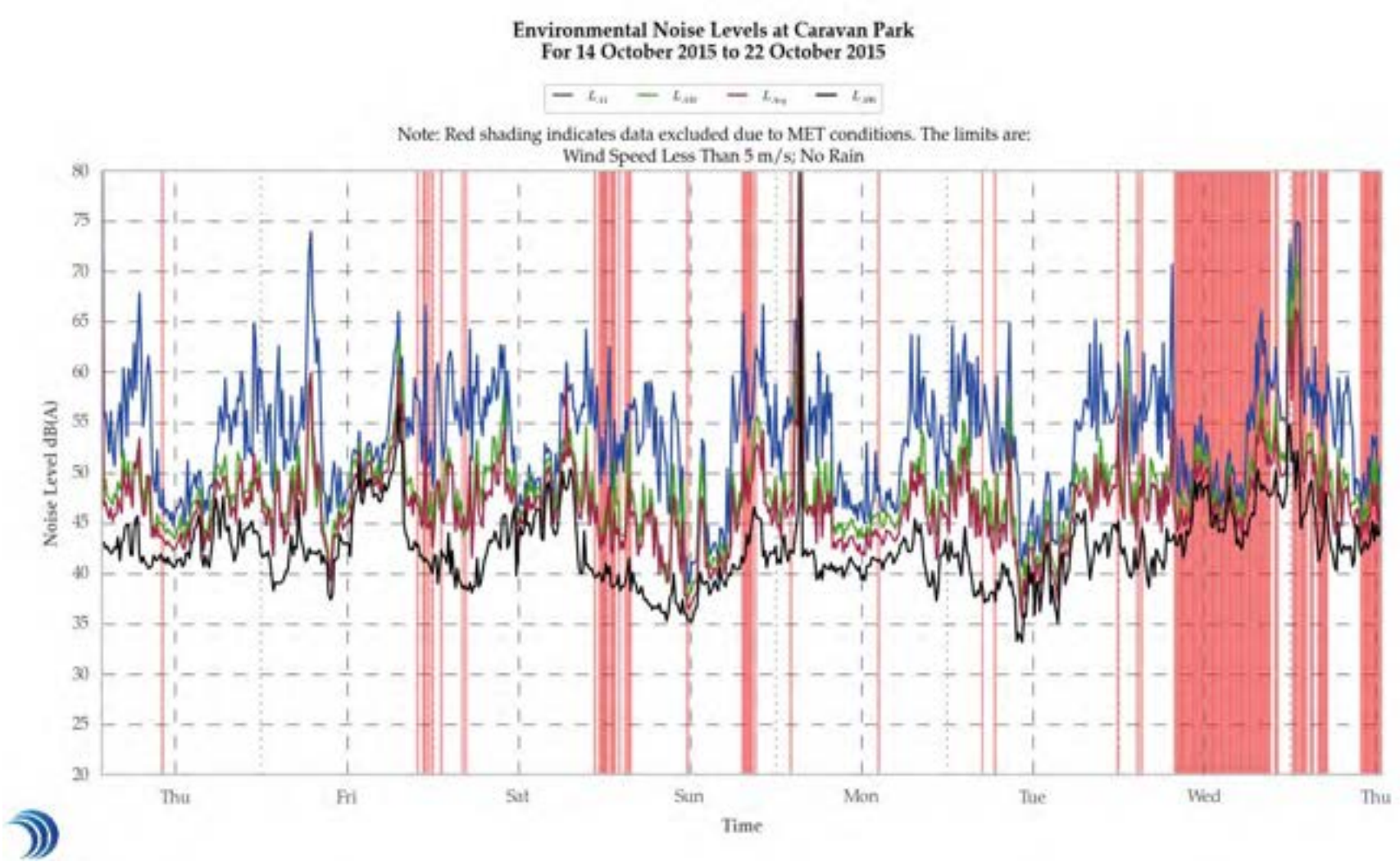

Environmental Noise Levels at OConnell Road
For Saturday, 17 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at OConnell Road
For Sunday, 18 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at OConnell Road
For Monday, 19 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at OConnell Road
For Tuesday, 20 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at OConnell Road
For Wednesday, 21 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
Time


Environmental Noise Levels at Caravan Park
For 14 October 2015 to 22 October 2015
Note: Red shading indicates data excluded due to MET conditions. The limits are:
Wind Speed Less Than 5 m/s; No Rain
Noise Level dB(A)
80
75
70
65
60
55
50
45
40
35
30
25
20
Thu
Fri
Sat
Sun
Mon
Tue
Wed
Thu
Time

APPENDIX

C SOURCE LOCATION FIGURES

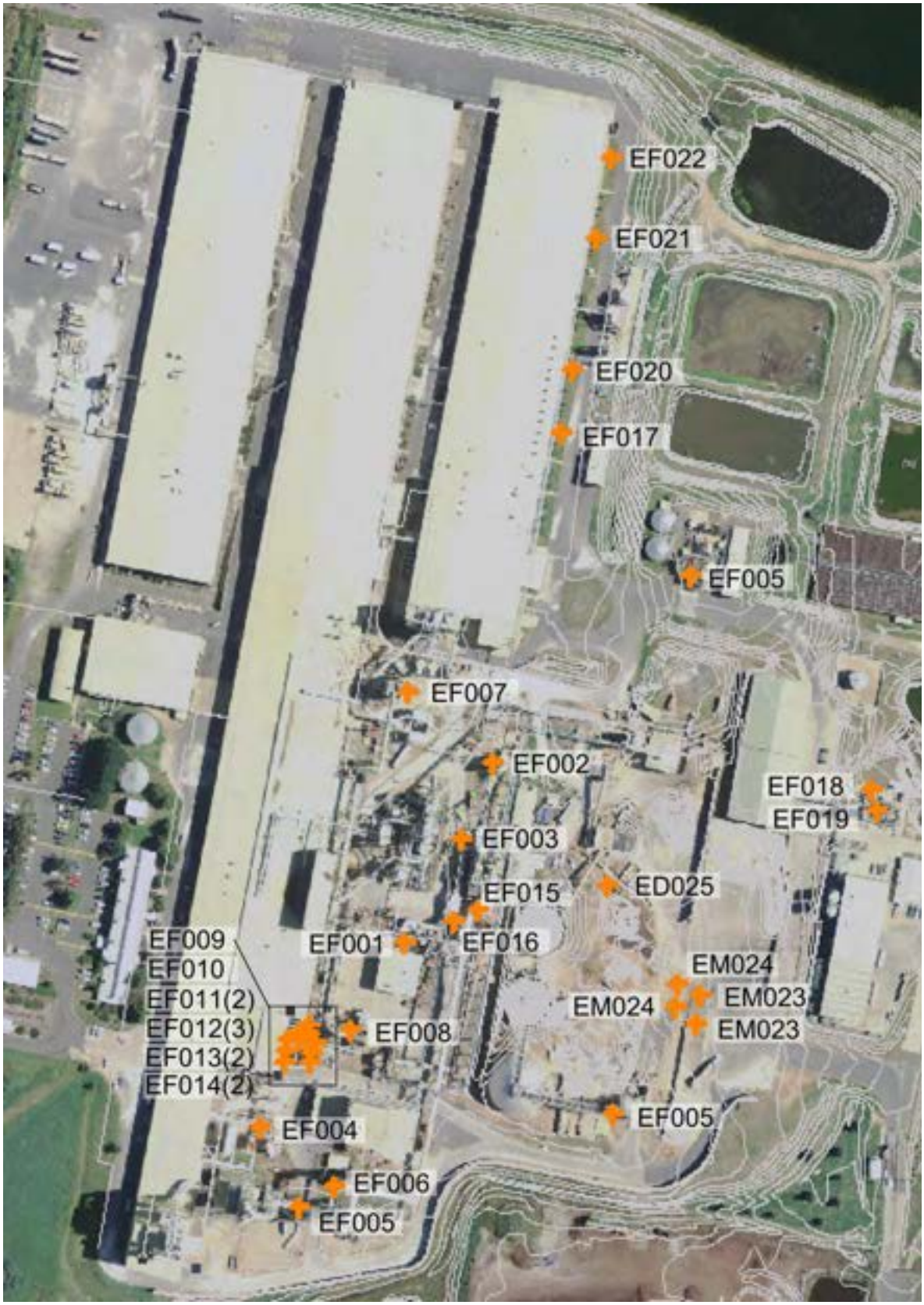


Figure C.1: Modelled Source Locations, Existing Site

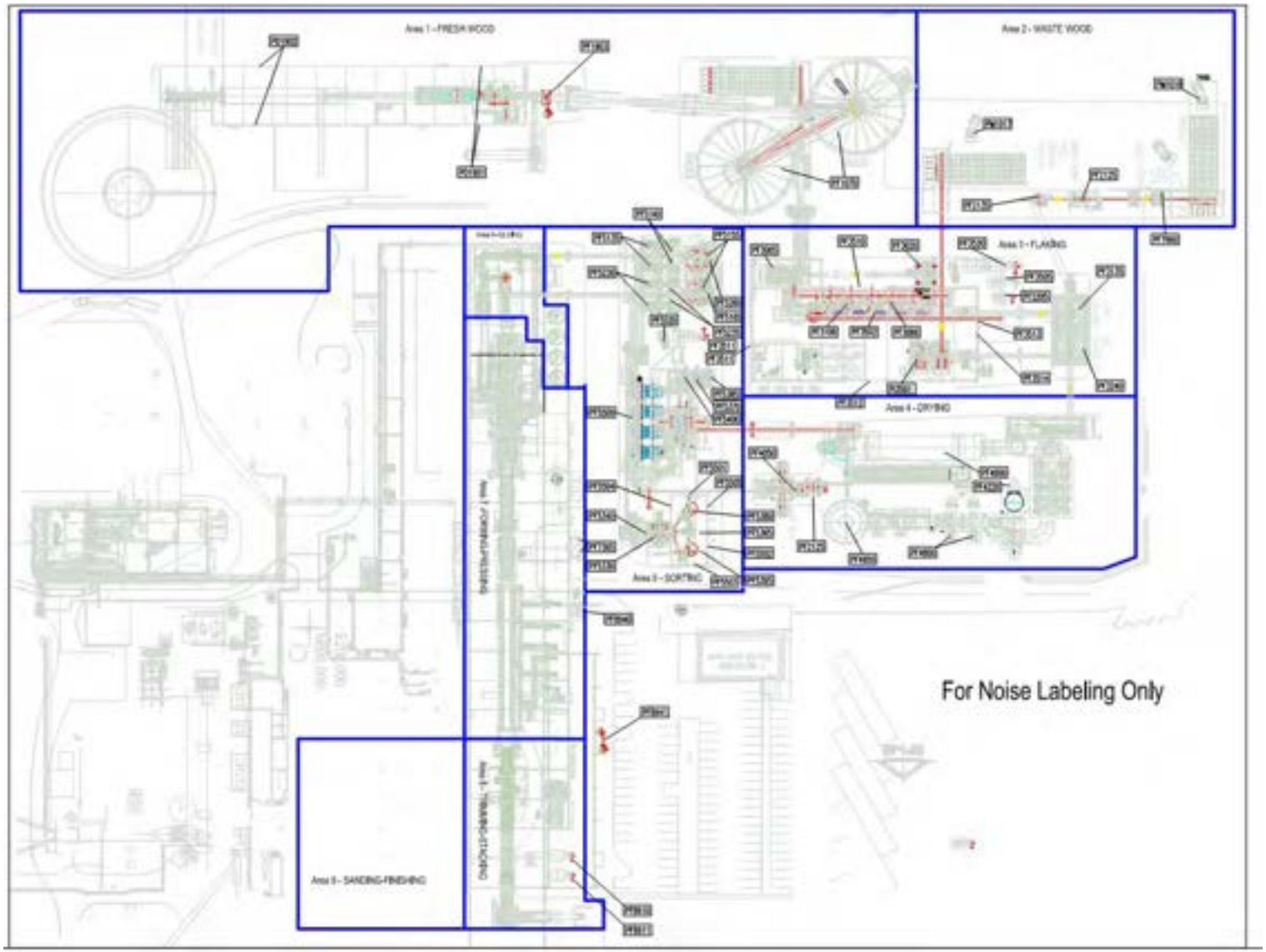


Figure C.2: Modelled Source Locations, Proposed Sources

MULLER partnership

BORG PANELS, OBERON
PROPOSED FACTORY EXTENSION
CAPITAL INVESTMENT VALUE ESTIMATE

Newcastle :: Sydney :: Melbourne

10 MAY 2016

MULLER partnership
QUANTITY SURVEYORS

10 May 2016

Borg
1090 Pacific Highway
SOMERSBY NSW 2250

ATTENTION: VICTOR BENDEVSKI

Dear Victor,

BORG PANELS, OBERON
PROPOSED FACTORY EXTENSION
CAPITAL INVESTMENT VALUE ESTIMATE

As per your request dated 4 May 2016, Muller Partnership has prepared a Capital Investment Value Estimate for the above development totalling **$106,125,000** ***excl. GST*** and enclose our report.

The report comprises the following:

- Executive Summary
- Schedule of Information
- Assumptions
- Exclusions
- Drawing Cover Sheet
- Capital Investment Value Estimate

Please note the attached is an estimate of value based on the preliminary information provided.

Should you have any queries or require any further information please do not hesitate to contact the undersigned.

Yours faithfully
MULLER PARTNERSHIP

CAMERON BEARD – Director
CB:ML – 15205 - Est Rep

1.0 EXECUTIVE SUMMARY

Project Description

The project involves the extension of the Borg Panels Manufacturing Plant at Lowes Mount Road, Oberon NSW. New works consist of the extension of the main warehouse, new warehouse to the south of existing carpark, motor control centre / pump room building, associated industrial plant and services.

Demolition and alteration works comprise of the demolition of existing warehouse and the relocation of 2 No. silos.

Construction generally comprises of site preparation, bulk / detail earthworks, reinforced concrete piles / footings / slabs / subfloor, structural steel portal frame, metal sheet roof and wall cladding, precast concrete walls up to 2400 high, fire rated doors, metal roller doors, office / amenities fitout, electrical, hydraulic, mechanical, fire and external services.

Cost Summary

Item	$ (Excl GST)
Demolition & Alterations	$ 197,000
Site Preparation	$ 497,201
Awning over Woodchip Area & Materials Handling	$ 117,400
Flakers Building	$ 2,071,874
Log Store/Load, Debarker & Chipper	$ 3,209,895
Press Building Extension	$ 12,459,178
Admin Building Extension	$ 460,253
New Gate House	$ 153,000
Automated Storage	$ 4,751,147
Extension to Production Building	$ 2,423,437
Log Storage, Debarker & Chipper	$ 1,022,767
External Services	$ 410,155
Preliminaries & Margin	$ 4,846,693
BUILDING WORKS SUBTOTAL	**$ 32,620,000**
Factory Plant	$ 73,505,000
GST EXCLUSIVE SUBTOTAL	**$ 106,125,000**

Project Job Creation

Project Phase	No. of Jobs
Construction phase	760
Operating phase	70

Muller Partnership has benchmarked the construction jobs created from a similar sized previous factory project.

We note we have been advised by Mr Victor Bendevski of Borgs in relation to the number of operating jobs that are to be created.

2.0 SCHEDULE OF INFORMATION

The information used in compiling our Capital Investment Value Estimate includes the following:

- Borg Construction DA drawings (refer attached drawing cover sheet)
- Price List Quotation for Borgs Manufacturing provided by Mr Victor Bendevski of Borg and received 1 October 2015.
- Telephone and email correspondence with Victor Bendevski of Borg. (Numerous)

All rates used within our Capital Investment Value Estimate have been gathered from our in-house databases as well as being constructed from first principles namely labour, materials and waste to reflect current market and project specific value.

3.0 ASSUMPTIONS

The following assumptions have been made in the preparation of the attached Capital Investment Value Estimate:-

General

1. Project to be competitively tendered to a suitable number of qualified contractors;
2. All works can be undertaken during normal work hours;
3. The existing factory will remain open and operational during construction;
4. No works are required to existing factory;
5. The works will be completed in a single stage;

Demolition & Alterations

6. Provisional allowance of $77,000 *excl. GST* made to demolish existing approx. 70.7m long x 14.7m wide building and miscellaneous site requirements;
7. Provisional allowance of $120,000 *excl. GST* made to relocate 2 No. silos;

Site Preparation

8. Allowed for 300 deep imported fill across building areas;
9. Assumed detail excavation in material other than rock (NB: No Geotechnical Report provided);

Building Works

10. Allowed for footings based on building GFA;
11. Allowed for 240 thick reinforced concrete slab to main warehouse area;
12. Allowed for 630 thick reinforced concrete slab to pit areas;
13. Allowed for 300 thick reinforced concrete walls to pit area subfloor walls;
14. Allowed for structural steel based on building GFA;
15. Provisional allowance of $5/m2 *excl. GST* made for roof safety systems;
16. Allowed for 175 thick precast concrete panel walls to 2400 high and metal sheet cladding above this;
17. Allowed for motorised roller doors;
18. Allowed for $1,200/m2 *excl. GST* for office fitout;
19. Allowed for $3,000/m2 *excl. GST* for amenities fitout;

20. Provisional allowances for signage and linemarking;

External Services

21. Provisional allowance of $5,000 *excl. GST* made for connection to existing stormwater system;

22. Provisional allowance of $50,000 *excl. GST* made for detention tank;

23. Provisional allowance of $5,000 *excl. GST* made for connection to existing sewer main;

24. Provisional allowance of $5,000 *excl. GST* made for connection to existing water main;

25. Provisional allowance of $5,000 *excl. GST* made for fire protection connection;

26. Provisional allowance of $20,000 *excl. GST* made for connection to existing electrical services;

27. Provisional allowance of $30,000 *excl. GST* made for site CCTV;

28. Provisional allowance of $5,000 *excl. GST* made for connection to existing communication services;

Factory Plant

29. Allowed for exchange rate of €1 EUR = $1.591 AUD;

30. Factory plant has been included as per Price List Quotation for Borgs Manufacturing as provided by Mr Victor Bendevski of Borg;

31. Buyer and option items have been excluded from our estimate;

32. Assumed all itemized prices are in AUD.

4.0 EXCLUSIONS

Within the following Capital Investment Value Estimate the acronym 'EXCL' means work that has not been included in our estimate. We specifically note the following exclusions from the estimated cost:

General Exclusions

1. Land costs and legal fees;
2. Holding costs and interest charges;
3. GST;
4. Escalation;
5. Costs relating to any part of the development or project that is the subject of a separate development consent or project approval;
6. Soil remediation;
7. Delay costs;
8. Staging allowance;
9. Cost of finance;
10. Removal of contaminated materials;
11. Costing of ongoing maintenance requirements;

Project Specific Exclusions

12. Property acquisition;
13. Bulk excavation;
14. Excavation in rock;
15. De-watering;
16. Works to MDF fines & saw dust storage building other than works outlined in following estimate;
17. Works to existing structures and buildings on the site other than outlined in following estimate;
18. Buyer and option items in factory plant quotation price list;
19. Revegetation;
20. Carpark works;
21. Fencing.

5.0 DISCLAIMER

MULLER PARTNERSHIP have prepared this report in part on the basis of information supplied to it in the ordinary course of business by Mr Victor Bendevski of Borg.

Whilst all reasonable professional care and skill has been exercised to validate its accuracy and authenticity, MULLER PARTNERSHIP is unable to provide any Guarantee in that regard, and will not be liable to any party for any loss arising as a result of any such information subsequently being found to be inaccurate, lacking authenticity or having been withheld.

This report is only intended for use by Borg, Muller Partnership accepts no responsibility to other parties who use opinions or information contained herein. They do so at their own risk. In acting as Quantity Surveyor for Borg, Muller Partnership's liability is limited to the scope of services and value limit, as defined in their Professional Indemnity insurance cover. A copy is available on request.

This report covers only the items as contained in this report. Should Borg require additional items or areas of assessment, these should be specifically requested and will be actioned as agreed between the parties.

The construction costs are current as at the date of this assessment only. The values assessed herein may change significantly and unexpectedly over a relatively short period (including as a result of general market movements or factors specific to the particular property). We do not accept liability for losses arising from such subsequent changes in values.

Proposed Particle Board Facility

Water Cycle Impact Asessment

Report Prepared for: Borgs Group

May, 2016
Project No. 015-087

Prepared by:
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Document Information

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Document title	As above	Project number 015-086
Description	Assessment ofpotentil water quality impacts of a proposed particle board manufacturing facility at Oberon	
Client Contact	Victor Bendevski	

	Name	Signature	Issue:	Date
Prepared by	Mark Liebman		D	12/5/2016
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EXECUTIVE SUMMARY

The Sustainability Workshop (TSW) was commissioned by Borg Construction (Borgs) to undertake a water cycle impact assessment of a proposed particle board facility at its long established manufacturing plant at Lowes Mount Road at Oberon in NSW.

The existing manufacturing plant manufactures Medium Density Fibreboard a, reconstituted timber board and ancillary (mainly wood and resin processing, painting and treated paper laminating) operation at its Oberon site. Borgs wish to further develop the site to enable production of particle board using a high tech, relatively clean and mostly covered and contained operation.

The proposed particle board facility will wrap around the undeveloped but disturbed south and western part of the existing facility at Lowes Mount Road, Oberon.

The proposed operation is to use closed silos for storage of chipped wood and would therefore generate less polluted runoff.

The proposed development involves an increase in impervious areas of approximately 10.5 hectares. Mostly this will be in the form of new roof and concrete hardstand areas associated with the new particle board facility and some covered conveyer belts and covered silos which are used to store wood chip. A log storage yard which will not be covered is also proposed and this is likely to be a source of additional surface water quality impacts. A detailed description of the proposed development is included in Section 3 of this report.

The existing operation is licenced and has an Environment Protection Licence (EPL) with tight limits on the discharge of stormwater from the site.

Kings Stockyard Creek receives runoff from the Borgs site and is a first order Strahler system creek without any other upstream reaches. It has a defined bed and bank and intermittent flow. The existing creek is denuded of riparian vegetation though it is well sealed and stable with a mildly incised bed typical of most rural creeks.

The proposed process is considered cleaner than the existing MDF process. Key sources of stormwater pollution will arise from:

- An increase in roof areas
- Storage of logs in a log yard
- Handling and transport of woodchip including woodchip created from recycled timber sources as well as new sources
- An increase in traffic volume

The key stormwater pollutants of concern will be:

- Tannins – tannic acid – these are thought to be strongly correlated with total suspended solids (TSS).
- TSS, total phosphorus (TP) and total nitrogen (TN).

A MUSIC water quality model for the site was constructed to assess the potential impacts of the proposed 10.5 hectare development and to help design appropriate mitigation measures.

Predicted maximum concentration values for TSS, TP and TN are shown below.

Parameter	Post-development with mitigation	EPL limit (mg/L)
Total Suspended Solids (mg/L)	44.1	50
Total Phosphorus (mg/L)	0.227	0.3
Total Nitrogen (mg/L)	9.515	10

The table shows that with mitigation in place the proposed development is predicted to meet the conditions of the EPL.

The proposed mitigation measures include:

- Construction of a new swale with a much longer flow path to convey CHH runoff around the site and ultimately into a new treatment pond described below.
- Creation of a new stormwater treatment pond with a storage volume with a minimum of 6 ML. No reliance on extended detention has been made though there may be a need to include detention to reduce peak flows. This would only improve water quality results further. An assumed weir width of 2m needs to be subject to appropriate design rigour during detailed design.
- The new pond is located downstream of the existing pond and accepts runoff from the whole Borgs site including overflows from the existing upper stormwater treatment pond.
- In accordance with the SEARs, a state of the art, stormwater harvesting and reuse scheme is proposed. Both the new pond and existing pond each have a daily demand for stormwater reuse of 200 m^3/day withdrawn from the pond. This water will be used in the production processes on-site and forms a low salt, preferable source of water. It also serves to reduce the volume of pollutants leaving the site and takes pressure of Council's town mains system.
- Stormwater from the existing upper pond will be pumped to the existing bank of sand filters and from there into the existing on site Microfiltration/Reverse Osmosis treatment process for use as steam and as an ultra-high quality alternative source of water.
- It is envisaged that stormwater from the lower pond would also be pumped back to the existing bank of sand filters and so on.
- Redirection of the southern catchment flows into the proposed treatment pond. Currently there is some treatment of the southern catchment flows in an existing dam which is to be removed. This also allows emergency spill retention from this whole southern catchment.
- The redirection of the southern catchment flows to the north to the new treatment pond making the existing small aerated dam redundant. Therefore it will be converted into a dry emergency spill dam. This dam would need to be manually

drained dry after wet weather events to ensure it has capacity to absorb a spill or fire-fighting water and a system of manual valves put in place to allow spills to be captured and temporarily stored in the dam. This approach would provide a superior level of spill protection, i.e. another critical control point in the risk management approach and prevent fire water or spills from migrating into the proposed stormwater treatment ponds. The small aerated dam which would be converted into a spill retention basin is located where it could capture a spill from the most hazardous aspects of this operation. This is in addition to existing bunds and existing compliant hazardous management practices.

- A second new accidental spill retention basin is also proposed to be located upstream of the proposed lower pond and provides yet another additional critical control point on the Borgs site and has been strategically located so that it can intercept an accidental spill from practically anywhere on the existing site. The new 6 ML stormwater pond will also provide yet another and final critical control point on the site, most often being drawn down due to the proposed stormwater use on the site and so will frequently have air space available with which to capture a spill that somehow exceeded the capacity of the upstream 4700m^2 emergency spill basin.

The site is located at an elevation of 1100m above sea level in the headwaters of the Macquarie catchment. The proposed development will not have any floodplain or flooding impacts either upstream or downstream. Local overland paths and site drainage will be designed to cater for 100 year peak flows during the detailed design process. The proposed development is located in a sparsely populated catchment, rural in nature, which has no buildings located close to the creek downstream of the development. The catchment also grows in size to become a very large catchment within a kilometre of the site. Any minor increase in peak flows associated with an increase in impervious area, estimated to be less than 500l/s, arising from the proposed development is unlikely to have any consequences. There are three buildings within several kilometres downstream of the development. These three buildings are unlikely to be located within the floodplain, i.e. are likely located above the probable maximum flood levels. None the less it is appreciated that the addition of 10.5 hectares of impervious area could result in an increase in peak flows leaving the site. During detailed design, a detailed site model will be prepared to assess the impacts on peak flows and if there is an increase then this will be mitigated through the use of on-site detention. The storage of stormwater for peak flow reduction purposes will in the air space above the proposed stormwater treatment pond and may, subject to modelling, require up to 0.5m of detention.

The proposal is likely to reduce any existing risk of groundwater contamination from an accidental spill due to the comprehensives spill management approach with numerous additional critical control points proposed. Wood chips used in the proposed particle board process will be stored in covered silos with no risk of leaching into groundwater. The proposal is therefore unlikely to have any chronic risk of groundwater pollution and it is not proposed to extract or alter any additional groundwater sources beyond the existing water access licence entitlements held by Borgs. Groundwater impacts are not considered further.

The proposed harvesting and reuse scheme will see the volume of runoff from the site, reduced from its unmitigated level of 406.5 ML/a down to 287.5 ML/a, this is despite an increase in impervious area associated with the proposed development resulting in an additional volume of runoff of about 39 ML/a compared to the current volumes of runoff.

This will see both the frequency and volume of runoff from the site reduced. Due to the highly impervious nature of this site with its approximately 12 hectares of roof area, the reuse of water will ensure that there are only positive geomorphic and creek health benefits arising from this project (Walsh et al, 2005 & Tippler et al 2012). This outcome, if approved, would see this development put in place best practice water quality and quantity management, resulting in conservation of town water and protection of the environment.

Runoff volumes for the site have been prepared for the site under three scenarios, rural, "future without harvesting" and "future with harvesting".

Rural runoff volume (ML/a)	Future Runoff Volume without harvesting (ML/a)	Future runoff volume with harvesting (ML/a)
140.35	406.5	287.5

It has been found that even after harvesting 120 ML/year of stormwater (proposed), the site still produces about double the volume of runoff it would if it was in a rural state. This is due to the extensive impervious areas on the site. Because this site generates so much more runoff than it would in its rural form the harvesting scheme will reduce environmental impacts and protect the receiving waters. Furthermore, creek health is still supported by the 'clean water' rural run off from the catchment west of Lowes Mount road which will continue to pass through to King's Stockyard Creek via the site's northern most swale.

In the absence of a clear policy on urban stormwater harvesting, dispensation from the need to acquire a water access licence to harvest this urban stormwater from the roofs and hardstands of the site is requested on this basis. Clearly it can be shown that the intent of the Water Management Act which is to protect the environment and to allocate water equitably would be achieved by allowing Borgs to harvest the excessive volumes of runoff it would otherwise dispose of down Kings Stockyard Creek.

It is recommended that the proposed pond be constructed prior to site stripping and used as a temporary sediment basin during construction and converted to a permanent water quality pond only once the site has been effectively sealed. During this high sediment loading phase of the project it is probable that a flocculent would need to be used before any water was allowed to discharge from the basins. This would also aid in the early reuse of water reducing the burden on the sand filters and filtration equipment.

Small scale sediment and erosion control measures would be needed to manage local erosion issues at the source and these can be designed and planned in more detail prior to construction. The site would need to comply with the Blue Book and its existing pollution control licence – both of which stipulate that TSS is to be less than 50 mg/L.

In conclusion the proposed stormwater harvesting and reuse scheme will see the impacts of the proposed development reduced below current levels through an improved treatment strategy that will manage water across the whole site not just the area subject to development. The proposal will see about 120ML/year of potable water harvested and treated on-site and therefore saved each year. The proposal, if approved, would improve water quality and geomorphology of Kings Stockyard Creek and is an exemplar of ecologically sustainable development in practice. The risk of an accidental spill leaving the site will also be dramatically reduced through the creation of three additional and significant critical points.

On this basis it is concluded the project can proceed as it would have a beneficial effect on the aquatic environment.

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1.0 INTRODUCTION

1.1. Background and Context

The Sustainability Workshop (TSW) was commissioned by Borg Construction (Borgs) to undertake a water cycle impact assessment of a proposed particle board facility at its long established manufacturing plant at Lowes Mount Road at Oberon in NSW.

The existing manufacturing plant makes Medium Density Fibreboard, reconstituted timber board and ancillary (mainly wood and resin processing, painting and treated paper laminating) operations at its Oberon site. Borgs wish to further develop the site to enable production of particle board using a world class, high tech, relatively clean and mostly covered and contained operation.

The proposed particle board facility will wrap around the undeveloped but disturbed south and western part of the existing facility at Lowes Mount Road, Oberon.

There is an existing environmental protection licence (EPL) which limits the discharge concentrations of stormwater leaving the site. Future runoff from the site would need to continue to comply with the conditions of the current EPL.

Oberon is situated at an elevation of 1100m above sea level where flash flooding, floodplain and riverine flooding is not an issue and the site is located within the headwaters of the Fish River in the Macquarie catchment. Kings Stockyard Creek is the initial receiving water for the site. Kings Stockyard Creek downstream of the existing development has in the past been subject to environmental remediation and creek rehabilitation and is in a stable and well vegetated condition following that rehabilitation process. Moreover surface waters now have undetectable levels of Dieldrin and it is concluded that previous work to seal contaminated areas and elsewhere to remove contaminated material has been successful.

The existing operation involves the transport, debarking, chipping and storage of timber for processing into MDF. The proposed operation is to use closed silos for storage of chipped wood and would therefore generate less polluted runoff.

The proposed development involves an increase in impervious areas of approximately 10.5 hectares. Mostly this will be in the form of new roof and concrete areas associated with the new particle board facility and some covered conveyer belts and covered silos which are used to store wood chip. A log storage yard which will not be covered is also proposed and this is likely to be a source of additional surface water quality impacts. A detailed description of the proposed development is included in Section 3.0 of this report.

1.2. Scope of Works

Sustainability Workshop has been commissioned to assess the water quality impacts of the proposed development. This document assesses the following water cycle impacts:

- Long term surface water quality impacts associated with the development
- Accidental spill control (acute impacts)

- Recommended mitigation measures to maintain compliance with the existing environmental pollution licence
- Assessing the impacts of the proposed development on the stability of Kings Stockyard Creek, i.e. assessing potential geomorphic impacts
- Flood risk – flood risk is qualitatively discussed in this report. During detailed design an open channel and piped drainage network would be designed to manage local drainage flows – this is typical of most development work and is not described in detail in this report. This report is instead focused at a strategic level whereby the general drainage system and flow directions and flow paths have been documented and modified where required to mitigate the impacts of the proposed development.
- Soils and water management during construction – largely this is a detailed design issue but is commented on in this report.

1.3. Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARS) detail what is required to be included in the Environmental Impact Assessment (EIS).

In the Table 1 below, the relevant requirements (pertaining to water issues) are summarised and adjacent is the location in this report where each requirement has been addressed.

Table 1: SEARS pertaining to water issues

SEARs	Relevant report section
Water usage, including location of intakes and discharges, volumes, water quality and frequency of discharge	Section 5 and 6.
Options considered to minimise discharge, and environmental impact due to discharge	Section 5 and 6
Relevant water balance including requirements, sources, disposal, treatment and re-use options	Section 5 and 6
Existing surface and groundwater quality considered and analysed where necessary	Section 2.4 deals with existing water quality, while Section 4.4.3 discusses groundwater implications.
Impact of discharges on receiving environment	Section 5.2.1 discusses discharge water quality results and the impact on the receiving creek, while 5.2.2 deals with the impact of increased quantity of discharge.

Management of stormwater during and after construction	Section 2.2 outlines current stormwater management facilities, and Section 6 outlines the proposed measures to manage stormwater during and after construction.
Monitoring and assessment of predicted impacts	Section 6.

2.0 EXISTING ENVIRONMENT

2.1. Description of Existing Environment

The existing manufacturing plant is shown in Figure 1 below:

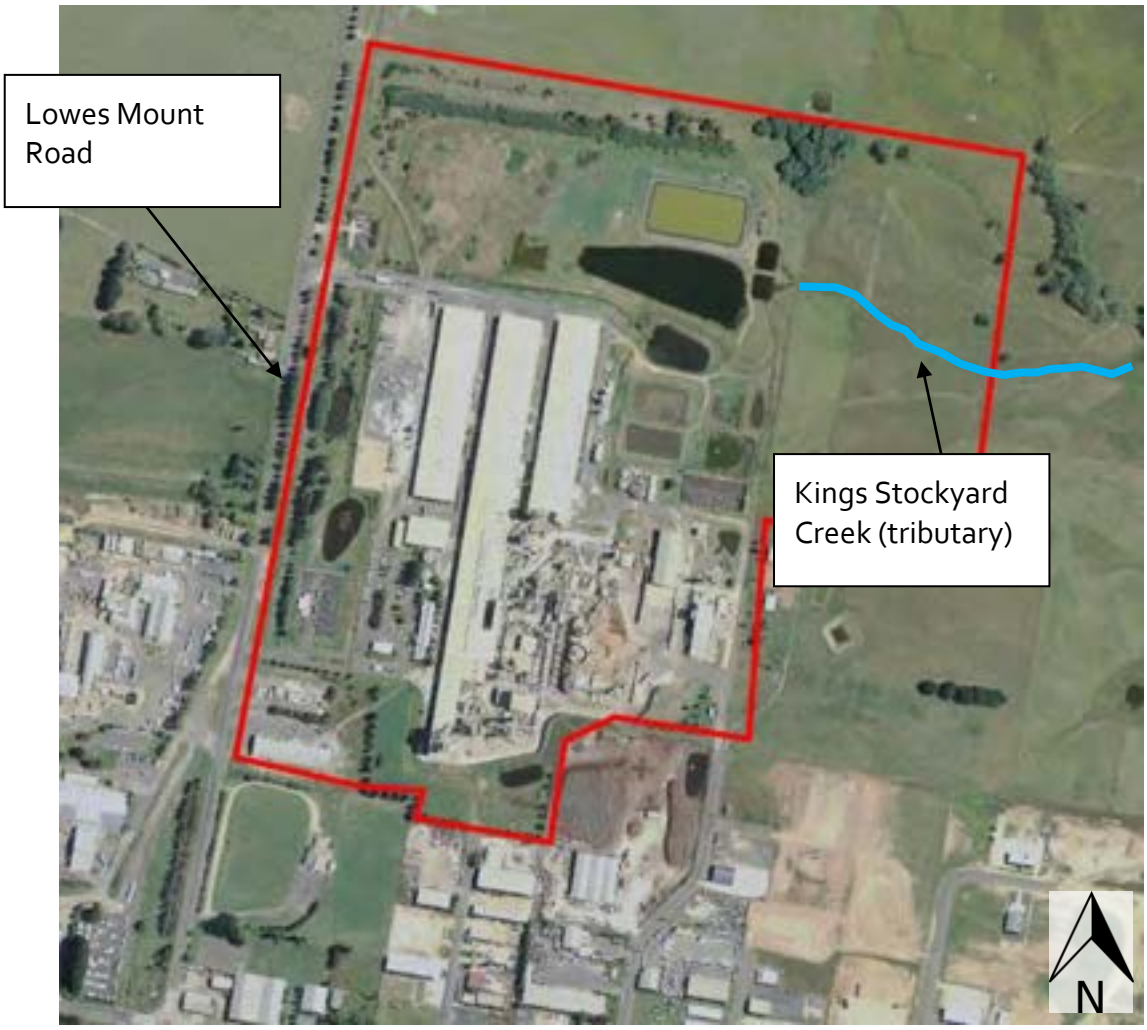


Figure 1: Existing Borgs operation at Oberon (courtesy Six Maps)

The existing plant includes substantial roof and hard stand areas and a complex water cycle management system involving numerous storage ponds with a multitude of functions.

There is a system of open vegetated swales and pipes/culverts which conveys water around the site. Existing stormwater management is described in more detail in Section 2.2.

Figure 1 shows a number of existing ponds on the site which are used for effluent treatment, stormwater treatment, fire water storage and as treated effluent storage for later reuse. Borgs has a trade waste agreement with Oberon Council and site effluent (that is not recycled internally) is discharged to the Council sewer with no on-site disposal. There is an existing microfiltration and reverse osmosis treatment plant on-site which recycles most of the process water back into the system as feedwater and the brine is directed to the Council wastewater treatment system for further treatment. On occasion the brine is too high in colour for discharge to the Council wastewater system and needs to be diluted with town water.

Note that another facility owned by Carter Holt Harvey (CHH) is located to the west of the Borgs site on the western side of Lowes Mount Road and is independent of the Borgs operation and not the subject of this assessment. However this facility does discharge its polluted stormwater into the same stormwater system which is measured for EPL purposes. There is an agreement between CHH and Borgs that CHH's stormwater discharge must comply with stipulated concentrations limits. Kings Stockyard Creek can be seen in the right of the image and is a typical rural creek, largely cleared of riparian vegetation.

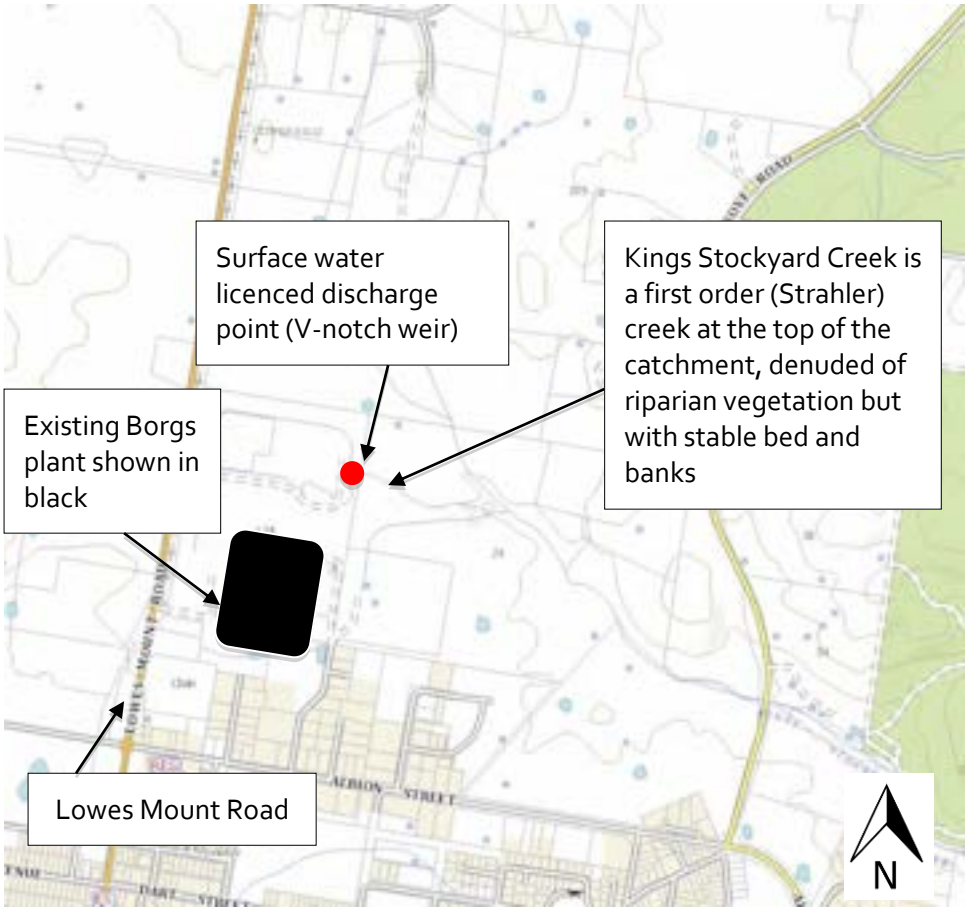


Figure 2: Kings Stockyard Creek at Oberon showing approved EPL monitoring point in red

Figure 2 shows the location of the Borgs plant in black and the licenced discharge point in red.

Kings Stockyard Creek is a first order Strahler system creek without any other upstream reaches. It has a defined bed and bank and intermittent flow. The existing creek is denuded of riparian vegetation though it is well sealed and stable with a mildly incised bed typical of most rural creeks. Leaky weirs have been placed across the creek downstream of the existing buildings and V notch weir where the EPL is measured.

2.2. Existing Water Management Approach

Referring to Figure 3 below, surface water is managed as follows:

- Runoff from the CHH facility across Lowes Mount Road is directed onto the site in a "dirty" water swale.
- Clean water from rural undeveloped parts west of Lowes Mount Road is also directed onto the site in a "clean" water swale which runs alongside the dirty water swale. This is shown below.

Plate 1: Clean water swale (left hand side) and dirty water swale from the CHH and Borgs site on the right hand side. Viewed looking north with Lowes Mount Road on the left hand side and the Borg factory on the right hand side.

- Borgs roof runoff and runoff from the western side of the Borgs development is directed into the dirty water swale and then conveyed into an existing stormwater treatment pond shown below.

Plate 2: Existing Stormwater Treatment Pond

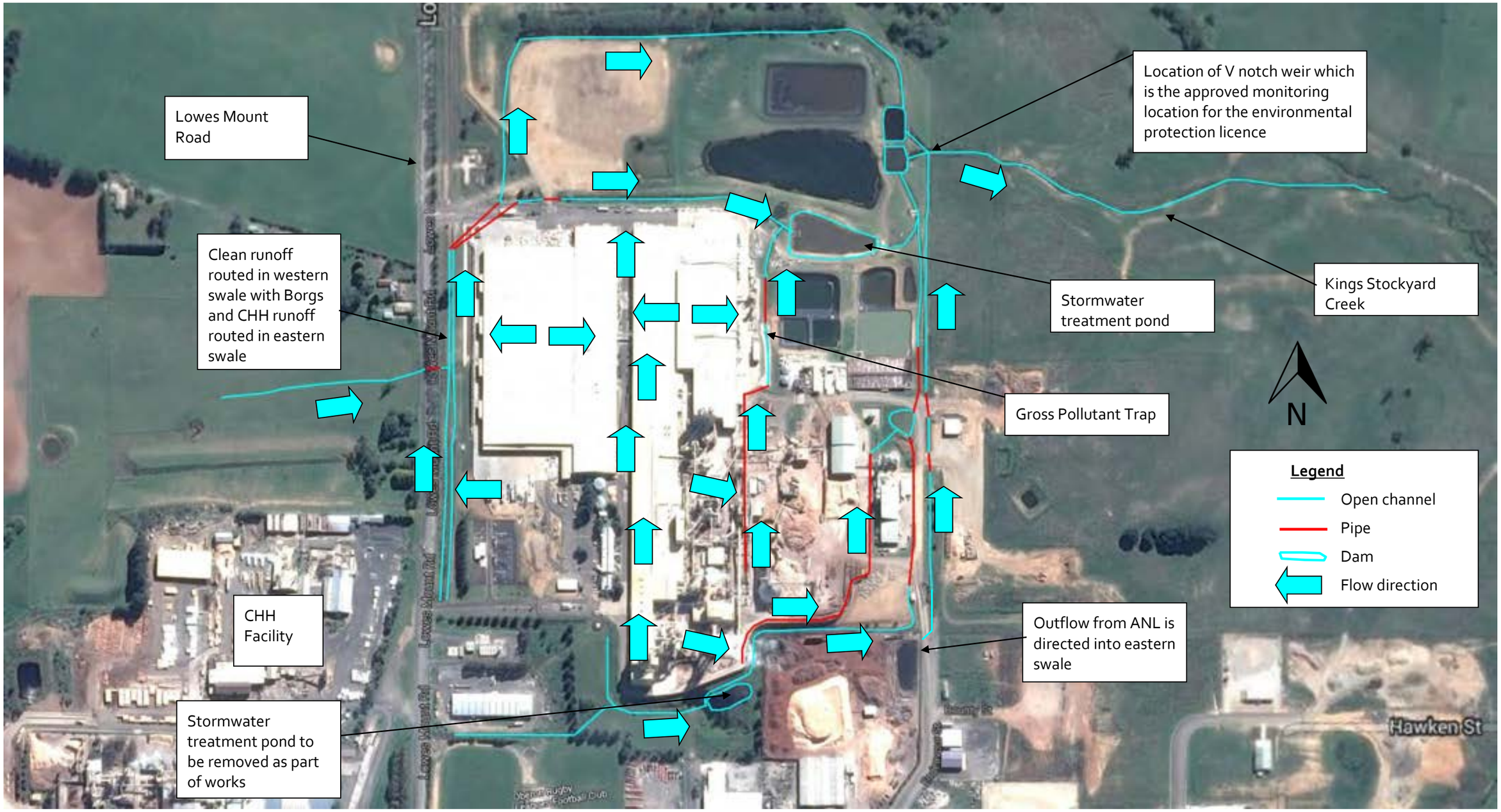


Figure 3: Current Stormwater Management at Borgs

Runoff from the eastern and open part of the site which contains fine fibrous wood material is directed first to a gross pollutant trap and then into the stormwater treatment pond shown above in Figure 3.

Plate 3: Gross Pollutant Trap with penstock control (not visible) upstream

2.3. Existing Pollution Licence

Borgs is currently permitted to discharge stormwater from the site, at the 100 % compliance level in accordance with following conditions:

Table 2: Permitted maximum discharge concentration limits

Pollutant	Permitted Maximum Discharge Concentration (mg/L)
Aldrin & Dieldrin	0.3
BOD	20
Colour (Hazen)	160
Methylene Blue Active substances	0.5
Total Nitrogen (TN)	10
Oil and Grease	10
pH	6.5-8.5
Total Phosphorus (TP)	0.3
Total Suspended Solids (TSS)	50

While all of these pollutants are sampled weekly during discharge or yearly in accordance with the licence conditions, the major pollutants of concern are total suspended solids (TSS), and nutrients (TN and TP). The Dieldrin and Aldrin have been chemicals of concern in the past associated with a previous spill on the CHH site. These are no longer a concern as affected parts of the site have been remediated. Kings Stockyard Creek was also rehabilitated with contaminated material removed and the creek stabilised. This work was undertaken when the site was under the ownership of CSR several years ago.

It is worth noting that the TSS concentrations stipulated in the licence are much more stringent than a typical rural land use which has an event mean concentration of 90 mg/L while agricultural land has a typical event mean concentration of 140 mg/L (Fletcher et al, 2004).

2.4. Existing Water Quality Performance

Tested water quality samples have been analysed over many years. Results for the major pollutants are summarised below from 2010 to 2014:

Table 3: Average concentrations of TSS, TP and TN from 2010 to 2014 from the Borgs site:

Pollutant	Average Concentration (mg/L)	Standard Deviation (mg/L)
TSS	25.08	27.32
TP	0.155	0.166
TN	5.127	8.577

Note these values include runoff from rural land characterised as clean runoff as well as runoff from the CHH site on the western side of Lowes Mount Road.

Average values for the same pollutants discharged from the CHH facility are tabulated below.

Table 4: CHH Average pollutant concentrations from 2012 to 2013.

Pollutant	Average Concentration (mg/L)
TSS	70.69
TP	0.215
TN	4.91

3.0 PROPOSED DEVELOPMENT

The proposed project is for the construction of new industrial buildings and the installation of plant at Oberon. See **Error! Reference source not found.** next page.

3.1. Key Project Components

The key Project components as numbered above are as follows (Position 1-9 represent existing plant):

Particle Board Facility

This is the principle focus of development. Particle board is constructed mainly from relatively coarse woodchip unlike the existing MDF which is constructed from fine wood particles resulting in the generation of a fibrous waste product.

Position 10

Log yard for storage of raw timber for particle board processing and recycling reclamation point

Position 11

Enclosed Chipper and Debarker Unit

Position 12

Conveyor to transfer woodchips to silo

Position 13

Silos for storage of woodchips

Position 14

Flaking building

Position 15

Flake silos to store the wet processed wood flakes

Position 16

Partial demolition of existing building and fines and sawdust storage

Position 17

Dryer area for the drying of processed particles

Position 18

Screening area to sort material in to appropriate grades.

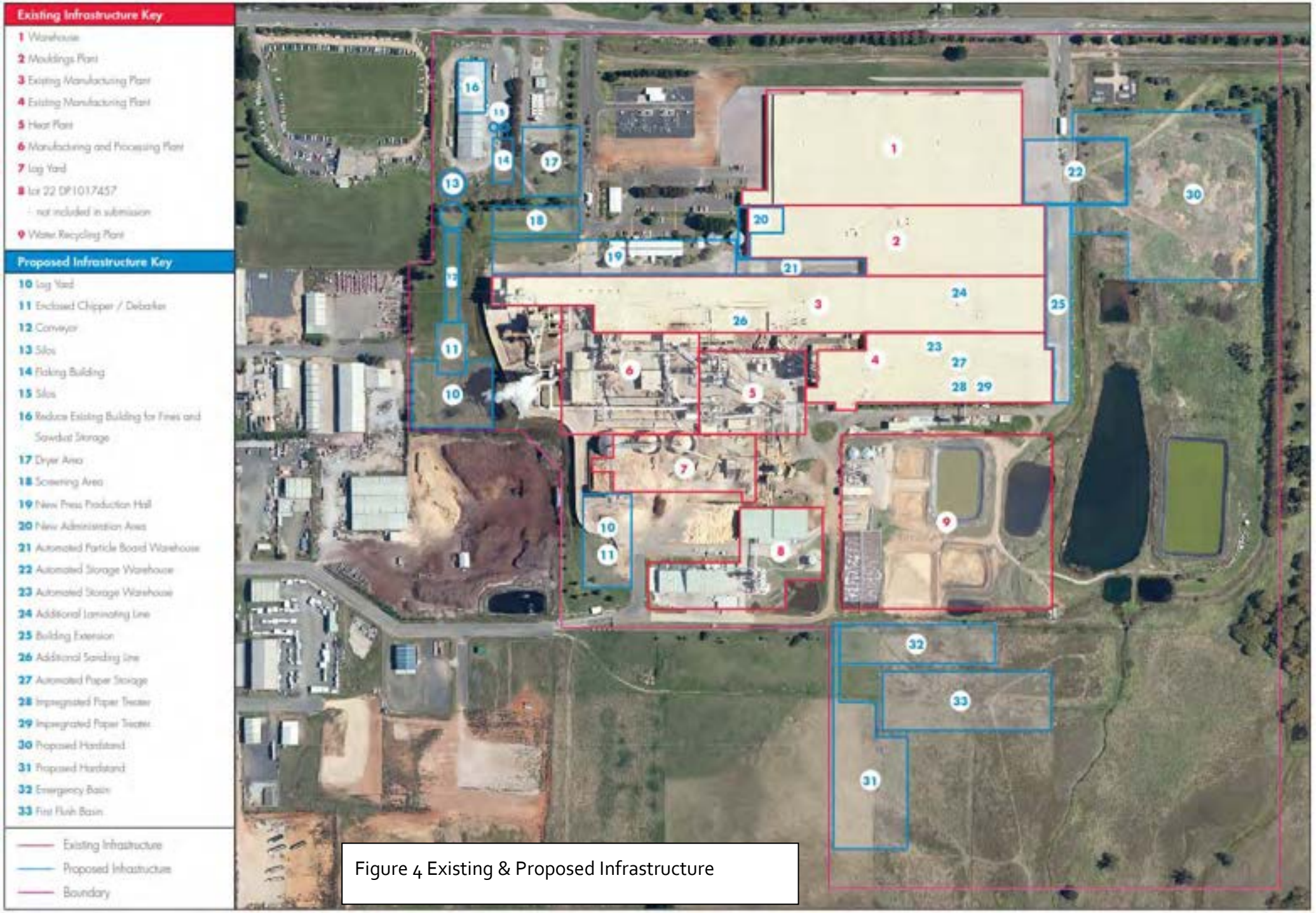


Figure 4 Existing & Proposed Infrastructure

Position 19

New production hall to allow for the manufacturing of particle boards once the wood has been processed (Positions 10-

18 above)

Other Site Works

Position 20

New administration area, located in existing building on site to replace administration area to be demolished to allow for the construction of 19.

Position 21

Automated warehousing system to store Medium Density Fibreboard, capable of storing approximately 6000m³.

Position 22

Automated board storage system, automated storage system to support site board production lines, capable of storing 3000m³.

Position 23

Automated laminated board warehouse system for laminating line, capable of storing 3000m3 of board.

Position 24

Additional laminating line- for production of laminated particleboard and MDF.

Position 25

Building extension- warehouse

Position 26

Additional sanding line for increased particle board capacity.

Position 27

Automated rolled paper storage system for paper produced on the paper treaters in preparation for use on the laminating lines. Capable of storing 1500 rolls.

Position 28

Impregnated paper treatment process.

Position 29

Impregnated paper treatment process.

Position 30

Proposed hardstand

Position 31

Proposed Hardstand

Position 32

Emergency spill catchment basin

Position 33

First Flush basin

3.2. Process Description

The Project is for the expansion of an existing timber manufacturing and processing facility. The major change to the existing approval for the site is to provide for a facility to manufacture particle board. Particle board manufacturing involves both the processing of virgin wood, residual wood waste from sawmills and the recycling and processing of appropriate used wood to create suitable sized particles. These are then processed to form particle board. In addition to this, expansion to existing Paper treatment and laminating operations are to be undertaken. These are largely to be located within existing structures on site.

3.2.1. Particle Board Facility

The process description for the particle board process is as follows, with the numbers relating to the key on **Error! Reference source not found.** and in Section **Error! Reference source not found.** above.

Plantation timber logs are brought to site from external locations and processed through a timber yard (10). This includes processing the timber through a debarker and chipper (11). The chipper is to reduce the timber to a consistent particle size. Once the chips have been produced the product is screened to ensure consistency in size and any foreign ferrous contaminants are removed using magnets.

These chips are then moved through (via belts and conveyors) (12) to a silo (13) prior to being further reduced in size using Knife Ring Flakers (14). These Knife Ring Flakers are designed to produce the optimum macro sized particles for the proposed processing methods. These particles are then stored in silos (15) prior to being fed into the drier. Saw dust is also introduced to the particles at this point in time.

The dry saw dust and wet wood particles are then dried in a rotating drum drier (17). Any small particles generated during the drying process which are smaller than required are removed using cyclone extractors. Any surplus air generated which is not required for the drying process is cleaned using a Wet Electrostatic Precipitator prior to being released to the atmosphere as clean air. Once dry and processed in this manner, the particles are removed and stored in a silo.

Once this process has been carried out, screening is undertaken (18). Any appropriate sized particles and dust are sent to storage, whilst any oversize particles are sent to a grinding mill to reduce them to an appropriate size.

These particles are then blended with glue and additives (usually a blend of urea formaldehyde with a paraffin wax emulsions and a catalyst to accelerate the reaction) in a specifically designed ribbon blender (19).

After blending, the now resinated particles are sent to the corresponding mat forming stations. The forming stations are designed to ensure that there is an even distribution of core and surface layer particles across both the width and through the thickness of the board. The mat is then weighed and adjusted electronically to ensure that the finished product has a consistent density.

The forming line then transports the layered mat in a continuous format to the press, while simultaneously measuring moisture and removing any remaining ferrous material. The forming line is able to reject and recycle the mat before pressing if the specified product parameters are not of a suitable standard. Any rejected material is reused on site. The press then applies the specified heat and pressure required to cure and consolidate the board in order to meet or exceed the relevant Australian Standards. This process is remotely controlled from the press control room.

Once processed, the pressed board is then cut square, cooled and stored in an automated storage system. Once cooled and cured, the boards are removed from storage and processed through the sander to ensure they meet final standards.

The boards are then stored on site before other downstream processing activities are undertaken and the boards are shipped out.

3.2.2. Other Site Processes

In addition to this, additional plant will be provided inside existing buildings on site. These will be extensions of existing operations on site and will be located internal to the existing approved structures.

These works are an expansion and continuation of the existing manufacturing facilities on site, and will follow the same process as the existing approved facilities, but with updated machinery that will create lower noise levels and operate more efficiently.

These works will run in parallel with the existing MDF processing lines, and MDF mouldings operation, laminating building (including press and paper treatment) ancillary cranes and storage systems which are to be retained. Full details of existing and proposed operations and processes on site are provided within the EIS.

3.3. Chemical Production and Storage

The resin transported to site will be stored in tanks near the particle board production process. The resin will be applied to the wood particles prior to drying. The resin is usually blended with additives to promote specific properties in the products quality. These include but are not limited to waxes, organic salts used as catalysts and dyes…

On the wider site, typical maintenance fluids such as hydraulic oil, diesel fuel, heating oil and the like will be stored. This will be carried out in accordance with the relevant guidelines and controls.

3.4. Utilities

The Project is located in close proximity to the existing Oberon township. As such, it is serviced by town water, sewerage, electricity and gas. As part of a wider approach taken by Borgs a number of options are being considered that will reduce the overall demand on these services, such as providing a co-generational power plant on site, reducing landfill waste as well optimizing the amount of natural gas the plant uses.

4.0 POTENTIAL IMPACTS

4.1. Water Quality

4.1.1. Long term water quality risks

By comparison with the existing MDF process, the proposed world class particle board facility is a cleaner process using covered silos, conveyors and fully enclosed buildings. The optimum particle size range for particle board production is between 2 mm and 5 mm which are fairly coarse particles easy to strain/screen and remove from solution.

The covered nature and larger particle size of this process means there will be lower risk of polluting stormwater. The proposed development will not see the generation of fine (particle sizes smaller than 1mm) fibrous wood waste that the existing MDF process generates.

The storage of logs in the log yard is likely to generate coarse timber particles and leach tannin from the logs. It should be noted that bark removed from logs is stored in a covered shed on both the existing and the proposed facilities. This will minimise the potential tannin leaching and gross pollutants.

Additional traffic loads will result in an increase in traffic related pollutants though these are not significant by comparison with any main road.

Additional roof and hardstand areas totalling 10.5 Ha associated with the proposed development will result in an increase in the export of TSS, TN and TP from the impervious roof areas though given the rural location, atmospheric deposition of dissolved nitrogen onto roof areas is not expected to be as high as atmospheric deposition in Sydney.

Electrostatic precipitator will scrub the air stream released from the particle board drying process and this will prevent airborne particle discharge which in turn will reduce stormwater pollution. There is an existing EPL which also limits discharge of pollutants to the air and indirectly this acts to limit water quality impacts on and away from the site.

In summary the proposed process is considered cleaner than the existing MDF process. Key sources of stormwater pollution will arise from:

- An increase in roof areas
- Storage of logs in a log yard
- Handling and transport of woodchip including woodchip created from recycled timber sources as well as new sources
- An increase in traffic volume

The key stormwater pollutants of concern will be:

- Tannins – tannic acid.
- TSS, TP and TN

The TSS generated from the wood handling parts of the process should be relatively easy to mitigate as expected particle sizes are in the gross size range, i.e. 2mm to 3mm or larger. Equally the forms of TP and TN associated with the wood handling will be the particulate forms and relatively easy to remove and unlikely to pose a significant water quality risk.

The TSS arising from roof runoff will be at a low loading rate given the relatively good air quality in Oberon compared to say the Cumberland Plain. The TP in the roof runoff is likely to be attached to the TSS and therefore removal of TSS will see good removal of TP. The TN in the roof runoff will be in the dissolved form (though at lower levels than typical urban environments) and more difficult to remove than the particulate form of nitrogen and sourced from the atmosphere. Again the good air quality in the region is likely to see lower levels of nitrogenous pollutants deposited on the building roofs.

The impact of the key pollutants on river health is as follows:

- TSS can smother benthic the benthos and result in siltation of creeks and an increase in turbidity of stormwater. By smothering benthos and benthic organisms TSS disrupts the natural exchange processes that occur in creeks. These processes see nutrients and sediment exchanged in different forms. Smothering of creeks with sediment reduces available habitat.
- TP and TN in the bioavailable forms (dissolved forms) contribute to the eutrophication of water bodies and waterways potentially leading to algal outbreaks and a change in the assemblage of the aquatic ecosystems from ones dominated by low nutrient levels to ones dominated by high nutrient levels.
- Tannic acids can discolour water and the impact is mainly aesthetic. There are many natural ecosystems (e.g. Melaleuca swamps) which have very high loads of tannic acids and which remain healthy and productive.

4.1.2. Short term Water Quality Risks

Short term water quality risks associated with the development would include:

- Soil and water management during construction.
- The risk of an accidental spill of a chemical during operation of the plant.

The management of soil and water during construction can have devastating impacts and is often overlooked. It is known that the impacts of poor soil and water management during construction can have the same effect as water quality discharged from an operation over its entire life. The transport of sediment from the site is the key risk during construction. It is likely that more than 1 hectare of land will be disturbed during construction and therefore the risks of sediment transport off the site are significant. The sediment could be deposited within the rehabilitated section of Kings Stockyard Creek downstream of the discharge point. This would impact on creek ecology at a time when it is probably reaching pre contamination levels of diversity. None the less adherence to the Blue Book would see soil and water impacts mitigated.

4.2. Geomorphology

The proposed development will not see any new structures within 40m of the top bank of a creek however there will be work associated with the construction of a modified drainage scheme for the site connecting into the existing ponds and Kings Stockyard Creek. Therefore direct geomorphic impacts will be negligible. No riparian vegetation or aquatic habitats will removed or affected by this proposal except that the existing southern water quality pond will be removed.

The addition of approximately 10.5 Hectares of impervious area would result in an increase in the volume of runoff leaving the site. This could potentially have some minor impact on the geomorphic condition of the creek resulting in erosion of either the bed and or banks to cater for the extra water being conveyed into the creek.

This could be mitigated through harvesting of the runoff which would reduce both the frequency of runoff and the volume of runoff and theoretically lead to an improvement in creek health (Walsh et al, 2004).

The creek has also been rehabilitated in the past by CSR and has already adjusted to the presence of large impervious areas draining into it and is now stable. Some further minor adjustment is possible though it is expected to be minor and potentially negligible if mitigated.

4.3. Flooding

The catchment downstream of the proposed development is a sparsely populated rural catchment where the creek flows through an incised valley eventually to form the Fish River a few kilometres downstream of the site. This is quite a common geomorphic feature of the weathered granite landform of this region which can sustain steep hills which are not prone to erosion.

Analysis of aerial photography down to the confluence of Fish River with Slippery Creek (15 km downstream of the site) reveals that there are three buildings which could potentially be affected by flooding. The first and second are located 75m from the creek and in fact not likely to be flood prone let alone affected by the 1 in 100 year flood event. Both of these buildings are elevated about 20m above the creek. The third building is located 40m from the creek and is elevated between 10m and 20m above the Fish River but where the sides of the river are relatively flat and the flood conveyance area is about 80m wide. Therefore the risk of any potential increase in peak flows impacting on downstream property is considered negligible.

None the less the 10.5 Ha increase in impervious area is not insignificant and could potentially increase peak flows without mitigation. Therefore, during detailed design, a peak flow model of the site shall be developed to determine if there is an increase in peak flows. If there is an increase in peak flows, these would need to be detained to ensure that peak post development flows do not exceed predevelopment peak flows for the full range of storm events from the 1 year ARI up to the 100 year ARI.

While this work has not been undertaken at this development application stage, the key land use decisions needed to assess the potential peak flow impacts of the proposed development have been made as follows. If on-site detention is required it will be provided as air space above a proposed stormwater treatment pond. Typical on site detention storage volumes vary from 300 to 450 m^3/Ha of development. Therefore the proposed development could need to store up to 4,500m^3 of stormwater, subject modelling. This volume of storage would, if required, be provided above the proposed stormwater treatment pond as approximately 0.5m of air space depending on final design levels and configurations.

Refer to **Error! Reference source not found.** and Figure 10 for more details. Both the proposed treatment pond and proposed emergency spill basin are described in more detail later in this report.

The proposal, located at an elevation of 1,100m above sea level is not located within a floodplain and therefore there would be no potential impacts from floodplain filling and this will not be considered further.

Local overland flow paths may be affected by the proposal. During the design stage, checks should be made to ensure that local overland flow paths will not be restricted by the proposal. This is considered beyond the scope of works of this report.

4.4. Water Resources

4.4.1. Water Supply

The new particle board process will see an increase in demand for water which could be sourced from either:

- Recycled water made available from the site's own treatment plant – this plant can treat up to 1000 m^3/day
- Town water - Council has indicated it has available capacity
- Harvested stormwater runoff. The impervious areas on the site and upstream are extensive and lend themselves to a reliable stormwater harvesting scheme.

4.4.2. Wastewater

Wastewater generated form the new plant will be recycled back into the process and permeate and excess wastewater will be directed to the town wastewater treatment plant as currently happens. As noted above the existing treatment plant has the capacity to treat up to 1000 m^3/day and currently treats about 350m^3/day. The extra 400m^3/day capacity could be used to treat and desalinate stormwater which would produce much lower volumes of brine due to the low salinity of the stormwater compared to the wastewater.

4.4.3. Groundwater

There are no expected impacts to ground water caused by the proposed development. While surface runoff across pervious surfaces can infiltrate into the groundwater storages, extensive mitigation measures have been proposed to treat the surface water such that it will pose no risk to either natural receiving stream or water bodies, or groundwater. Critical Control Points (CCPs) have been incorporated into the plan, in order to protect stormwater treatment and storage facilities from contamination threats such as spills. Covered silos will store woodchips and prevent potential leaching of tannins from the woodchip into the groundwater.

Furthermore, Borgs have a licence to extract water from an onsite spring fed dam and will not be extracting in excess of this licence, causing no additional demand on groundwater resources.

Any potential impacts to groundwater resources, groundwater (and the spring fed dam) are not considered further.

5.0 PREDICTED IMPACTS

5.1. Methodology

A MUSIC (Model for Urban Stormwater Improvement Conceptualisation) water quality model for the site was constructed. MUSIC was developed by the Cooperative Research Centre for Catchment Hydrology in 2001 and the program is now widely used across Australia to predict water quality impacts arising from a proposed development, and to then design appropriate stormwater mitigation strategies. The following sections of this report describe the MUSIC models that were created to simulate both the existing site (pre-development model), the proposed development for the site (post development model), and the site as it would be if in an un-developed state (rural model). All models of the site were developed based on previous catchment mapping by GHD, analysis of aerial mapping available through the NSW Government Six Maps site and available site contour data.

The method used to create the climate file which contains historical rainfall data and which was used to run the MUSIC models is described.

5.1.1. Pre-development model

The predevelopment model includes:

- "Clean" and "dirty" nodes: The Borgs site was broken up into areas termed clean and dirty. The clean part of the site is the large roofed areas where all activity is undercover and where effectively the site functions as would a distribution centre. Event mean concentration (EMC) values for the roof and road areas were taken from Fletcher et al, 2004. The dirty part of the site is that part of the site where wood fibre is handled or processed outdoors and some fibre can and does make its way into the stormwater system where either the existing GPTs or ponds remove the pollutants.
- Pervious and impervious areas: Each node has a mix of pervious surfaces (allowing rain to seep into the ground) and impervious surfaces (allowing no seepage).
- Flow paths: generally modelled as "links" (which merely convey the water in the model, providing no treatment), however the flow path along the southern boundary of the site was modelled as a swale, providing a certain level of treatment as well as conveyance.
- Treatment ponds and Gross Pollutant Traps (GPTs).
- Other catchments: The predevelopment model includes the CHH land to the west of the site and the Rugby oval to the south, as the runoff from these sites drain onto the Borgs land. There is also some agricultural land located to the west of Lowes Mount Road, controlled by Highland Pine Products (HPP) that drains through the "clean" swale to the northern V notch weir and

which is subject to its own (EPL). After the northern, HPP V-Notch this flow mixes with the runoff from the Borgs site. In the post development state this relatively clean swale will converge with the creek downstream of the proposed Borgs V-notch weir location and so it has been excluded from the water quality assessment in both the pre and post development models.

The configuration of the pre-development model can be seen below in Figure 5.

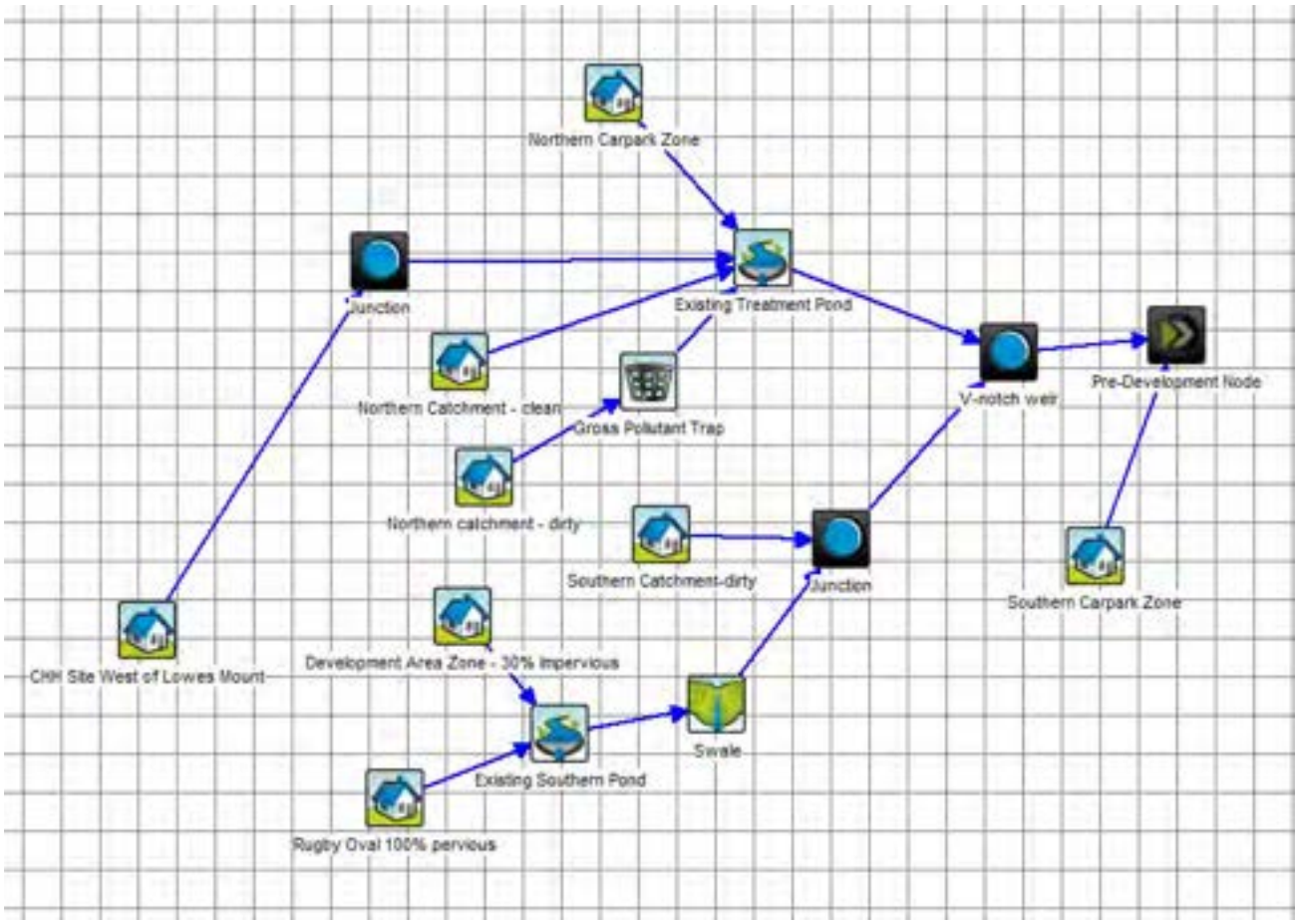


Figure 5: Predevelopment MUSIC model configuration

In order to calibrate the model the following actions were undertaken:

- The mean and standard deviation and maximum value of TSS, TN and TP for the CHH site was calculated from the existing water quality record – see Table 5 below, or Section 2.4for more details.
- The EMC data for the node representing the CHH land was adjusted so that the model indicated it was exporting pollutants with a concentration close to the mean and maximum pollutant values from the water quality record.
- "Clean" parts of the Borgs site had EMC values (for roof areas and road pavements) based on Fletcher et al (2004) which are widely recognised as being the most plausible estimates. The EMC values for dirty parts of the sites were manually adjusted until the receiving node (called the "Pre-Development" node in Figure 5) had mean and maximum concentration

values that were close to the field monitoring water quality data from 2010 to 2014.

- It is worth noting that some outlying maximum values could not be simulated by MUSIC, despite using the stochastic generator in the model. Outlier values are therefore considered unusual events outside of the log normal distribution range of pollutant events. In reality this is true and these unusual events correspond with unusual activity for example, construction on site where there has been major disturbance.
- The treatment pond was modelled in accordance with its characteristics – it has a surface area of 2,460 m^2 and a permanent pool volume of 6,000m^3.
- The southern swale was modelled based on its measured length and slope.
- The southern pond (which will be removed as a result of the proposed development) was modelled with a surface area of 1,000m^2 and a permanent pool volume of 1,000m^3.

The predevelopment model was trained to reproduce the actual measured data shown earlier in Section 2.4, and the model performance compared to these measured values can be seen below in Table 5. As mentioned, a conservative approach was adopted in the model in order to overestimate the predevelopment loads, to ensure there is some margin of error with the use of the model.

Table 5: Mean discharge concentrations

Location of water quality data	Measured Leaving the CHH site (mg/L)	Measured Leaving the Borgs site (mg/L)	MUSIC predictions Leaving the Borgs Site (mg/L) for flows > 0.001 m^3/s
TSS	70.69	25.08	24.05
TP	0.215	0.12	0.17
TN	4.91	5.127	3.96

Because the stochastic function in MUSIC was used to randomly generate a pollutant concentration value from a log normal distribution of pollutants (based around a specified mean and standard deviation), each model run has slightly different results.

Because the EPL specifies maximum upper limits at the 100th percentile, the maximum concentration values predicted by MUSIC become the key parameter for assessment.

There is therefore some degree of uncertainty with respect to the maximum values generated in MUSIC, i.e. the maximum values can vary considerably from run to run. We have reduced this uncertainty in two ways:

1) By having a climate file that covers 20 years of 6 minute data – this is discussed further later, i.e. a climate file that spans a very long time making it highly probable that a very high value would be generated within this very long time period, and
2) By running the model 10 times to obtain an envelope of solutions and by then adopting the largest maximum value from the set of 10 values. This provides us with sufficient certainly to predict the 1 in 20 year worst single pollutant event with confidence.

It is noted that should it occur, an occasional exceedance of the EPL limit of 50 mg/L for TSS is unlikely to cause environmental harm given the rural nature of Kings Stockyard Creek which is likely to receive significantly higher TSS loads from a variety of both upstream and downstream agricultural sources unrelated to Borgs or CHH.

To explain further, the cleanest (least polluting) land use (including pristine forested land uses) from a TSS perspective is a roof. Even the cleanest roofs discharge maximum TSS concentrations well in excess of 100 mg/L on occasion (Duncan, 1999 and Fletcher et al, 2004). Further, the average TSS concentration from a roof plus one standard deviation was found to be 90 mg/L (Duncan, 1999). This would equate to something like the 90th percentile event. In conclusion an occasional exceedence by Borgs of its stringent TSS target would still see levels of pollution emitted from its site, lower than an equivalent clean roof.

5.1.2. Post-development model

The predevelopment model was modified as follows to produce the post development model:

- Increase of impervious area: The node that represents that part of the site to be developed, was modified to reflect the addition of another 10.5 hectares of impervious area. This was achieved by increasing the imperviousness of the predevelopment catchments.
- Of the additional 10.5 hectares in impervious area this is split into roof and hardstand including 2 proposed car parks, in in the north and one in the south-east. Refer to Figure 6 and Figure 10 for more details.
- The southern pond was removed from the model as this pond is to be removed.
- All EMC values derived from the predevelopment model were kept constant. This means we assume the new development area will be as polluting as the existing development area. This is conservative as in reality, the increased use of covered processes and larger particle diameters associated with the core process will make it less polluting.
- Addition of new treatment pond: The new pond is to be located downstream of the existing pond and has similar dimensions to the existing pond – it is to be a minimum of 6 ML in volume with a surface area of about 2,500m^2.
- Addition of swales: two additional swales were added to convey runoff to the new proposed stormwater treatment pond, one to convey flows from the

Borgs southern site and the other along the northern boundary to convey the CHH site runoff.

- Stormwater harvesting from each pond was included in the model with demands of 200 m^3/day drawn from each pond when water was available.
- The HPP owned, undeveloped agricultural land to the west of Lowes Mount Road was included but was routed around the Borgs site to converge with the runoff from the Borgs site downstream of the proposed V-notch weir location. This point relates to water quantity calculations and not water quality calculations.

The proposed mitigation measures, namely additional pond and swale are shown in more detail in Figure 6 and Figure 10. It should be noted that the water *quality* analysis is conducted at the V-notch weir while the water *quantity* analysis is conducted just downstream, at the node called "Post Development Node". This is because the runoff from that undeveloped rural land is routed around the Borgs onsite stormwater treatment system, therefore not affecting the quality of the Borgs runoff, however it does affect the volume of runoff entering Kings Stockyard Creek and is therefore considered in the water quantity analysis included in this report.

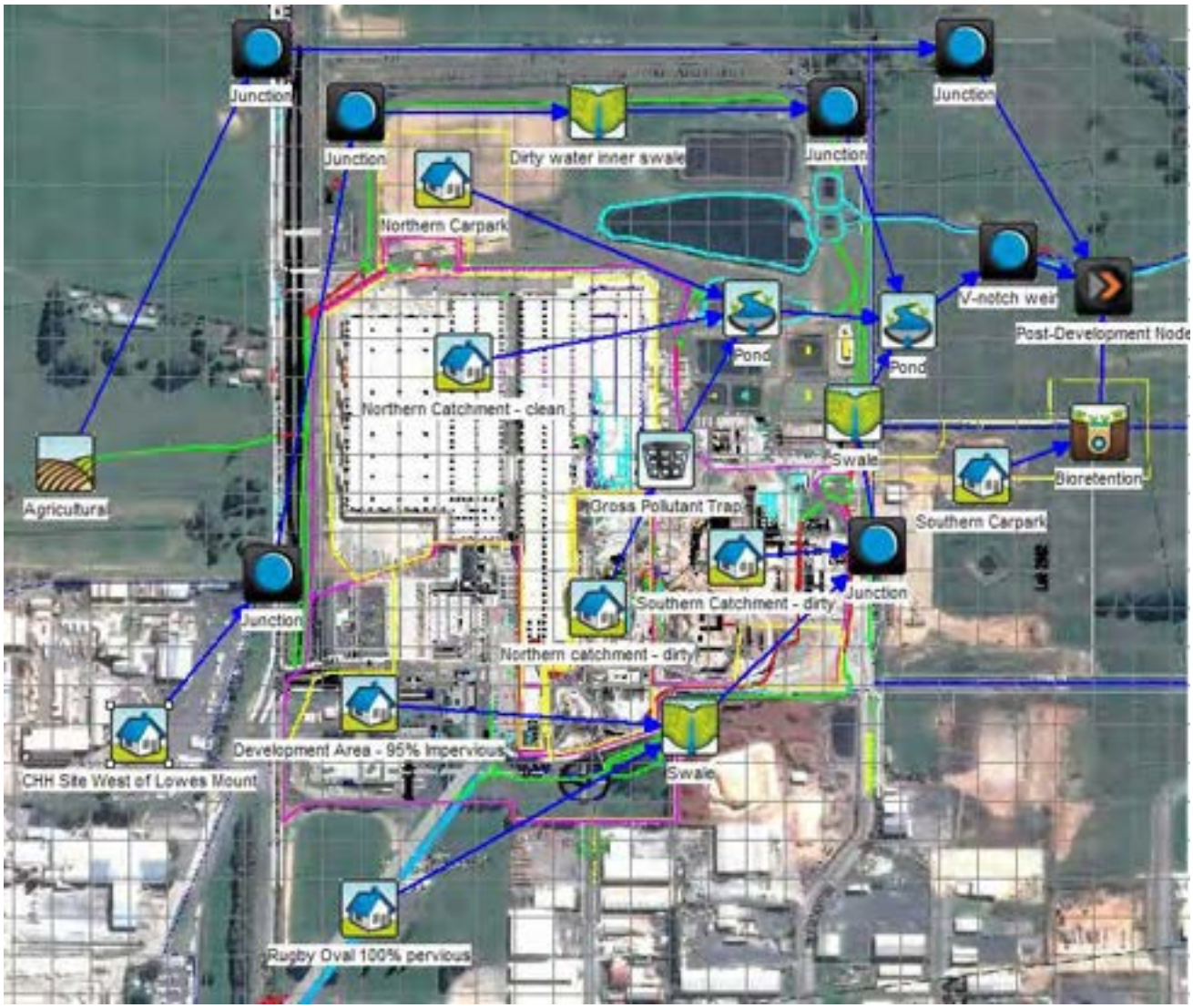


Figure 6: Post Development MUSIC model configuration

5.1.3. Rural state model

A model of the Borgs site, as it would be in an undeveloped rural state (i.e. 100% pervious) was developed. A comparison between the runoff quantity results from this model and the post development model provide an estimate of the increase in the quantity and frequency of runoff discharging into the Kings Stockyard creek, caused by the creation of impervious areas on the Borgs site. The results of the rural model are also used to analyse the potential impact of the increased runoff, both with and without harvesting the stormwater.

The configuration of the rural state model can be seen below in Figure 7, and consists of:

- One node of 54.5Ha representing the entire Borgs site plus the CHH site (with an area equal to the sum of all of the Borgs an CHH site nodes in the post development model, but set to be 100% pervious).
- The agricultural and rugby oval nodes (40 hectares) remained unchanged from the post developed case.
- Treatment and detention nodes (swales and ponds) were not included.

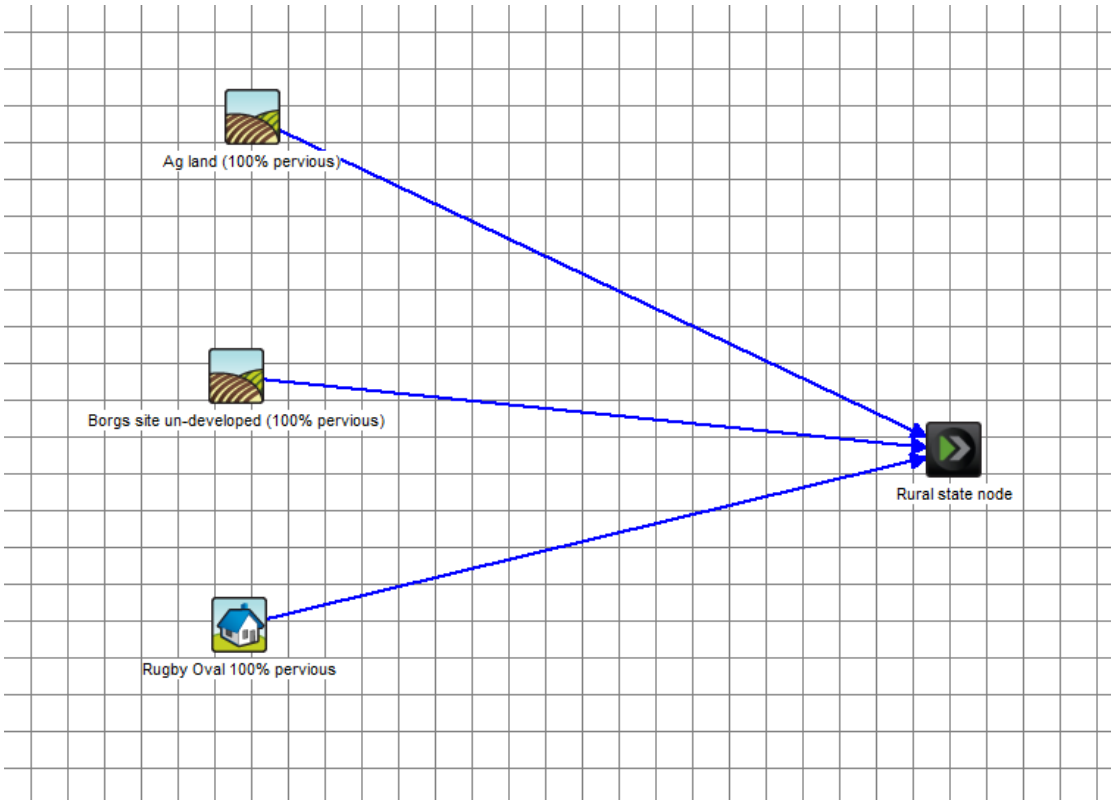


Figure 7: Rural state MUSIC model configuration

5.1.4. Rainfall data selection

There are several pluviograph stations in close proximity to the Borgs site, which are all in the same mean annual rainfall zone, as can be seen in Figure 8, and the long term daily records at each site were analysed extensively in order to select a data set of sufficient length and quality to run in the MUSIC models. In order to accurately model the impacts of the proposed development, 6 minute (or "real time") rainfall data is required from a pluviograph station. It is preferable to use a long period of data, which reflects the long-term average rainfall, so that the results are more reliable and not affected by short-term cyclical weather variability. Furthermore, the data chosen should have no large continuous gaps where the station has failed and stopped recording.

Unfortunately, none of the weather stations around Oberon provide long-term high quality data, making it difficult to select a period for use. To overcome this, two smaller high quality periods (of approximately 10 years each) were selected and run separately, but with the results analysed together, effectively creating a 20-year climate file used for simulation of the urban water cycle on the Borgs site.

The two periods selected were from 13/4/1966 to 15/6/1975 (with a mean annual rainfall of 1056mm), i.e. a wet period, and from 11/11/1977 until 20/05/1987 (with a mean annual rainfall of 592mm) i.e. a dry period, obtained from the Oberon Dam weather station (station number 063108). Since one period has a higher mean annual rainfall than the long term average, and the other has a lower one, the mean annual rainfall averaged across the two periods is 824mm/year while the long term average for the Dam gauge is 882.5mm/year.

Each model variation (outlined in sections 5.1.1 to 5.1.3) was then run for both the "66-75" and "77-87" sets of rainfall data, and the results collated and analysed.

Evapotranspiration data for the site was modelled as 1200mm per annum based also on BOM data monthly distribution.

Figure 8: Location of pluviograph stations around the Borgs site. The uniform background colour indicates all stations are within the same zone of average annual rainfall around 800mm/year.

5.2. Results

5.2.1. Surface water quality impacts

5.2.1.1. Load based results

The predevelopment and post development MUSIC models were run and the results obtained.

Pre and post development average annual loads and treatment performance is shown

Residual Pollutant Loads			
	Pre-development	Post-development	% Reduction from pre to post development
Total Suspended Solids (kg/yr)	8,325	4,980	40.2
Total Phosphorus (kg/yr)	42.2	30.45	27.8
Total Nitrogen (kg/yr)	1230	1130	8.1

below in **Error! Reference source not found.**. **Error! Reference source not found.** has sources columns, residual load columns and percentage reductions columns. The sources columns describe the unmitigated pollutant loads running off the land surface. The residual load is the pollutant load after mitigation. The percentage reduction columns report the percentage reduction from source to residual load, i.e. the effectiveness of the treatment systems. It needs to be appreciated that this is the predicted performance for the whole site in its entirety and not just for the additional impervious area proposed as part of this development, i.e. a wholistic approach to water management on the entire site is being undertaken as part of this assessment.

Table 6: Annual Pollutant Export Loads and Treatment Train Performance

Table 6 shows that despite the addition of another 10.5 hectares of impervious area, with the additional reuse of stormwater and the additional treatment measures, the proposed development is predicted to have a beneficial effect on its catchment. It is predicted there will be a substantial improvement in TSS and TP with a minor improvement in TN.

Best practice stormwater treatment is often described as follows:

Removal of:

- 85% of the average annual load of TSS
- 65% of the average annual load of TP
- 45% of the average annual load of TN

Table 7 Treatment Train Effectiveness of the Borgs Treatment System

Treatment-train Effectiveness (% Reduction of Pollutants)		
	Pre-development (with existing treatment system)	Post-development (with proposed treatment system and increased impervious areas)
Total Suspended Solids (kg/yr)	48.6	72.6
Total Phosphorus (kg/yr)	41.5	65.2
Total Nitrogen (kg/yr)	29.3	50.4

Table 8 shows how much the proposed treatment system improves as a result of this proposal. For example TSS retention increases from about 50% to 70% but remains below the best practice target of 85%. TP increases to 65% (best practice target) and TN exceeds the best practice target.

The performance of TSS removal is marginally less than best practice, however this is due to the already low concentration of TSS discharge from the site (25 mg/L measured event mean discharge concentration (EMC)), compared to the EMC of most urban land uses (150mg/L) upon which the Best Practice Standards are based. Reducing the already low concentration of TSS discharge by 85% becomes a very challenging task due to significant diminishing returns associated with incremental improvements to what is ostensibly very good existing water quality. For example an 85% reduction of 150 mg/L would see TSS reduced down to 22.5 mg/L, and could easily be achieved by measures such as those proposed at the Borgs site, where as an 85% reduction of 25 mg/L would require TSS to be reduced down to 3.75 mg/L which is a much more difficult, if not impossible level to achieve.

The resulting TSS discharge loads from the post development case are a 40% reduction when compared to the current TSS discharge load, meaning that the proposed development water treatment measures will achieve a substantial beneficial effect on water quality compared to the current state, despite not quite meeting Best Practice standards for TSS. A comparison between pre development levels and post development levels is common in drinking water catchments, and is one of the most stringent tests to apply to a new development. Viewed in this context, the proposal and mitigation measures would satisfy all current applicable legislation, namely the Water Management Act and Protection of the Environment Operations Act.

5.2.1.2. Concentration based results

The Environmental Protection Licence (EPL) specifies pollutant discharge limits in terms of concentrations rather than annual loads. Although there is less confidence in MUSIC's ability to predict concentration based results (versus load based results), it remains the best tool available for doing so, and thus enabling a comparison with the EPL limits.

One difficulty in modelling the predicted maximum discharge concentrations values in MUSIC, is that the pollutant concentration values applied at the source nodes in the model, are derived stochastically from a log normal distribution, meaning that a pollutant concentration value for each pollutant is randomly synthesized by MUSIC based around a log normal distribution defined by its event mean concentration and standard deviation at each time step and is therefore different for each simulation (or run) of the model. While the mean predicted pollutant concentrations don't vary much between each model run, the maximum values do vary significantly.

To overcome this uncertainty with the model, the model was run 10 times to ensure a broad envelope of results was predicted. This is equivalent to running 100 years of six minute climate data. From the 10 runs the maximum value was selected and reported below in Table 8.

Table 8: Predicted maximum discharge concentrations from the MUSIC model (from 10 runs)

Parameter	Predicted Maximum concentrations (mg/L)	EPL limit (mg/L)
Total Suspended Solids	44.1	50
Total Phosphorus	0.227	0.3
Total Nitrogen	9.515	10

The proposed treatment train and harvesting scheme are predicted to see compliance with the existing EPL limits.

5.2.2. Surface water quantity impacts

In order to examine the predicted impacts of the proposed development on Kings Stockyard Creek in terms of water quantity, the post development case is compared with the predevelopment and rural site case. The purpose of modelling the rural site, (that being the same area as the Borgs site and contributing catchments, but as it would be in its undeveloped condition i.e. 100% pervious), is to determine how much extra runoff is generated by the entire Borgs manufacturing site (including the proposed new development). We note the rural state is the same state of development adopted under all Water Sharing Plans formed under the Water Management Act (2000) regardless of the level of imperviousness of a site.

Table 9 below shows the results of the rural site simulation compared with the post development simulation, both with and without the reuse of the stormwater that is generated on the site. It can clearly be seen that the post development case (which includes the current infrastructure) causes a substantial increase in the volume of runoff produced on the site, more than doubling the volume of runoff that would be discharged to the creek. Such drastic increases compared with the "natural" flow regime in the creek, can have adverse effects such as erosion of the creek bed or banks.

However it can be seen in Table 9 that by harvesting and reusing some of the stormwater, rather than disposing it to the creek, the mean annual volume of runoff can be reduced closer to the rural runoff volumes, thereby lessening the chance of any adverse effects on the creek.

Table 9: Mean annual flow comparison

	Rural State (no dams)	Post development (No harvest)	Post development (with 400kL/day harvest)
Mean Annual Flow (ML/year)	140.35	406.5	287.5

It can be seen from the flow duration curves below in Figure 9 that the post development case with no reuse of the stormwater (red line), results in higher flow rates than would occur in the rural case (blue line).

If stormwater is harvested and reused (pink line), the magnitude of flow rates is reduced down much closer to the rural case but it can be seen that the magnitude of low flows is slightly lower than the rural case while the magnitude of high flows is higher than the rural case resulting in a net export of water into the catchment over and above the rural case which forms the basis for water allocations in the Macquarie catchment.

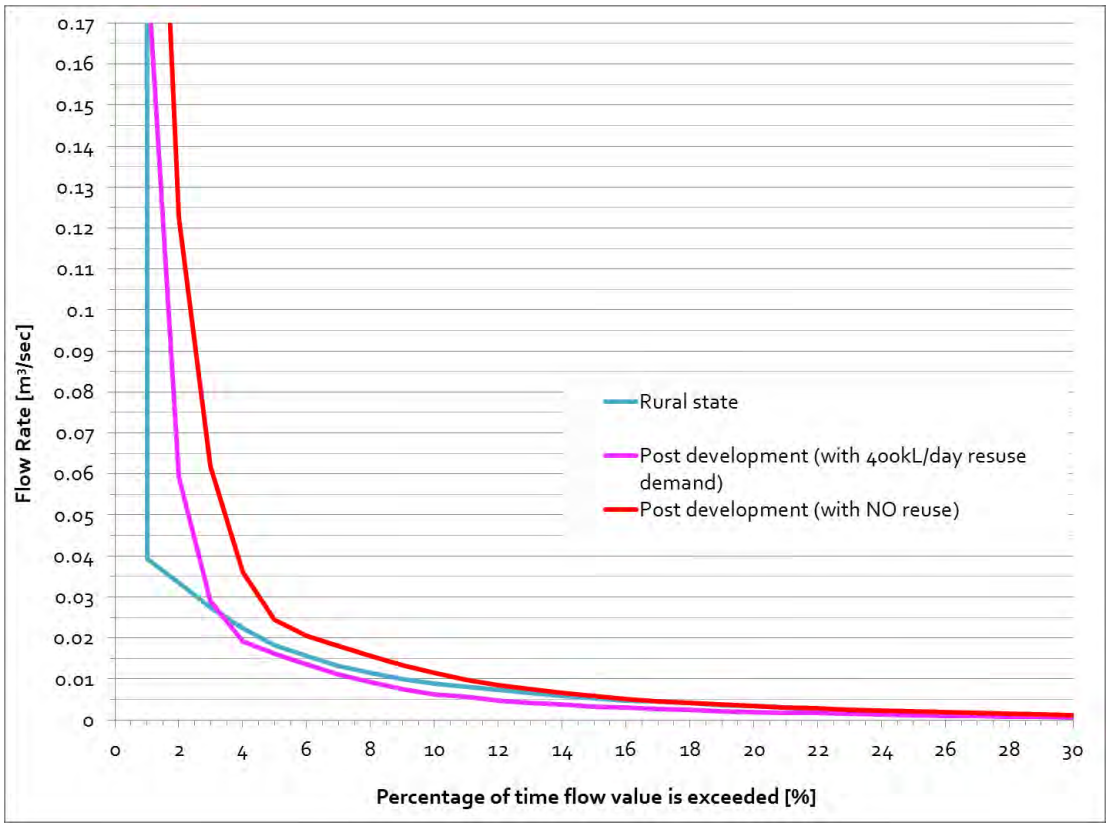


Figure 9: Flow Duration Curves, showing that the positive effect of harvesting the stormwater outweighs the negative.

Another benefit of harvesting the stormwater generated on the site is that less of Borgs demand will be required to be met through the supply of town mains water. Table 10 shows the yield from the proposed scheme would be about 120 ML/year and this will therefore reduce the demand for mains water of the same volume.

Table 10: Yield from stormwater harvesting and reuse

	Pond 1	Pond 2
Yield (ML/yr)	53.59	65.335
Total (ML/yr)	119	

It has been found that even after harvesting 120 ML/year of stormwater (proposed), the site still produces more runoff than it would if it was in a rural state. This is due to the extensive roof areas (approximately 13 hectares on the Borgs site alone) and hardstand areas. Because this industrial site generates so much more runoff than it would in its rural form the harvesting scheme will reduce environmental impacts and protect the receiving waters. It is understood that all water allocations under the Water Management Act (2000) are based on the assumption that all sites are undeveloped and that they are rural, i.e. have 100% perviousness. Clearly the water allocations would not be affected in this case if Borgs were permitted to harvest the water without a WAL. On the contrary, even after harvesting, the site would contribute almost twice as much water as water allocations would have allowed for.

In the absence of a clear policy on urban stormwater harvesting which the NSW Office of Water has reportedly been developing for years, dispensation from the Minister for the need to acquire a water access licence to harvest this excessive volume of urban stormwater from the roofs and hardstands of the site is requested on this basis.

Clearly it can be shown that the intent of the Water Management Act (2000) which is to protect the environment and to allocate water equitably would be achieved by allowing Borgs to harvest the excessive volumes of runoff it would otherwise dispose of down Kings Stockyard Creek.

6.0 PROPOSED MITIGATION MEASURES

The proposed mitigation measures and strategy is shown below in Figure 10.

The proposed long-term water quality treatment measures include:

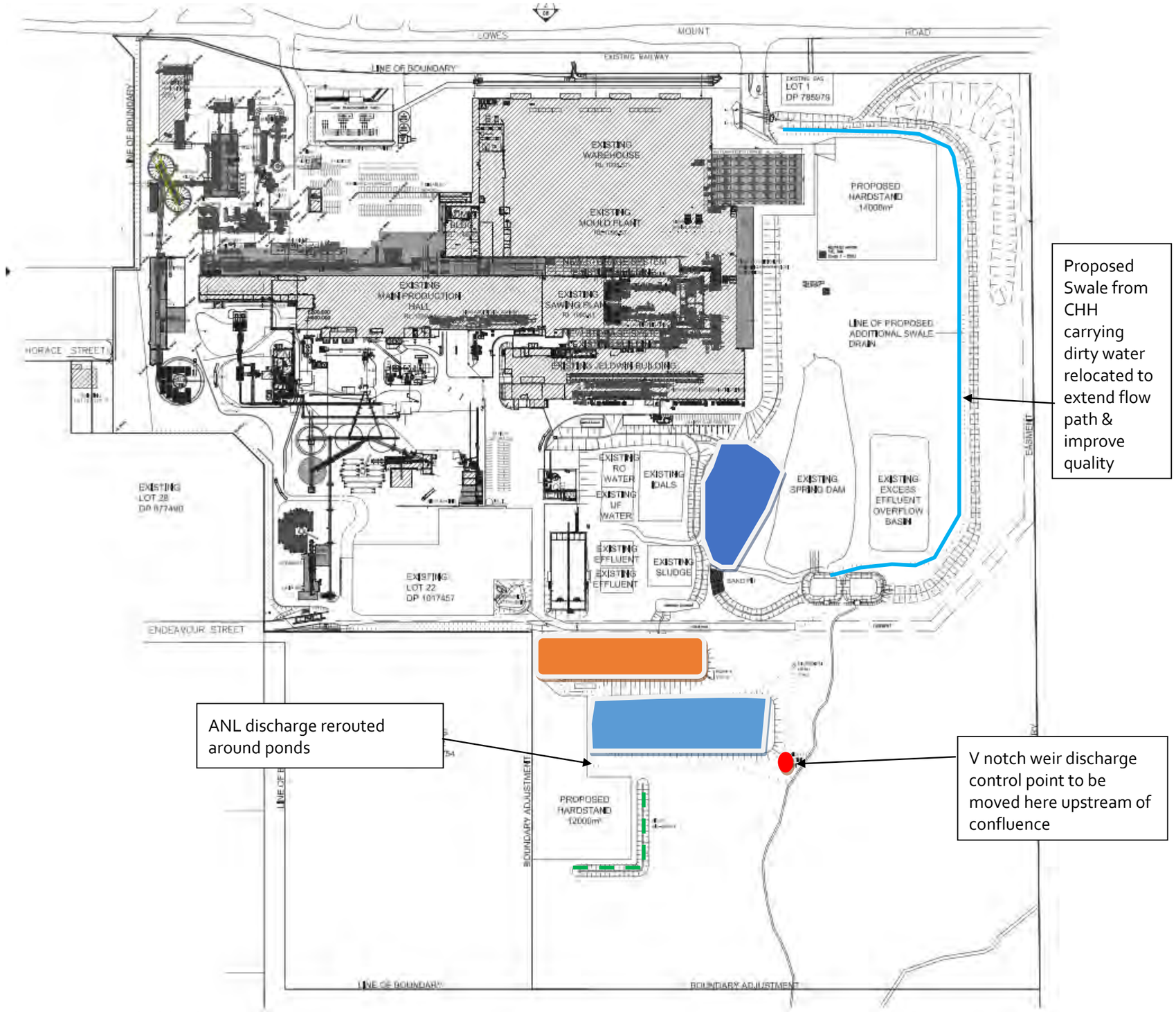
- Construction of a new swale with a much longer flow path to convey CHH runoff around the site and ultimately into a new treatment pond described below. This new swale will provide additional reduction of TSS and improvement of colour through removal of tannins. The swale will be vegetated using appropriate grasses or macrophytes.
- Creation of a new stormwater treatment pond with a minimum storage volume of 6 ML. No reliance on extended detention has been made. An assumed weir width of 2m needs to be subject to appropriate design rigour.
- The new pond is located downstream of the existing pond and accepts runoff from the whole Borgs site including overflows from the existing upper stormwater treatment pond.
- Both the new pond and existing pond each have a daily demand for stormwater reuse of 200 m^3/day withdrawn from the pond.
- Stormwater from the existing upper pond will be pumped to the existing bank of sand filters and from there into the MF/RO process for use as steam make up water.
- It is envisaged that stormwater from the lower pond would also be pumped back to the existing bank of sand filters and so on.
- If the demand were to be increased above 200m^3/day this would improve the predicted water quality further though the predicted maximum discharge concentration values do not alter. Equally if the demand for stormwater drops below 200m^3/day it will not reduce the predicted performance of the system. This was checked by turning off the stormwater reuse option from both ponds, running the model and checking predicted maximum discharge concentrations. They did not differ with or without stormwater harvesting – probably because they are maximum values they occur when the ponds are full and overflowing and so remain unaffected by the harvesting. This means it is not essential that harvesting occurs to meet the EPL limits but it will none the less deliver load based water quality benefits and geomorphological benefits.
- It has also been confirmed that the existing plant has the capacity to treat the extra water.
- A Water Access Licence (WAL) to harvest the 120 ML/year is not warranted due to the excessive volumes of water produced from this site over and above the rural state.

The proposed accidental spill capture measures proposed include:

- Conversion of the small existing aerated pond into an emergency catch dam. This dam would need to be continually drained dry to ensure it has capacity to absorb a spill or fire-fighting water and a system of manual valves put in place to allow spills to be captured and temporarily stored in the dam. This approach would provide a superior level of spill protection and prevent fire water or spills from migrating into the proposed stormwater treatment ponds.
- There is also an additional emergency spill basin proposed of 4,700m^2. This basin will be operated as a dry basin, pumped out after inspection when there is water inside it. This proposed basin provides yet another critical control point on the Borgs site and is located strategically so that it could collect an accidental spill from practically the whole site.
- The proposed stormwater treatment pond would have a valve controlled outlet which would enable the pond to be drained for maintenance.
- Please note these measures are proposed in addition to the existing bunds and controls in place and are entirely voluntary.

During construction, compliance with the Blue Book would see sediment and erosion control measures put in place. It is likely that a sediment basin would be required given that it is likely that more than 1 hectare of land would be exposed. Thus if the proposed pond were constructed prior to stripping of any topsoil, it could be used as a temporary sediment basin and then converted into its final form following practical completion of works and site stabilisation. Operation as a sediment basin may require the use of a flocculent to expedite settlement prior to reuse of the water.

Continued water quality monitoring will take place in accordance with the EPL, and measurements will be taken at the V-notch weir, downstream of the two treatment ponds as shown in Figure 10 below.



Proposed Swale from CHH carrying dirty water relocated to extend flow path & improve quality

ANL discharge rerouted around ponds

V notch weir discharge control point to be moved here upstream of confluence

LEGEND

- Existing buildings
- Proposed new buildings
- New Swale
- New Pipe
- Valve
- Buildings to be demolished
- Existing swale carrying flows from west of Lowes Mount Road
- Proposed 6ML stormwater treatment & storage pond
- Proposed Emergency Spill Basin 4700 m²
- Existing stormwater treatment pond
- Proposed linear bioretention swale around new car park

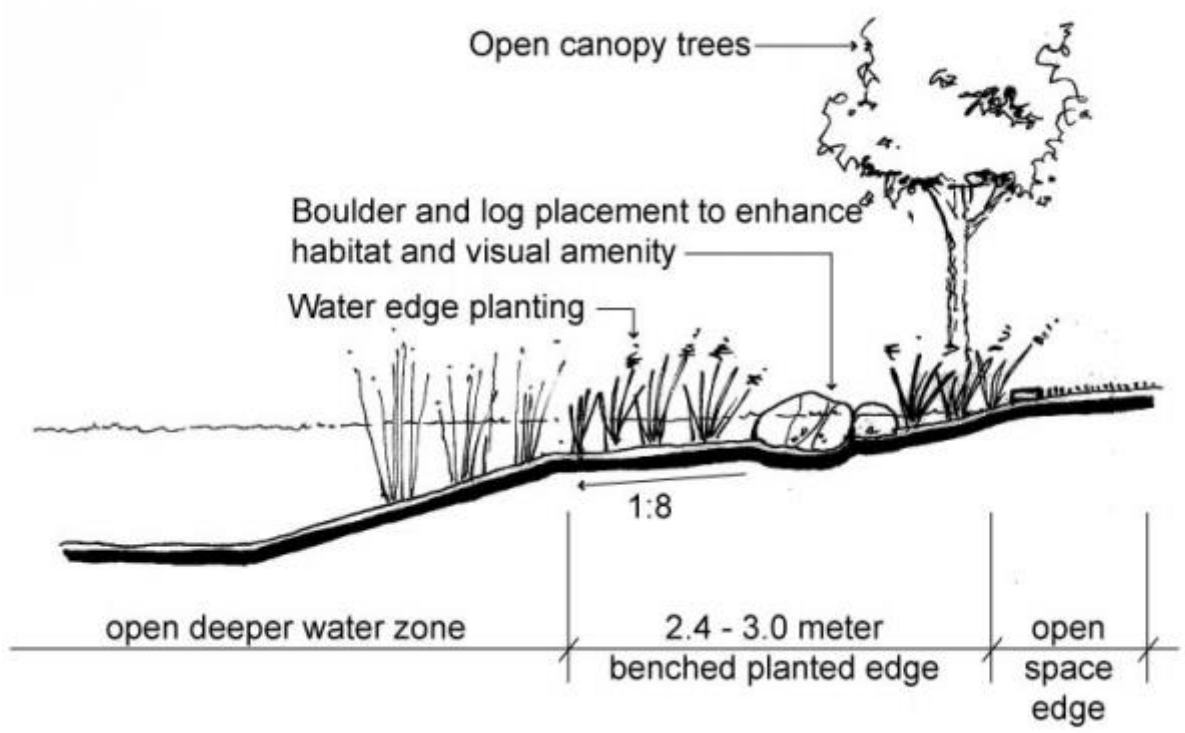
Figure 10 Proposed Mitigation Measures

The proposed stormwater treatment pond will need to be designed with care. Batters can typically be 1 in 4 and planted with appropriate reeds and sedges. The pond water levels will fluctuate significantly so vegetation must be designed to be suitable for its depth zone. Ephemeral wetland plants that can tolerate both extended wetting and drying would be most suitable.

If space permits, shallower batters would allow greater density and diversity of fringing vegetation and this would improve water quality and improve safety. The pond shall be designed to enable access by machinery to remove accumulated sediment from its bed on a routine basis. This will help to improve long term quality.

An example of a pond cross section is shown below in Figure 11Figure 11.

Figure 11 Typical water quality pond section

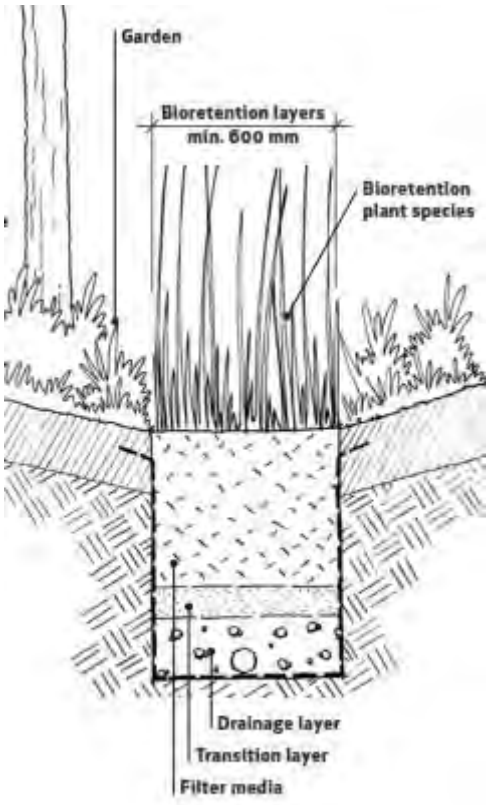


The proposed works also include a car park to be located in the south east of the site. Runoff from this car park will be treated in a linear bioretention swale and then allowed to flow across the open field toward Kings Stockyard Creek.

The proposed bioretention system is to be 60m² in area and with an assumed media width of 0.5 providing 30 m² of media in total. There should be a collection swale on top of the media that provides a minimum of 100mm extended detention depth. It was also assumed that the filter media would be 300mm deep and include a transition layer and drainage layer each 100mm deep. A subsoil drainage pipe would be located in the drainage layer and these would discharge into the field.

A typical bioswale is shown below in Figure 12

Figure 12 Typical Bioswale



7.0 CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the development can proceed without detrimental water quality impacts provided that the recommended mitigation measures are put in place.

7.1. Predicted Water Quality Results

Provided that the proposed mitigation measures are put in place then it is likely the future maximum discharge concentrations will be below current EPL limits. Should Borgs find that this is not the case then it will be necessary to retrofit additional water quality treatment measures. For example retrofitting of floating wetlands to the existing ponds would be feasible and not require any additional space and would certainly further improve water quality – notably reducing TSS if required.

The harvesting of stormwater would potentially reduce operating costs when compared to the cost of purchasing the water from Council. Therefore there is an economic incentive to pursue this action. It is however noted that it is not essential that harvesting is undertaken to meet the EPL limits. However there would be load based water quality and geomorphological benefits from harvesting and therefore it is to be considered a core component of the mitigation measures.

What this means in practice is that if the pumps or sand filters or MF/RO plants were to break down and there is no harvesting for say a month then Borgs should still be able to meet its EPL limits. Provided that harvesting resumes again once the RO plant is repaired then the load based and geomorphic benefits of the proposal would be restored. Should no harvesting occur at all then the proposal is likely to have some minor additional geomorphic and load based water quality impacts but it shouldn't breach its current licence conditions.

It is therefore recommended that the proposed mitigation measures are adopted and as much stormwater as possible is to be harvested from the ponds. The economic and environmental incentive to do so is certainly present.

7.1. Review of the EPL

It is recommended that the EPL is reviewed by the NSW EPA as follows:

1. The location of the approved monitoring point be moved downstream to the location shown in Figure 10. The reason for this is to enable discharge from the proposed new pond to be included while excluding discharge from the ANL site and Endeavour Road which are not part of the Borgs existing or proposed development.
2. It is recommended that it is not feasible to have an EPL with 100% limits and that it would be more appropriate to specify a 95th percentile level of discharge. Knowing that one day it is inevitable that this limit would be exceeded, not due to poor practice by Borgs but because this is what happens in nature. It is unreasonable to

impose an absolute maximum 50 mg/L discharge limit on Borgs while numerous other business, residential and industrial developments exceed this limit almost every time it rains. Moreover, it is unreasonable to impose this condition on Borgs on the basis of environmental protection – even fully undeveloped forested catchments have higher maximum levels of TSS concentrations in their runoff from time to time. Infrequent discharges of TSS that exceed 50 mg/L not more often than 5% of the time, i.e. 95th percentile, are not likely to result in degradation or harm to the receiving water. It is recommended that EPL be revised so that the same discharge limits are applied at the 95th percentile level rather than the 100th percentile level.

7.2. Emergency Spill Control

It is recommended that the spill control measures shown in Figure 10 are put in place. Noting that the existing aerated small dam (which is no longer required for water quality management) be converted into an emergency spill basin. It shall be operated to ensure there is sufficient spill storage capacity within it. This will require it to be drained by either pumping or gravity together with a system of manually operated diversion valves to isolate the basin if it is needed for spill control. It is recommended that spill control procedures be developed, staff trained and the procedures practiced annually.

7.3. Geomorphology Impacts

The proposed harvesting and reuse scheme will see the volume of runoff from the site reduced by about 133 ML/year compared to current levels of discharge. This will see both the frequency and volume of runoff from the site reduced. This in turn will ensure that there are only positive geomorphic and creek health benefits arising from this project (Walsh et al, 2005 & Tippler et al 2012).

7.4. Water Resources and Licencing

It is recommended that Borgs be granted dispensation from the Water Management Act (2000) for the need to acquire a water access licence to harvest the excessive volumes of runoff generated by this highly impervious site.

7.5. Soil and Water Management during Construction

It is recommended that the proposed pond be constructed prior to site stripping and used as a temporary sediment basin and converted to a permanent water quality pond once the site has been effectively sealed. Small scale sediment and erosion control measures would be needed to manage local erosion issues.

8.0 REFERENCES

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GHG Assessment of new Particleboard plant at Oberon

For Borg Panels

29th April 2016

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Northmore Gordon is a climate change consulting firm specialising in energy efficiency, renewable energy and greenhouse gas management for the manufacturing and mining sectors.

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1 Introduction

1.1 Background

Borg Manufacturing is developing a new manufacturing plant for the production of Particleboard at its existing Oberon facility. As part of the development an Environmental Impact Statement is required, a component of which is an assessment of the likely annual greenhouse (GHG) gas emissions resulting from the operation.

1.2 GuidelinesRelevant policies

This GHG assessment considered relevant national and state policy and guidelines for GHG emissions and assessment. This includes the Renewable Energy (Electricity) Act, the National Greenhouse and Energy Reporting (NGER) Scheme, and the National Greenhouse Energy Report Act 2007. In addition, the GHG assessment followed the accounting standards of the GHG Protocol (World Resources Institute/World Business Council for Sustainable Development 2004) in conjunction with:

- the National Greenhouse Account (NGA) Factors – August 2015
- other published information, including online manufacturer provided data;
- data supplied by the indicative site layouts, process flows, equipment utilisation, and equipment load factors; and
- data from research or prior experience, where information has not been available from the above sources.

Emissions were reported in terms of standardised carbon dioxide equivalent (CO_2-e) values, which account for a number of GHGs, including CO_2, CH_4, N_2O, HFCs, PFCs, and SF6.

1.2.1 Principles

In accordance with the GHG Protocol, this report follows the principles of Relevance, Completeness, Consistency, Transparency, and Accuracy. This is designed to ensure that the reported information represents a faithful, true, and fair account of a company's likely GHG emission.

1.2.2 Scope definitions

The GHG Protocol is probably the most widely used international tool for corporations and government to classify various emissions sources and is used in this report as a guideline. Emissions sources are defined as:

- **Scope 1 emissions**: direct GHG emissions occurring from sources owned or controlled by the company – for example vehicle fleet using non-renewable fuels, and direct non-renewable fuel combustion in gas boilers.
- **Scope 2 emissions**: indirect GHG emissions from purchasing electricity, heat or steam from other parties; and
- **Scope 3 emissions**: indirect emissions (or sinks) which occur due to the company's business activities, but from sources not owned or controlled by the company – for example employee business-related air travel, third party logistics companies, waste.

1.3 Our approach

1.3.1 Boundary of the assessment

Since the operations are established on the same site as an existing operation, the boundary of the assessment is set around the new site works, plus the truck delivery fleet for the new products, and shown in Figure 1.

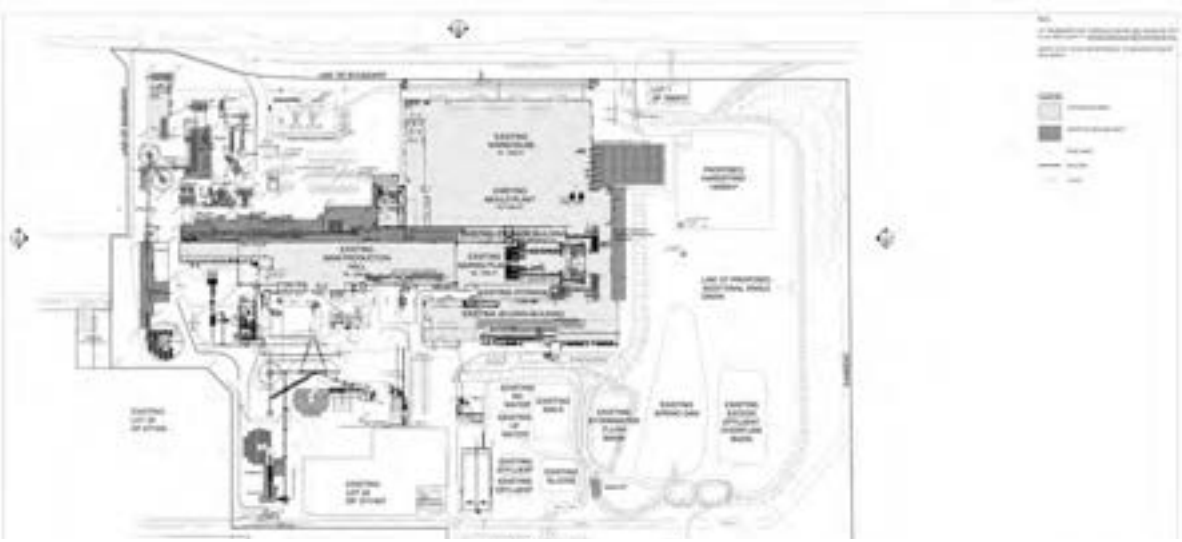

Figure 1: Boundary of GHG assessment – new plant and equipment only, plus new transport

1.3.2 Scope 3 emissions

Under the NGER Act, Scope 1 and 2 emission sources must be accounted for, but reporting Scope 3 emissions sources is optional.

Scope 3 emissions associated with the 'upstream' activities for this operation include but are not limited to those from third-party forestry and harvesting operations (e.g. fuels for vehicle and mobile plant), soil carbon changes in the harvested forests and land systems, employee-related travel and fertiliser use on plantations. These are offset, however, through regrowth of plantation forest. When the wood is grown, there is substantial take-up of atmospheric carbon dioxide from the biosphere.

Scope 3 emissions associated with the 'downstream' use of the products include both (i) sequestration of CO2e since the main product is mostly constructed of natural fibres (wood) and used in building materials, thereby 'locking up' CO2e in permanent and static use, and (ii) potentially substituting for the use of more energy-intensive raw materials. According to research by the Inter-governmental Panel on Climate Change (IPCC)1, the benefits are far greater in the substitution of more energy intensive materials than permanent carbon sequestration in wood products.

A detailed assessment of Scope 3 emissions was not incorporated in this study.

[1] IPCC (2001), *Climate Change 2001: Mitigation*, Chapter 4 - Technological and Economic Potential of Options to Enhance, Maintain, and Manage Biological Carbon Reservoirs and Geo-engineering, Section 4.3.2.1

1.3.3 Construction emissions

GHG emissions from the operation of the plant over multiple decades will far exceed emissions arising from construction. Further, as most of the construction activity will be completed by third party contractors, almost all construction emissions will be considered Scope 3, and excluded from this assessment.

2 Emissions estimates

2.1 Scope 1 GHG emissions sources

Potential Scope 1 emissions during operation of the new plant are projected to arise from:

- Direct combustion of natural gas on site in various heat plants
- Direct use of Diesel in line haul trucks
- Air conditioning gas losses
- SF6 losses from high voltage switch gear
- Direct combustion of biomass[2]

The new plant being proposed is a similar style of operation to the existing one, albeit the existing plant produces MDF and the new one will produce Particle Board. In Borg's FY14-15 NGER report for the site, the plant reported emissions of PFC, SF6 and HFCs at 0 tonnes CO_2e compared with an overall Scope 1+2 emissions of 102,110 tonnes CO_2e. Emissions of these gases in the new plant are expected to be similar, hence they are not considered material in this assessment.

Further, the FY14-15 NGER report indicates Gasoline emissions at only 14 tonnes CO_2e, and hence the Gasoline emission sources are not considered material in this assessment. Electrically driven plant and equipment shall be used where possible.

2.1.1 Scope 1 GHG emissions from natural gas

Natural gas will be used in an industrial boiler for the heating of hot oil for the press, sustaining gas in a hot gas generator and other miscellaneous uses. Suppliers of the plant equipment who have extensive experience in such estimation have estimated the amount of gas to be used. Assumptions for this assessment are:

- Plant operational hours = 8,500 hours p.a.
- Boiler output = 8 MW average when operating (requiring an approximate 10 MW thermal input)

The estimation of GHG emissions is shown in Table 1.

[2] Note that whilst the CO_2e associated with direct combustion of biomass fuels are not generally considered to have a global warming potential there are relatively small quantities of CH_4 and N_2O that need to be reported.

Table 1: Estimation of GHG emissions from natural gas use

Estimated natural gas use (GJ/annum)	Emission Factor (kg CO_2e/GJ)	Annual GHG emissions (Tonnes CO2e/annum)
306,000	51.53	**15,768**

2.1.2 Scope 1 GHG emissions from diesel transport fleet

There will be a net increase in diesel used in the company heavy vehicle fleet as the new plant enters operation. Currently the fleet is used for:

- delivery to the site of wood/biomass for use in manufacturing of the existing MDF product, and
- delivery to the site of raw particle board that is to be lined with Melamine and then re-distributed,
- distribution all of the product including MDF and particle board.

Once the new particle board plant is constructed, the duties of the heavy vehicle fleet will be modified:

- the incoming deliveries of third party particle board will be reduced due to the new ability to manufacture it on site,
- the incoming deliveries of wood for the particleboard process will increase in line with capacity increase.,
- the outgoing particle board deliveries will increase by about 100%, and
- total out-going product deliveries will increase by 30-40%.

The FY14-15 NGER report indicates annual GHG emissions from transport to be 233 tonnes CO_2e, based on diesel use of 86 kL per annum.

We have based our GHG assessment of the additional GHG emissions from Borg's transport fleet attributed to the new plant on estimates by Borg of the future changes in truck movements:

Table 2: Truck Diesel usage and GHG emissions

Scenario	Truck movements (No. Trucks per year)	Change from FY14-15 (%)	Diesel use (kL/ annum)	Emission Factor (kg CO2e/GJ)	Annual GHG emissions (Tonnes CO2e/annum)
Base case (FY14-15)	20,816	0%	86	70.2	233
Operational (2017)	37,145	78%	153	70.2	416
Operational (2027)	54,824	163%	227	70.2	614
Operational (2017-27 average)	45,985	121%	190	70.2	515
Additional transport attributed to new plant based on Operational Average	25,169		**104**	70.2	**282**

Therefore we observe a total increase in total in/out truck movements of about 78% by 2017, and 163% by 2027. Assuming transport distances for each truck movement stays constant, this equates to future GHG emissions from diesel in the range of 416 – 614 tonnes CO_2e/annum. For the purposes of this assessment, the additional GHG emissions attributed to the new plant for the period 2017 to 2027 is estimated to 282 tonnes per annum, giving a total of 515 tonnes CO_2e /annum.

No additional diesel will be used within the boundaries of the new plant since site vehicles, forklifts, cranes and wood chippers will be electric.

2.1.3 Scope 1 GHG emissions from biomass combustion

Waste products from the new plant will be used in a large biomass heat plant to create hot air for the drying process. The hot gas generator fuel from waste product has been estimated by Borg to consist of 11% Resin & Wax and 89% Dry Wood by weight.

The hot gas generator feed requirement has been estimated by Borg to be 80% duty of a 50MW heat plant during operation.

The weighted calorific value of the boiler fuel has been calculated from the waste feed ratios and the corresponding NGA factors[3] to be 17.3 GJ/tonne.

The weighted Emission factor for the boiler fuel has been calculated from the waste feed ratios and the corresponding NGA factors to be 14.7 kg CO2-e/GJ.

[3] Per Borg 2014-15 NGER report, 'Resin & Wax' is assumed to be equal to the NGA factors for "Industrial materials and tyres that are derived from fossil fuels, if recycled and combusted to produce heat or electricity".

Assumptions for the Scope 1 GHG emissions from biomass combustion are:

- Fuel consists of 11% Resin & Wax and 89% Dry Wood by weight.
- Hot gas generator utilisation = 40 MW (average utilisation of 80% in a 50MW heat plant)
- Plant operational hours = 8,500 hours p.a.

The estimation of GHG emissions is shown in Table 3.

Table 3: Estimation of GHG emissions from biomass use

Estimated biomass use (GJ/annum)	Energy content factor GJ/tonne	Estimated biomass use (Tonnes/ annum)	Emission Factor (kg CO2e/GJ)	Annual GHG emissions (Tonnes CO2e/annum)
1,224,000	17.3	70,706	14.6	**17,874**

2.2 Scope 2 GHG emissions

Scope 2 emissions during operation of the new plant will come from the use of grid electricity in the main plant from production equipment and from the mobile plant which include an electric wood chipper, cranes and forklifts on site. The energy consumption of the 1.5 MW capacity electric chipper has been estimated by Borg's suppliers to be 1.15 MW average load when operating with 75% duty of operation. The main plant power usage has been estimated by Borg to be 9943 kVA. We estimated the Power Factor of the main plant to be 0.95.

Assumptions in estimating overall Scope 2 emissions are:

- A 1.5 MW Chipper will operate at 1.15 MW load with a 75% duty cycle
- Other mobile plant electricity consumption such as electric forklifts and cranes are insignificant compared to chipper use and therefore not included
- Main Plant power usage is separate to mobile plant and will operate with a 9943 kVA load and a 0.95 Power Factor
- Plant operational hours = 8,500 hours p.a.

Table 4: Estimation of GHG emissions from electricity use

Electricity Usage	Load (kVA or kW)	Power Factor (kW/ kVA)	Operation hours (Hrs pa)	Duty (%)	Estimated electricity use (MWh/ annum)	Emission Factor (kg CO2e/ kWh NSW)	Annual GHG emissions (Tonnes CO2e pa)
Mobile Plant incl. Chipper	1150	1	8,500	75%	9,775	0.84	8,211
Main Plant	9943	0.95	8,500	100%	80,290	0.84	67,443
Total Use					**90,065**	0.84	**75,654**

2.3 Scope 3 GHG emissions

Not calculated as part of this report.

2.4 Comparison of Scope 1 and 2 emissions intensity of new to existing plant

The following table compares the emissions of the existing plant to the new plant, and shows that the emissions estimates appear reasonable. The output of the new plant is being designed at an additional 500,000m^3 p.a. whereas the existing plant is rated at 220,000m^3 p.a. When comparing two modern manufacturing processes, particleboard plant is about 30-35% more process efficient to make than MDF on a GJ/m3 basis. This assessment estimates that the new plant will increase capacity by 182%, and energy use by 147%. The improvement in energy efficiency is due to:

- The new plant is able to leverage some existing infrastructure, and
- The process is overall more efficient and requires less processing.
- The existing plant is not considered energy efficient at this point in time (though it is currently undergoing changes to improve energy efficiency).

Table 5: Old vs New plant comparison

Item	Old plant	New plant additional	Unit
Production	220,000	500,000	m^3 pa
Scope 1 – Gas	211,719	306,000	GJ pa
	10,867	15,768	Tonnes CO_2e/annum
Scope 1 – Biomass boilers (mix of process waste and green wood)	48,907	70,706	Tonnes biomass
	694,290	1,224,000	GJ/annum
	7,817	18,041	Tonnes CO_2e/annum
Scope 1 – Diesel & Gasoline for transport and mobile plant	292	104	kL/annum
	11,245	4,014	GJ/annum
	784	282	Tonnes CO_2e/annum
Scope 2 – Electricity	96,096	90,065	MWh/annum
	82,262	75,654	Tonnes CO_2e/annum
TOTAL Energy	**1,263,199**	**1,858,247**	**GJ/annum**
TOTAL CO_2e	**101,730**	**109,746**	**CO_2e/annum**
Total CO_2e/m^3	**0.46**	**0.27**	**CO_2e/m^3**

2.5 Summary

Total Scope 1 and 2 GHG emissions are estimated to be as follows.

Table 6: Total Scope 1 and 2 GHG emissions from the new plant

Source	Quantity per annum	Unit	Quantity per annum (GJ/annum)	Annual GHG emissions (Tonnes CO_2e/annum)
Scope 1 – Gas	306,000	GJ	306,000	15,768
Scope 1 – Biomass	70,706	tonnes	1,224,000	18,041
Scope 1 – Diesel for transport	104	kL	4,014	282
Scope 2 – Electricity	90,065	MWh	324,233	75,654
TOTAL			1,858,247	109,746

3 Design to minimise GHG emissions

The new plant has been designed to minimise energy use and therefore greenhouse gas emissions with the following features:

- 50 MWth biomass heat plant (operating on dust from the production process) to produce hot air for the flake drying process. As the inputs to the process are plantation softwood, this is a renewable energy source that significantly offsets potential GHG emissions from using fossil fuel for this process.
- A small 8MW thermal oil heater operating with combustion air preheating operating on gas will be used to generate hot oil for the press and other plant and equipment.
- Variable speed drives on fans and pumps.
- Extensive use of a SCADA system and sub-metering to assist in monitoring plant performance, provide feedback and improve plant control.
- Electric chippers have a higher overall efficiency and lower noise compared with diesel chippers when analysed over the full and part load operating cycles.

Document Control Sheet

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Client contact	Victor Bendevski		
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BORG PANELS PTY LTD

VISUAL IMPACT ASSESSMENT

TIMBER PROCESSING FACILITY (PARTICLE BOARD)

124 LOWES MOUNT ROAD, OBERON

MAY 2016

THE DESIGN PARTNERSHIP

BORG PANELS PTY LTD

VISUAL IMPACT ASSESSMENT

TIMBER PROCESSING FACILITY (PARTICLE BOARD)

124 LOWES MOUNT ROAD, OBERON

PROJECT NUMBER: 14.023

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1.0 INTRODUCTION

The Design Partnership has been engaged by Borg Panels Pty Ltd to prepare a Visual Impact Assessment (VIA) for the proposed expansion of the existing Medium-Density Fibreboard (MDF) processing facility at 124 Lowes Mount Road, Oberon. The need for this report arose as a result of the Secretary's Environmental Assessment Requirements, which specifically requested an assessment of visual amenity, **"**including an assessment of the potential visual impacts of the proposed development on the amenity of the surrounding area".

2.0 METHODOLOGY

The VIA process includes the following elements:

- Describe the location (Section 3.0)
- Define the project (Section 4.0);
- Assess the landscape context (Section 5.0);
- Identify, document and analyse the visual character of the surrounding landscape (Section 6.0);
- Identify and assess the potential View Points at which the proposed impact may have a visual impact (Section 7.0);
- Assess the visibility of the site from each View Point (Section 8.0);
- Assess the Visual Absorption Capacity (VAC) of the site and project (Section 9.0);
- Calculate the Visual Impact Rating (VIR) and identify potential adverse and positive visual impacts (Section 10.0); and
- Recommend mitigation measures where appropriate (Section 11.0), which may include:
  - Siting, scale, footprint, form and materials options; and
  - Vegetation alteration.

The purpose of all of the above is to ensure that the project is of a physical form which will have the lowest practical visual impact on its landscape setting, when viewed from viewpoints available to the public.

Visual management objectives provide the basis for determining the degree of intervention required to modify any identified adverse visual and landscape impacts.

A site visit was conducted by The Design Partnership's Andrew Neil (Director – Planning and Heritage) and Nicola Stainton (Urban Planner) on Friday 25 March 2016. This involved identification and documentation of various views of the site from the surrounding area.

3.0 LOCATION

The subject land is located on the outskirts of Oberon within the Oberon Local Government Area (Figure 1).

The site entry is approximately 1 kilometre north of Oberon Post Office. The development site comprises several lots, as follows:

- Lot 26 DP1200697
- Lot 24 DP1148073
- Lot 1 and 2 DP 1085563
- Lot 1 DP1076346

The site is largely flat, with an average elevation of 1090m and a high point of 1100m in the centre of the site (Figure 3). Lowes Mount Road forms the western boundary of the site. A sporting field and various light industrial sites are located to the south. Land to the north and east is presently undeveloped.

Consistent with the major industries of farming and forestry, the locality is generally characterised by rolling fields interspersed with areas of State Forest. Development within the town of Oberon is generally single detached houses of varying age on quarter acre blocks.

Figure 1: Location of the Subject Site (Source: The Design Partnership)

Figure 2: Aerial Map of the Subject Site and Surrounds (Source: Google Earth)

4.0 THE PROJECT

The Project is the expansion of the existing Borg Panels timber processing facility (Figure 3). The components of the expansion which have potential visual impacts are:

- New plant and buildings in the south-west corner of the site (items 10-18 below)
- Additions to the western side of the existing building (items 19-21 below)
- Additions to the northern side of the existing building (items 22 and 25 below)
- A new on-grade car park in the north-west corner of the site
- New basins and a new hardstand area east of the existing waste recycling plant

The remainder of the alterations and additions are inside the existing buildings.

Of the new plant and buildings, the largest will be two new silos (13) at a height of 42.5m and the new warehouse (22) at a height of 35.0m. Both of these additions are large in scale as well as height. However, there are existing structures on the site that are taller than these new features (Figure 4).

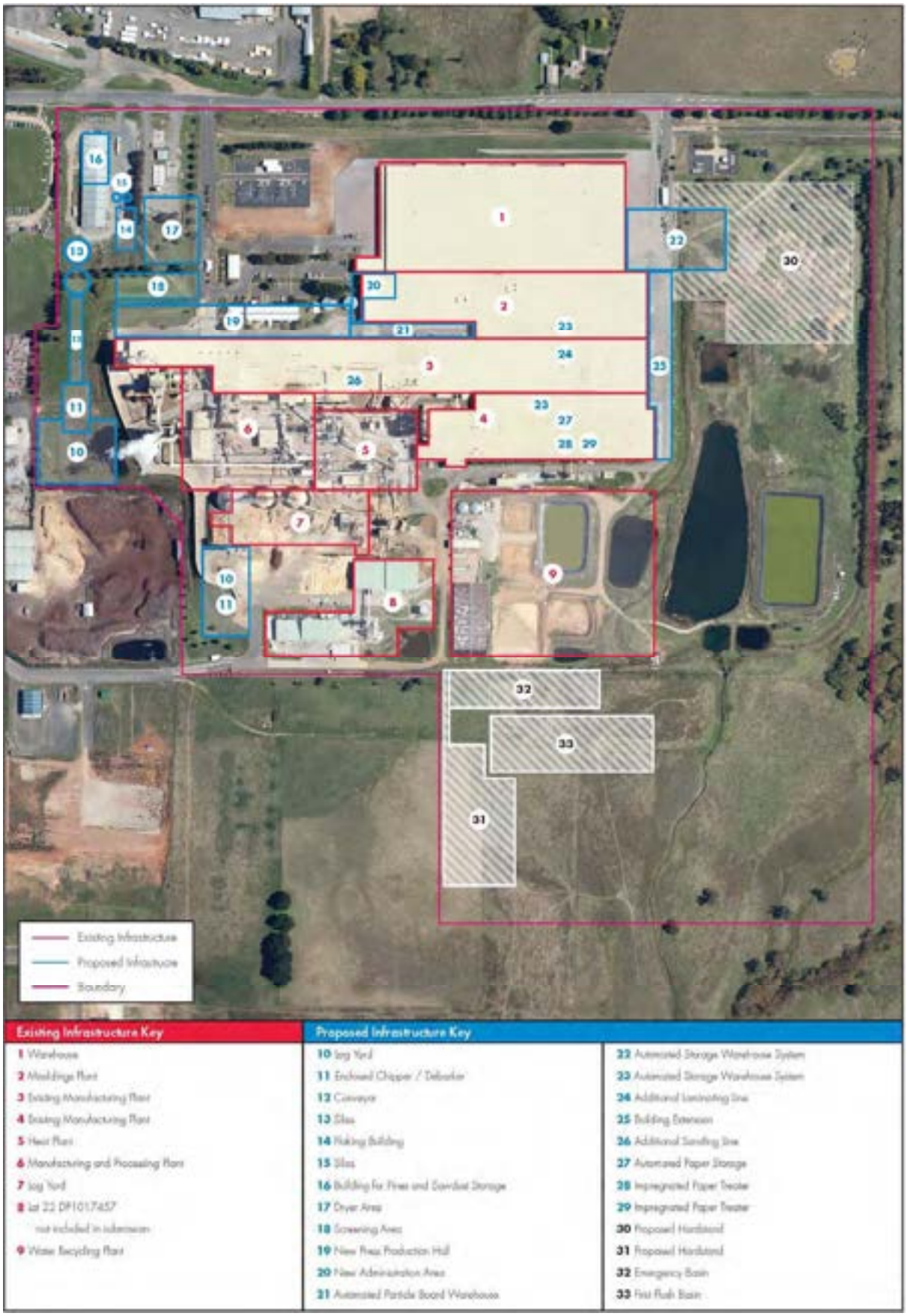


Figure 3: The Project (Source: Borg Panels)

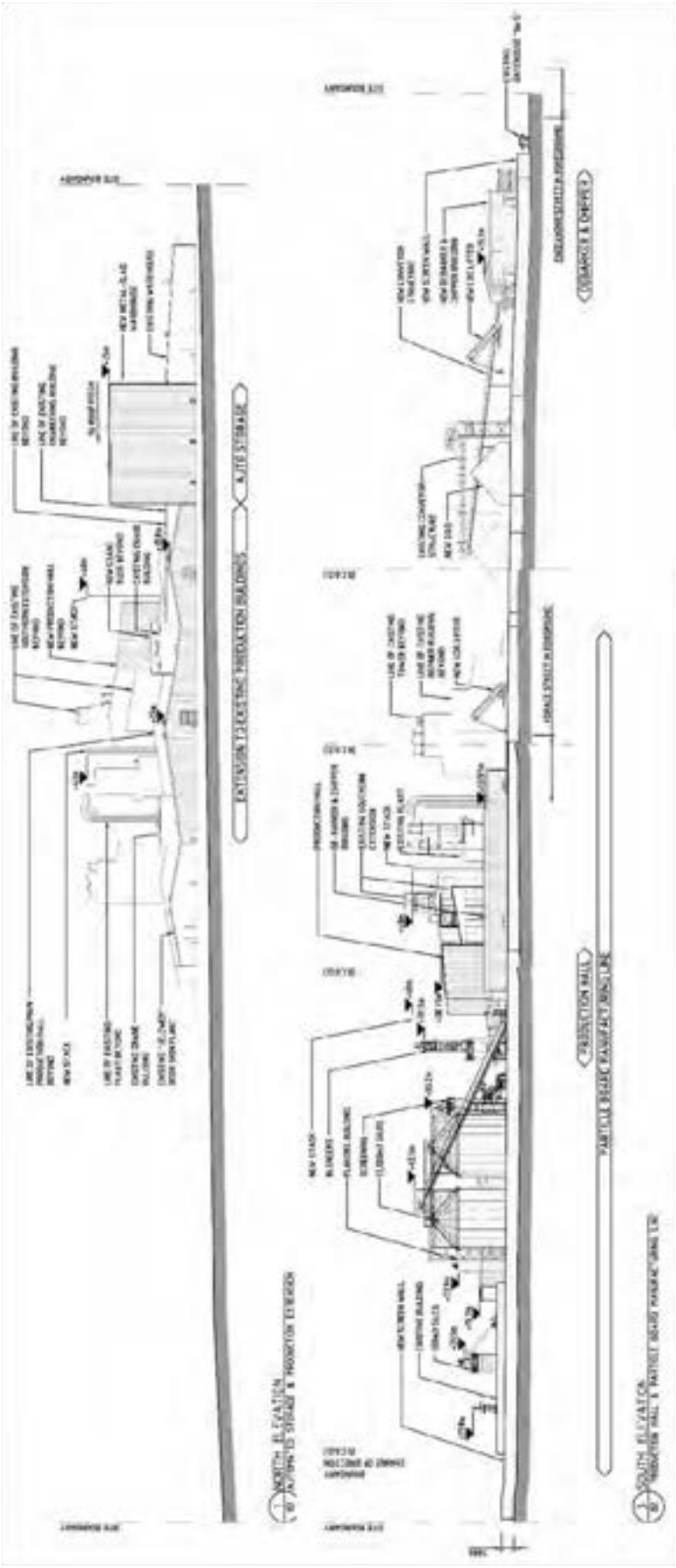


Figure 4: North and South Elevations of the Project (Source: Borg Panels)

5.0 LANDSCAPE CONTEXT

The subject site is located on the northern outskirts of Oberon. Historically, the primary local industries have been farming, forestry and wood products. Originally known as Bullock Flat by early pioneers, Oberon began to attract permanent settlers in the 1820s who used the land for grazing. From the 1930s onwards, native hardwood timbers were harvested from the local area; replanting with pine has sustained the timber industry in the locality. The surrounding area is generally characterised by grassy rolling hills interspersed with State Forest including Blenheim, Essington, Hampton and Lowes Mount. Most of the roads in the district are flanked with trees on both sides.

Oberon's industrial area is located in the north of the town, along Albion Street and the streets leading off it to the north (Figure 5). The subject site is located at the northern extent of the industrial area. Another large timber processing facility, Highland Pine Products, is located to the south-west of the Borg Panels site, and is bounded by Lowes Mount Road and Albion Street. Other uses in the area include warehousing, wholesale, retail, engineering and transport, many of which are related to the timber industry. The industrial area is characterised by very large warehouse type buildings, generally Colorbond in subdued shades of cream, beige and green, reflecting the surrounding landscape, interspersed with a few brighter reds and blues.

The use of the subject site for timber processing predates the original 1995 development consent.

Figure 5: Aerial Map of Oberon; the industrial area is clearly visible north of Albion Street (Source: Google Earth)

The town of Oberon is generally characterised by single storey detached houses of varying age on quarter acre blocks. The main street is primarily single storey; many of the shops have high parapets which help to block views of the timber processing facility.

6.0 VISUAL LANDSCAPE CHARACTER ASSESSMENT

6.1. METHOD

For the purposes of this Visual Impact Assessment:

- *Viewing Zones* means the distances (or locations) from the site from which it is possible to view the site
- *Viewshed* refers to the extent of views, which depends on how far distant the site remains visible and whether topographical features, bends in roads or physical structures prevent views of the site

In relation to the subject site, three Viewing Zones are necessary:

- Immediate vicinity (< 1.5 km)
- Local area (1.5 – 3.5 km)
- District area (3.5 – 10 km)

To assess the visual landscape character we carry out the following steps:

- Identifying the Viewsheds (or visual limits) of the project, including identifying the locations where viewers are likely to be affected by visual changes brought about by development of the site
- Identifying the visual character of each Viewshed. Character is then rated based on scenic quality as determined by positive and negative features of the landscape including vegetation, topography, land disturbance, urban forms, architectural character, and urban design:
  - Highest Quality Landscape
  - High Quality Landscape
  - Good Quality Landscape
  - Ordinary Quality Landscape
  - Poor Quality Landscape

The Viewing Zones and Viewsheds are identified and documented in a three-step process:

- A desktop review, including:
  - review of contours and topography of the site and surrounds
  - review of surrounding land uses and key road linkages
  - generation of viewshed maps using Google Earth to identify potential viewing sites (these viewshed maps, when located in regional areas, are generally based on topography as Google Earth does not yet have 3D models of buildings and vegetation for regional towns; consequently, the viewshed must be investigated further)
- A site visit to verify the findings of the desktop review and investigate further viewing sites
- Taking photographs in order to identify whether the proposed works could be seen from identified viewing sites

6.2. ASSESSMENT

Figures 6 and 7 show the overall viewsheds for the existing development on site (based on the tallest element, the 48m stacks) and the proposed development (based on the tallest element, the 42.5m silos). The majority of roads around Oberon are tree-lined so the subject site is generally not visible from most roads, only becoming visible where there are breaks in the trees or from particularly high vantage points. Within the town, the facility is mostly visible from the industrial area, Lowes Mount Road, and at intersections within the town. The limits of the viewsheds within each viewing zone are described in Table 1 and shown in Figure 8. Generally, the landscape is of a high quality within the district where views to the existing timber complex are brief and distant. The landscape is good to ordinary within the local area, and generally poor within the immediate vicinity of the site. This is due not only to the site itself but to the industrial area in general.

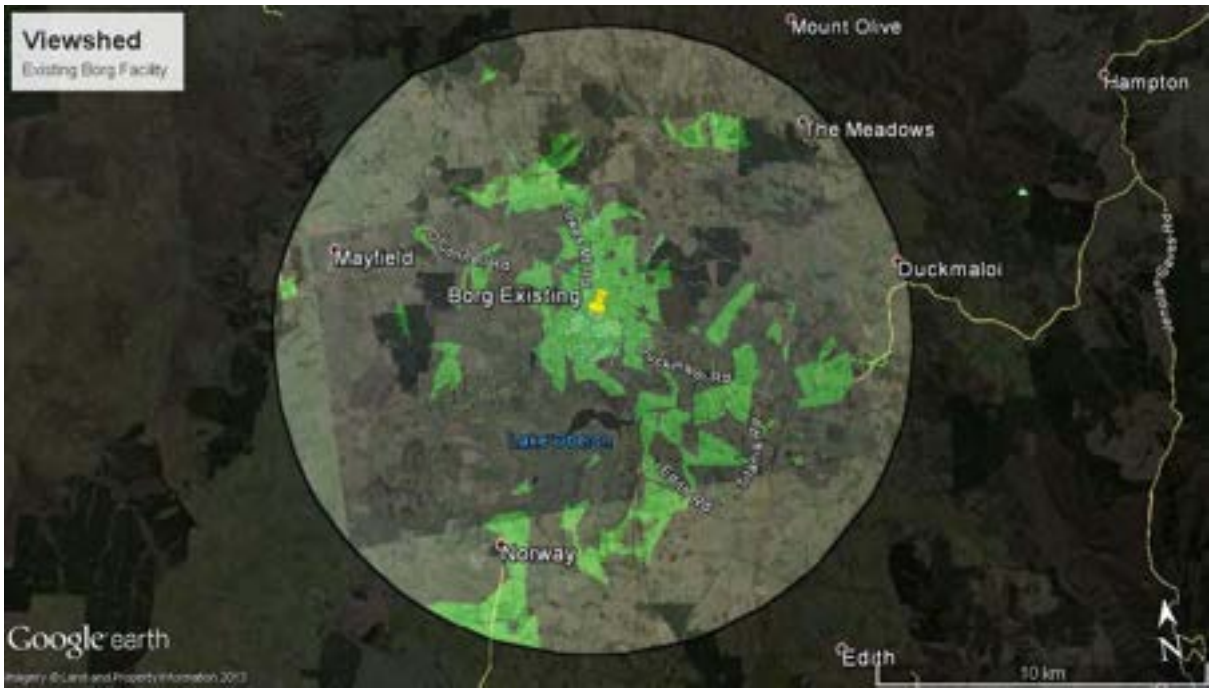


Figure 6: Viewshed of the Existing Facility (Source: Google Earth)

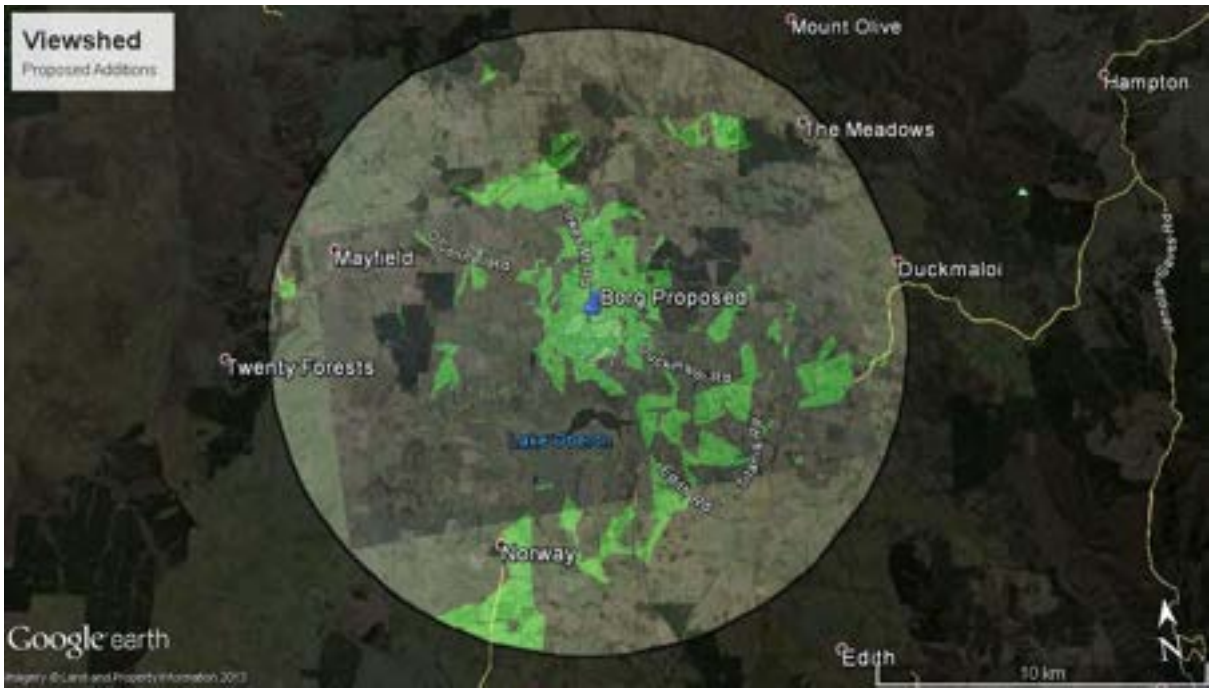


Figure 7: Viewshed of the Proposed Additions (Source: Google Earth)

Table 1: Viewshed Limits and Viewing Zones

	Immediate Vicinity (<1.5km) (red on map)	Local Area (1.5-3.5km) (yellow on map)	District Area (3.5-10km) (green on map)
North	Lowes Mount Rd, Clover Lane junction, 1km north of the site *Landscape Quality: Ordinary*	Rutters Ridge Rd, 3.0km north of the site *Landscape Quality: Good*	n/a – site not visible (from public areas) *Landscape Quality: High*
North East	n/a – site not visible (from public areas) *Landscape Quality: Poor*	Hazelgrove Rd, 1.5km north-east of the subject site *Landscape Quality: Ordinary*	n/a – site not visible (from public areas) *Landscape Quality: High*
East	n/a – site not visible (from public areas) *Landscape Quality: Poor*	Hazelgrove Rd, 1.75km east of the subject site *Landscape Quality: Good*	n/a – site not visible (from public areas) *Landscape Quality: High*
South East	Albion St, nr Hawken St junction, 1km south-east of the site *Landscape Quality: Poor*	Tarana Cr, 1.8km south-east of the site, outside Motel Titania *Landscape Quality: Ordinary*	Duckmaloi Rd, 8.0km south-east of the site *Landscape Quality: High*
South	Oberon St, junction with North St, 1.3km south of the site *Landscape Quality: Ordinary*	Ross St, 2.2km south of the site, near Oberon Golf Club entrance *Landscape Quality: Ordinary*	Edith Rd, 4.0km south of the site *Landscape Quality: Good*
South West	North St, Crete St junction, 1.3km south-west of the site *Landscape Quality: Poor*	The Reef Rd, 2.4km south-west of the site *Landscape Quality: Good*	Abercrombie Rd, 7.0km south-west of the site *Landscape Quality: High*
West	Lowes Mount Rd, southern entrance to the site *Landscape Quality: Poor*	O'Connell Rd, 1.5km west of the subject site *Landscape Quality: High*	n/a – site not visible (from public areas) *Landscape Quality: High*
North West	Lowes Mount Rd, northern entrance to the site *Landscape Quality: Ordinary*	O'Connell Rd, 2.5km north-west of the subject site *Landscape Quality: Ordinary*	n/a – site not visible (from public areas) *Landscape Quality: High*

* N.B. Distances from site are approximate

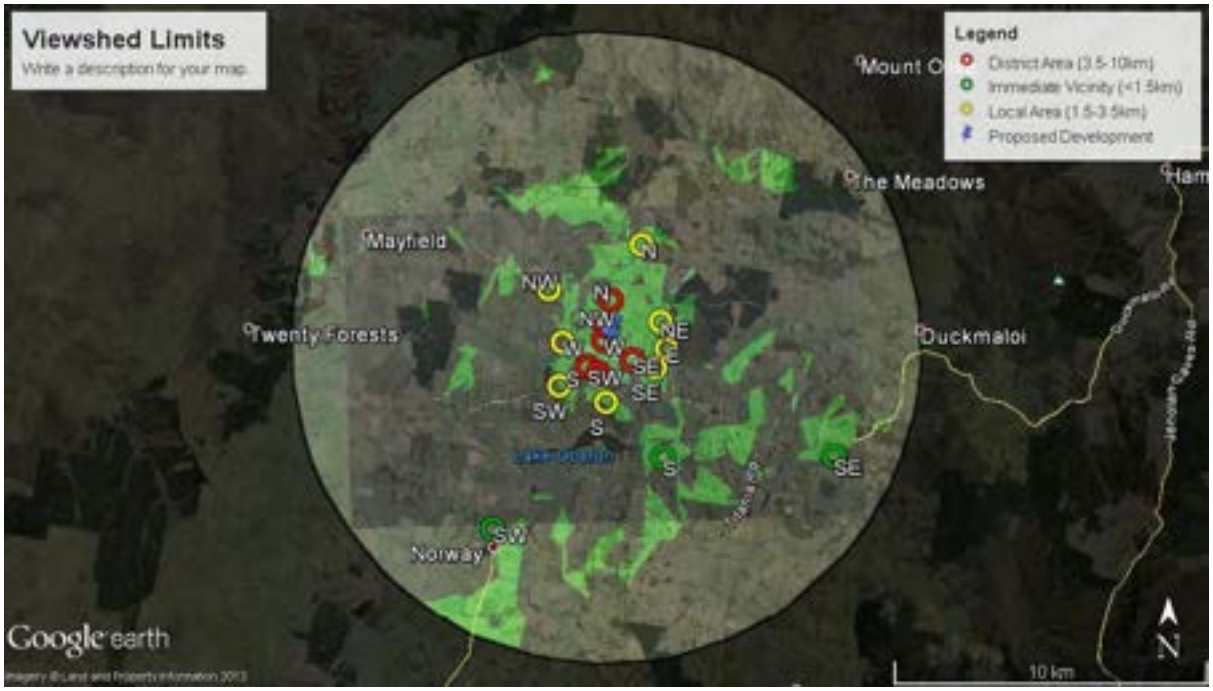


Figure 8: Viewshed with Limits for Immediate, Local and District (Source: Google Earth)

7.0 VIEW POINTS

For the purposes of this Visual Impact Assessment:

- *View Points* are key locations which most clearly convey the visual effects of the Project and the viewer groups potentially affected. View Points are determined based on a combination of Viewing Zones and Viewsheds.

Based on the topography and land uses of the locality, we took the approach of identifying view points by reviewing the surrounding area by sector based on compass points and viewing zones. The desktop review and site visit indicated that due to topography and vegetation the site could not be viewed from a public place in the district area to the north, north-east, east, west or north west, nor could it be viewed in the immediate vicinity from the north-east or east, as this land is owned by Borg Panels. Figure 9 shows the locations of the photographs taken during the site visit.

One View Point was selected for each of the 24 sectors (Table 2), except for the immediate vicinity south sector in which two View Points were chosen, and those sectors where the site cannot be viewed from a public place. Generally, the View Point chosen is the one with the clearest or closest view of the subject site, or the one with the highest number of viewers. In total, 18 View Points were identified in order to investigate the potential impacts of the proposed development on the visual landscape character (Figures 10 and 11).

Appendix A includes detailed descriptions of each View Point with maps and photographs.

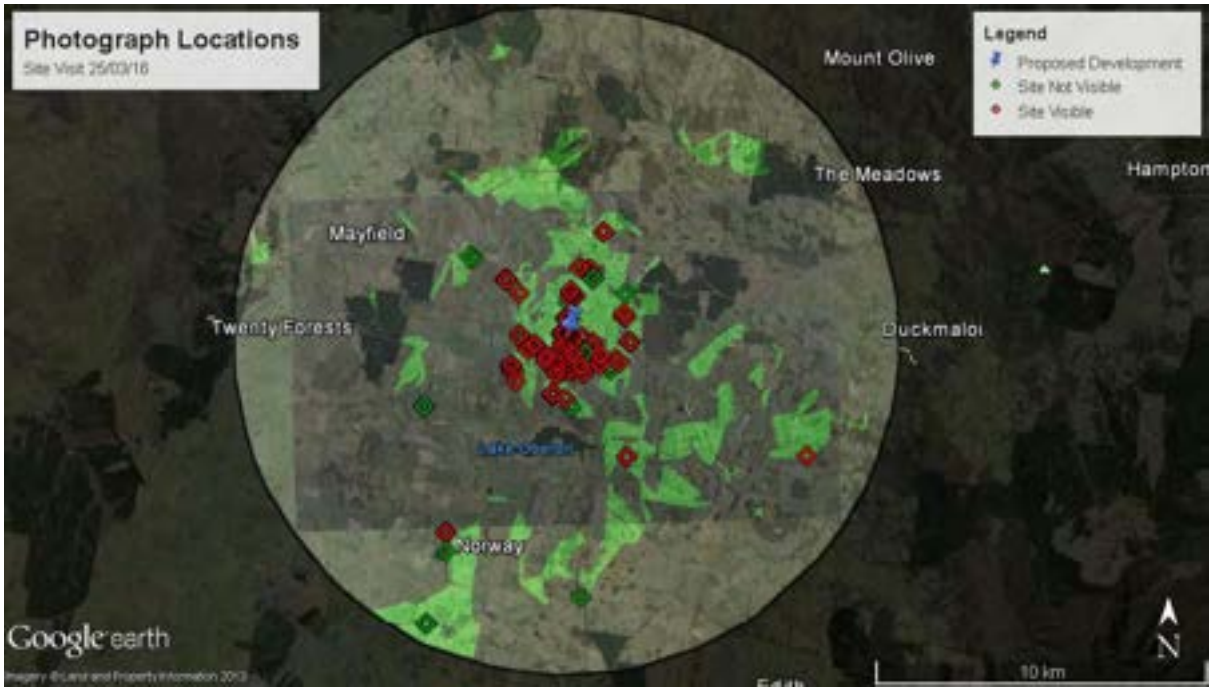


Figure 9: Photograph Locations (Source: Google Earth)

Table 2: View Point Locations

	Immediate Vicinity (<1.5km) (red on map)	Local Area (1.5-3.5km) (yellow on map)	District Area (3-10km) (green on map)
North	VP12 – Lowes Mount Rd, Clover Ln junction, 1km north of the site	VP4 – Rutters Ridge Rd, 3.0km north of the site	n/a
North East	n/a	VP5 – Hazelgrove Rd, 1.5km north-east of the site	n/a
East	n/a	VP6 – Hazelgrove Rd, 1.75km east of the site	n/a
South East	VP13 – Albion St, nr Hawken St junction, 1km south-east of the site	VP7 – Albion Rd, Tarana Rd junction, aged care facility, 1.6km south-east of the site	VP1 – Duckmaloi Road, 8.0km south-east of the site
South	VP14A – Oberon St, Ross St junction VP14B – Oberon St, North St junction	VP8 – Ross St, 2.2km south of the site, near Oberon Golf Club entrance	VP2 – Edith Road, 4.0km south of the site
South West	VP15 – football oval, Lowes Mount Rd, 600m south-west of the site	VP9 – Abercrombie/O'Connell/ Albion roundabout, 1.5km south-west of the site	VP3 – Abercrombie Road, 7.0km south-west of the site
West	VP16 – Lowes Mount Rd, southern entrance to the site	VP10 – O'Connell Road, 1.5km west of the site	n/a
North West	VP17 – Lowes Mount Rd, northern entrance to the site	VP11 – O'Connell Road, 2.5km north-west of the site	n/a

Figure 10: View Points (Source: Google Earth)

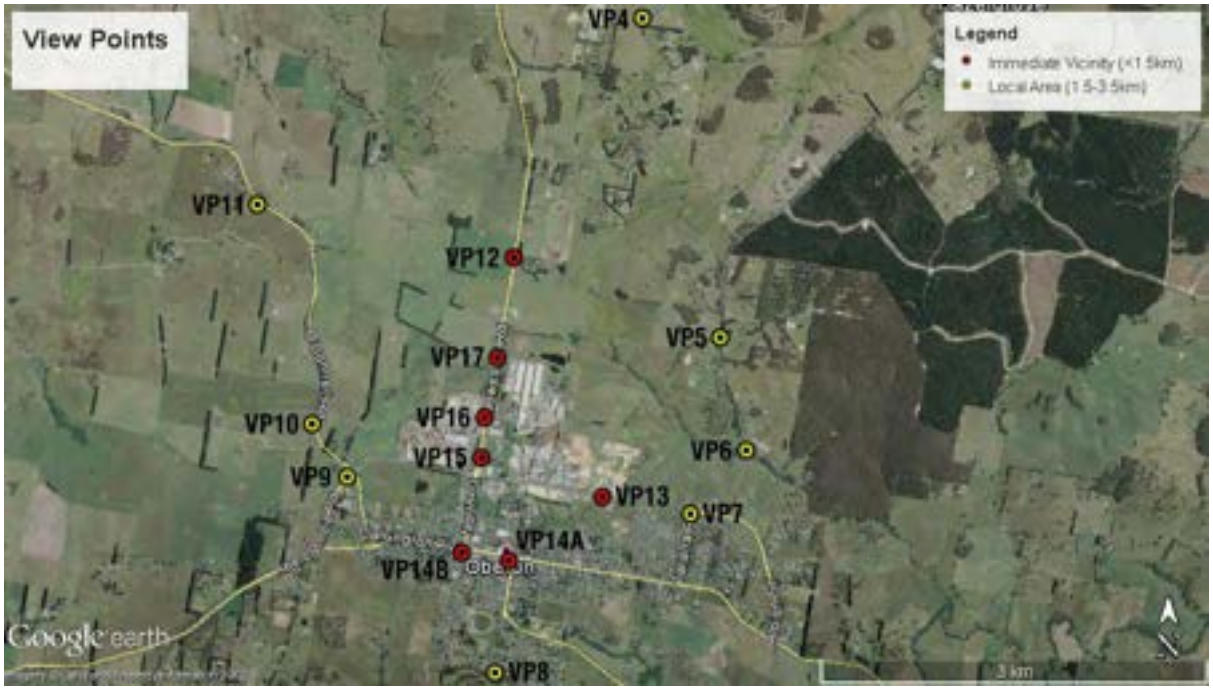


Figure 11: View Points, Zoomed Map (Source: Google Earth)

8.0 VISIBILITY

8.1. METHOD

Visibility is a measure of the extent to which particular activities/components of a proposal may be visible from surrounding areas, the relative number of viewers, the period of view, viewing distance and context of view. The rationale for the assessment is that if a proposal is not visible the impact is nil; if the number of people who would potentially see the proposal is low, then the visual impact would be lower than if a large number of people have the same view.

For the purpose of this Visual Impact Assessment, the general categories of visibility have been defined broadly and are presented in Table 3 below. In order to assess the Project, the following visibility categories have been used, and are based on the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA) prepared by the Landscape Institute (UK), which are commonly used for Visual Impact Assessments within NSW.

Table 3: Visibility Categories

High	Where a large number of people would see the proposed development at short distance over a short, moderate or long period of time
Moderate	Where a small number of people would see the proposed development at a short or medium distance over a moderate or long period of time, or a moderate number of people would see the proposed new development at a medium distance over a short, moderate or long period of time, or a large number of people would see it at a medium or long distance over a short period of time
Low	Where a small number of people would see the proposed development at long distance over a short, moderate or long period of time.

For the purpose of this Visual Impact Assessment, the criteria listed in Table 4 have been determined and used in the visibility assessment for the site.

Table 4: Visibility Assessment Criteria

Category	Definition
Number of Viewers	
High Moderate Low	> 1,000 people per day 100 – 1,000 people per day < 100 people per day
View Distance	
Long distance Medium distance Short distance	> 3 km 1.5 km – 3 km < 1.5 km
Period of View	
Long term Moderate term Short term	> 120 minutes 1 – 120 minutes < 1 minute

8.2. ASSESSMENT

We assessed the site from the eighteen (18) identified View Points based on the Visibility Assessment Criteria shown in Table 4. A summary of this assessment is shown in Table 5; further commentary can be found in Appendix A. It is important to note that for some View Points, while the existing facility is visible, the new development will not be visible due to the direction of view and/or topography and/or vegetation. This is reflected in the visibility assessment.

Assessment of the number of potential viewers is based on the size of the local population (5,040 in Oberon LGA, 3,185 in Oberon State Suburb and 2,459 in Oberon Urban Centre) and traffic counts conducted by SMEC for a Traffic Assessment Report in late 2015.

The roads around Oberon are mostly flanked by trees. Generally, those views that were not in the immediate vicinity were between breaks in the trees. The speed limit on the roads around town ranges from 80km/h to 100km/h. Consequently, these views are both brief and limited to a small 'window' where there is a break in the vegetation. It is not unreasonable to assume that many drivers on these roads would not even see the existing facility as they would be travelling at speed and not looking in the direction of the view of the site.

The most common number of potential viewers is moderate. The most common distance of view is medium. The most common period of view is short. In summary, the overall site has MODERATE visibility to the public in general.

Table 5: Visibility Assessment

Site Viewed from VP1 (Duckmaloi Road): MODERATE number of potential viewers; LONG distance of view; and SHORT period of view.	**Site Viewed from VP2** (Edith Road): MODERATE number of potential viewers; LONG distance of view; and SHORT period of view.
Site Viewed from VP3 (Abercrombie Road): NOT APPLICABLE - new development not visible from this location	**Site Viewed from VP4** (Rutters Ridge Rd): LOW number of potential viewers; MEDIUM distance of view; and LONG period of view.
Site Viewed from VP5 (Hazelgrove Rd): MODERATE number of potential viewers; MEDIUM distance of view; and SHORT period of view.	**Site Viewed from VP6** (Hazelgrove Rd): MODERATE number of potential viewers; MEDIUM distance of view; and SHORT period of view.
Site Viewed from VP7 (Albion Rd, Tarana Rd junction): MODERATE number of potential viewers; MEDIUM distance of view; and MODERATE period of view.	**Site Viewed from VP8** (Ross St, nr Oberon Golf Club): MODERATE number of potential viewers; MEDIUM distance of view; and MODERATE period of view.
Site Viewed from VP9 (Abercrombie/O'Connell/ Albion roundabout): MODERATE number of potential viewers; MEDIUM distance of view; and MODERATE period of view.	**Site Viewed from VP10** (O'Connell Road): MODERATE number of potential viewers; MEDIUM distance of view; and SHORT period of view.
Site Viewed from VP11 (O'Connell Road): MODERATE number of potential viewers; MEDIUM distance of view; and SHORT period of view. N.B. Site temporarily visible during roadworks	**Site Viewed from VP12** (Lowes Mount Rd, Clover Ln junction): MODERATE number of potential viewers; SHORT distance of view; and SHORT period of view.
Site Viewed from VP13 (Albion St, nr Hawken St junction): HIGH number of potential viewers; SHORT distance of view; and MODERATE period of view.	**Site Viewed from VP14A** (Oberon St, Ross St junction): HIGH number of potential viewers; SHORT distance of view; and MODERATE period of view.
Site Viewed from VP14B (Oberon St, North St junction): HIGH number of potential viewers; SHORT distance of view; and MODERATE period of view.	**Site Viewed from VP15** (football oval, Lowes Mount Rd): HIGH number of potential viewers; SHORT distance of view; and LONG period of view.
Site Viewed from VP16 (Lowes Mount Rd, southern entrance to the site): HIGH number of potential viewers; SHORT distance of view; and MODERATE period of view.	**Site Viewed from VP17** (Lowes Mount Rd, southern entrance to the site): MODERATE number of potential viewers; SHORT distance of view; and SHORT period of view.
Site Visibility Summary **Number of Potential Viewers:** **Distance of View:** **Period of View:**	 Low 1 Moderate 11 High 5 Total 17 Short 7 Medium 8 Long 2 Total 17 Short 8 Moderate 7 Long 2 Total 17

9.0 VISUAL ABSORPTION CAPACITY

9.1. METHOD

Visual Absorption Capacity (VAC) is the estimated capacity of the landscape to absorb development without creating significant visual change which results in a reduction in scenic quality. The capacity to absorb development is primarily dependent on vegetation cover, landform and the presence of other development. VAC increases where the development being assessed has visual forms which complement the existing environment.

Large footprint, large volume, highly coloured, sharp-edged structures will have less chance of achieving a high level of visual absorption into an unmodified natural environment than small, understated smooth-form structures coloured to blend into the existing environment. Table 6 details the criteria for the Visual Absorption Capacity of an area.

Table 6: Visual Absorption Categories

High	Landscape able to absorb development Low degree of visual contrast would result
Moderate	Landscape able to absorb some development Some visual contrast would result
Low	Landscape unable to absorb development High degree of visual contrast would result

It is important to note that the assessment of VAC is intended to relate to a landscape setting larger than simply the subject sites.

9.2. ASSESSMENT

From the majority of View Points there would be little visual contrast due to the distance of view. It is also important to note that many of the View Points are very specific locations where the site becomes briefly visible when travelling at speed and that for long distances either side of the identified View Point the site is not visible at all and the landscape will block views of the Project.

Where View Points are assessed as having a moderate VAC, the visual contrast results from an intensification of the existing landscape – more industrial development in an industrial area – rather than a change in landscape character. The site is not constantly visible around the industrial area, but is often blocked from view by other industrial development.

View Points assessed as having a high VAC are located in the closest proximity to the south-western corner of the subject site, where most of the new development is concentrated. Here the visual contrast is in replacing low-scale buildings with larger structures, rather than a change to the visual character of the landscape.

The VAC of the landscape is summarised in Table 7.

Table 7: Visual Absorption Capacity

View Point **Category**	*VP 1*	*VP 2*	*VP 3*	*VP 4*	*VP 5*	*VP 6*	*VP 7*	*VP 8*	*VP 9*	*VP 10*	*VP 11*	*VP 12*	*VP 13*	*VP 14 A*	*VP 14 B*	*VP 15*	*VP 16*	*VP 17*
High	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓				
Moderate							✓	✓					✓		✓			✓
Low																✓	✓	

On the basis of the above assessment, we conclude that the VAC for the site is HIGH.

10.0 VISUAL IMPACT RATING

The following matrix provides the means of setting the visibility rating for the site against the VAC, to arrive at a determination of the Visual Impact Rating (VIR).

In turn, it is this rating which determines whether or not any mitigation is required to reduce the visual impact to acceptable levels.

Table 8 is a matrix showing how the visibility and the visual absorption rating of the site combine to give the Visual Impact Rating. The Visibility of the site is based on the number of locations and distance it can be seen from, whilst the Visual Absorption Rating is the ability of the landscape and vegetation to shelter the project from view.

The Site has a MODERATE level of visibility and a HIGH VAC.

Using the matrix to align these two values, the result is a LOW Visual Impact Rating, as indicated by the shadings in the matrix below.

Table 8: Visual Impact Matrix

	1. VISIBILITY		
	LOW	MODERATE	HIGH

2. VISUAL ABSORPTION CAPACITY	**3. VISUAL IMPACT RATING**		
HIGH	LOW	LOW	MODERATE
MODERATE	LOW	MODERATE	HIGH
LOW	LOW	MODERATE	HIGH

11.0 RECOMMENDED MITIGATION MEASURES

Although the Project results in a low Visual Impact Rating, we recommend the following mitigation methods to ensure that this low rating is achieved.

LANDSCAPING

1. Provide screening vegetation where possible along the boundary and/or around the new warehouse in the northern part of the site.

2. Provide screening vegetation along the western boundary of the site in the south-west corner to screen new development when viewed from the road. The aim should be to replicate the effect of the existing screen planting along Lowes Mount Road.

3. Add screening vegetation along the southern boundary of the site in the south-west corner to soften the impact of the acoustic wall in this location when viewed from the oval. The aim should be to replicate the effect of the screening vegetation on the western boundary of the site.

MATERIALS AND COLOURS

For the proposed buildings within the Project Area select:

4. Facade materials that are of low reflectivity.

5. A colour palette that matches the existing development. This will enable the built form to blend in with its landscape context and reduce its visibility from View Points with a medium and long distance of view, such as VP2 and VP9.

VISUAL INTEREST

6. Provide an entry feature at the southern entrance on Lowes Mount Road (Gate 4). This could be a landscape statement, a signage element or a public art element. This feature should provide visual interest in the landscape and enhance views along Lowes Mount Road (VP16).

LIGHTING

7. The facility operates twenty hour hours per day. Lighting must be designed to minimise impacts on surrounding residential development and local roads. Recommended mitigation measures are:

    - only lighting required spaces within the Project Area;
    - focusing lights down, not up or out;
    - providing minimum lux levels to achieve the desired outcomes of safety and security;
    - minimising reflective material throughout the Project Area.

12.0 CONCLUSION

The proposed development is an extension of an existing timber processing facility. The Project Area is primarily located in the north-west and south-west corners of the site. The existing facility is visible from a number of locations in all directions and at various distances. However, it tends to be visible from very specific View Points where there are breaks in vegetation, rather than visible for long periods of time when travelling around the town. Within the industrial area, the subject site often disappears from view behind other industrial buildings.

The Project has a MODERATE level of visibility and a HIGH Visual Absorption Capacity, giving it an overall low Visual Impact Rating.

The most significant potential visual impacts are within the immediate vicinity at the southern entrance on Lowes Mount Road (Gate 4) (VP16) and from the football oval on Lowes Mount Road (VP15). There will also be some impacts close to the northern entrance (Gate 6) and when the site is viewed from the north. The proposed mitigation measures aim to minimise impacts on these locations in particular.

If the Project incorporates the proposed mitigation measures, the visual impact on the surrounding area will be minimal.

APPENDIX A

VIEW POINTS

VIEW POINT 1 - DUCKMALOI ROAD

Location of View Point

Location Coordinates:
Latitude: 33°43'37.92"S
Longitude: 149°56'4.00"E

Visibility Assessment

- MODERATE number of potential viewers
- LONG distance of view
- SHORT period of view

The existing facility briefly comes into view when travelling on Duckmaloi Road, approximately 8km from the subject site. From this vantage point, the new warehouse and new plant and buildings would be visible above the building line of the existing facility. However, at this distance, the visual contrast would be negligible.

Photograph from View Point

VIEW POINT 2 - EDITH ROAD

Location of View Point

Location Coordinates
Latitude: 33°43'39.12"S
Longitude: 149°52'35.33"E

Visibility Assessment
- MODERATE number of potential viewers
- LONG distance of view
- SHORT period of view

The existing facility briefly comes into view when travelling on Edith Road, approximately 4km from the subject site. From this vantage point, the new warehouse and new plant and buildings would be visible above the building line of the existing facility. However, at this distance, the visual contrast would be negligible.

Photograph from View Point

VIEW POINT 3 - ABERCROMBIE ROAD

Location of View Point

Location Coordinates
Latitude: 33°44'52.19"S
Longitude: 149°49'6.49"E

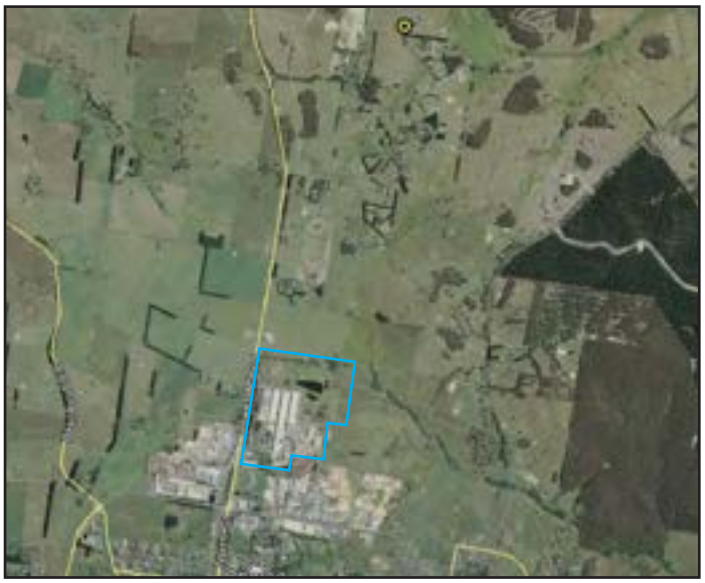
Visibility Assessment

- NOT APPLICABLE - new development not visible from this location

The existing facility comes briefly and intermittently into view through gaps in the trees along this stretch of Abercrombie Road, approximately 7km from the subject site. By taking a 10x zoom photograph it is possible to discern the tallest parts of the existing site above the tree line. As the new additions are lower in height than the existing plant, it is highly unlikely that the new development would be visible from this location.

Photograph from View Point

VIEW POINT 4 - RUTTERS RIDGE ROAD



Location of View Point

Location Coordinates
Latitude: 33°40'3.04"S
Longitude: 149°52'8.17"E

Visibility Assessment
- LOW number of potential viewers
- MEDIUM distance of view
- LONG period of view

Rutters Ridge Road is a no through road lined with farms and smallholdings. The existing facility is visible from several points along this road. As this View Point is north of the subject site, the new warehouse would be visible to the right of the existing plant shown in the highlighted section of the photograph below.

Photograph from View Point

VIEW POINT 5 - HAZELGROVE ROAD

Location of View Point

Location Coordinates
Latitude: 33°41'20.92"S
Longitude: 149°52'31.90"E

Visibility Assessment
- MODERATE number of potential viewers
- MEDIUM distance of view
- SHORT period of view

The existing facility becomes briefly visible at this point on Hazelgrove Road where there is a break in the vegetation. The new warehouse in the north of the subject site would be hidden from view by the tree in the right of the highlighted section of the photograph below. The uppermost parts of some plant equipment would be visible amongst the existing development. At this distance, very little visual contrast would result.

Photograph from View Point

VIEW POINT 6 - HAZELGROVE ROAD

Location of View Point

Location Coordinates
Latitude: 33°41'49.23"S
Longitude: 149°52'38.98"E

Visibility Assessment
- MODERATE number of potential viewers
- MEDIUM distance of view
- SHORT period of view

The existing facility becomes briefly visible at this point on Hazelgrove Road where there is a break in the vegetation. The new warehouse in the north of the subject site would not be visible. Some plant equipment would be visible amongst the existing development. At this distance, very little visual contrast would result.

Photograph from View Point

VIEW POINT 7 - ALBION STREET, TARANA ROAD JUNCTION

Location of View Point

Location Coordinates
Latitude: 33°42'4.75"S
Longitude: 149°52'21.97"E

Visibility Assessment

- MODERATE number of potential viewers
- MEDIUM distance of view
- MODERATE period of view (SHORT for drivers/riders, LONG for residents)

This viewpoint is located adjacent to a new aged care facility. A new bicycle path traverses this corner. A new housing estate and a motel are also located in the vicinity, resulting in viewer numbers at the upper end of moderate. The existing facility is visible from this View Point; other industrial sites are located closer to the viewer. New plant, buildings and warehouse are anticipated to be visible in the short term amongst the existing development until the trees along Albion Street grow taller.

Photograph from View Point

VIEW POINT 8 - ROSS STREET, NEAR ENTRANCE TO OBERON GOLF CLUB

Location of View Point

Location Coordinates
Latitude: 33°42'43.11"S
Longitude: 149°51'24.79"E

Visibility Assessment
- MODERATE number of potential viewers
- MEDIUM distance of view
- MODERATE period of view

This View Point is located at the crest of a hill in the southern part of town, close to the entrance of Oberon Golf Club. From this location, the new warehouse in the northern part of the site will not be visible. New plant and buildings in the southern part of the site will be visible clustered around the existing development.

Photograph from View Point

VIEW POINT 9 - ABERCROMBIE/O'CONNELL/ALBION ROADS ROUNDABOUT

Location of View Point

Location Coordinates
Latitude: 33°41'54.60"S
Longitude: 149°50'41.80"E

Visibility Assessment
- MODERATE number of potential viewers
- MEDIUM distance of view
- MODERATE period of view

This busy roundabout is used by a great number of vehicles accessing Oberon's Industrial Area. The site becomes visible on a few hundred metres south-west on Abercrombie Road and remains visible amongst the Industrial Area along Albion Street. A small part of the new warehouse may be visible from this View Point; new plant will be visible above the roof line of the Highland Pine Products facility located between the viewer and the Borg Panels site.

Photograph from View Point

VIEW POINT 10 - O'CONNELL ROAD

Location of View Point

Location Coordinates
Latitude: 33°41'42.40"S
Longitude: 149°50'31.43"E

Visibility Assessment
- MODERATE number of potential viewers
- MEDIUM distance of view
- SHORT period of view

The subject site becomes briefly visible on O'Connell Road where there is a break in the trees. From this location, the Highland Pine Products facility is located between the viewer and Borg Panels. The new warehouse will be blocked from view by the vegetation left of the highlighted section of the photograph below. New plant and buildings will be just visible above the tree line in the centre of the highlighted section below.

Photograph from View Point

VIEW POINT 11 - O'CONNELL ROAD

Location of View Point

Location Coordinates
Latitude: 33°40'48.89"S
Longitude: 149°50'15.95"E

Visibility Assessment
- MODERATE number of potential viewers
- MEDIUM distance of view
- SHORT period of view

One of the tallest parts of the existing facility becomes visible in this location. This section of O'Connell Road is currently being widened. Until the roadworks commenced, the subject site was blocked from view by trees. When the vegetation is reinstated at the completion of the roadworks, the facility will no longer be visible. Due to topography and vegetation, it is unlikely that the new development will be visible from this View Point.

Photograph from View Point

VIEW POINT 12 - LOWES MOUNT ROAD, CLOVER LANE JUNCTION

Location of View Point

Location Coordinates
Latitude: 33°41'1.22"S
Longitude: 149°51'30.41"E

Visibility Assessment
- MODERATE number of potential viewers
- SHORT distance of view
- SHORT period of view

Generally the existing facility is hidden view along Lowes Mount Road and only becomes visible at intersections, entrances to the site, and when there are breaks in the trees. The tallest parts of the existing facility are visible above the tree line in this location. The new warehouse would be partly visible through the trees.

Photograph from View Point

VIEW POINT 13 - ALBION STREET, NEAR HAWKEN STREET JUNCTION

Location of View Point

Location Coordinates
Latitude: 33°42'0.31"S
Longitude: 149°51'56.61"E

Visibility Assessment
- HIGH number of potential viewers
- SHORT distance of view
- MODERATE period of view

The existing facility is visible along much of Albion Street. Other industrial facilities can be seen in the foreground and background. It is unlikely that the new warehouse in the northern part of the site will be visible from this View Point. New plant and buildings in the south part of the site will be visible. However, given the industrial nature of this viewshed, little visual contrast will result.

Photograph from View Point

VIEW POINT 14A - OBERON STREET, ROSS STREET JUNCTION

Location of View Point

Location Coordinates
Latitude: 33°42'15.73"S
Longitude: 149°51'28.56"E

Visibility Assessment
- HIGH number of potential viewers
- SHORT distance of view
- MODERATE period of view

The existing facility is visible above the tree line from this major intersection on Oberon's main street. The new warehouse in the northern part of the site will not be visible from this location. The tallest element of the new development in the southern part of the site, the silos, will be hidden behind the trees to the left of the highlighted section in the photograph below. Consequently, visual contrast from this View Point will be negligible.

Photograph from View Point

VIEW POINT 14B - OBERON STREET, NORTH STREET JUNCTION

Location of View Point

Location Coordinates
Latitude: 33°42'13.58"S
Longitude: 149°51'14.66"E

Visibility Assessment
- HIGH number of potential viewers
- MEDIUM distance of view
- MODERATE period of view

This intersection was chosen as it is reasonably busy due to the presence of a service station. The existing facility is visible above the tree line from this intersection on Oberon's main street. The new warehouse in the northern part of the site will not be visible from this location. New plant and buildings will be visible above the tree line, generally in the left portion of the highlighted section of the photograph below.

Photograph from View Point

VIEW POINT 15 - FOOTBALL OVAL, LOWES MOUNT ROAD

Location of View Point

Location Coordinates
Latitude: 33°41'50.29"S
Longitude: 149°51'20.87"E

Visibility Assessment
- HIGH number of potential viewers
- SHORT distance of view
- LONG period of view

The football oval is immediately adjacent to Borg's landholdings. The number of viewers here will be high due to passing traffic and users of the oval. The new plant and buildings in the south-western section of the subject site will be highly visible from this location. The shed on the left of the photograph below will be demolished to make way for the new silos, which will be large in scale. This location will have one of the highest degrees of visual contrast; however, this is clearly an existing industrial landscape.

Photograph from View Point

VIEW POINT 16 - LOWES MOUNT ROAD, SOUTHERN ENTRANCE TO BORG PANELS SITE

Location of View Point

Location Coordinates
Latitude: 33°41'40.49"S
Longitude: 149°51'20.60"E

Visibility Assessment
- HIGH number of potential viewers
- SHORT distance of view
- MODERATE period of view

This View Point has a high number of viewers, comprising employees of Borg and Highland Pine, and passing traffic. The period of view will be short for passing traffic and longer for employees. The majority of the low-scale buildings in the photograph below will be demolished and replaced with larger scale plant and buildings. A high degree of visual contrast will result in this location; however, it is a matter of scale rather than usage, as this is clearly an industrial landscape.

Photograph from View Point

VIEW POINT 17 - LOWES MOUNT ROAD, NORTHERN ENTRANCE TO BORG PANELS SITE

Location of View Point

Location Coordinates
Latitude: 33°41'25.84"S
Longitude: 149°51'24.75"E

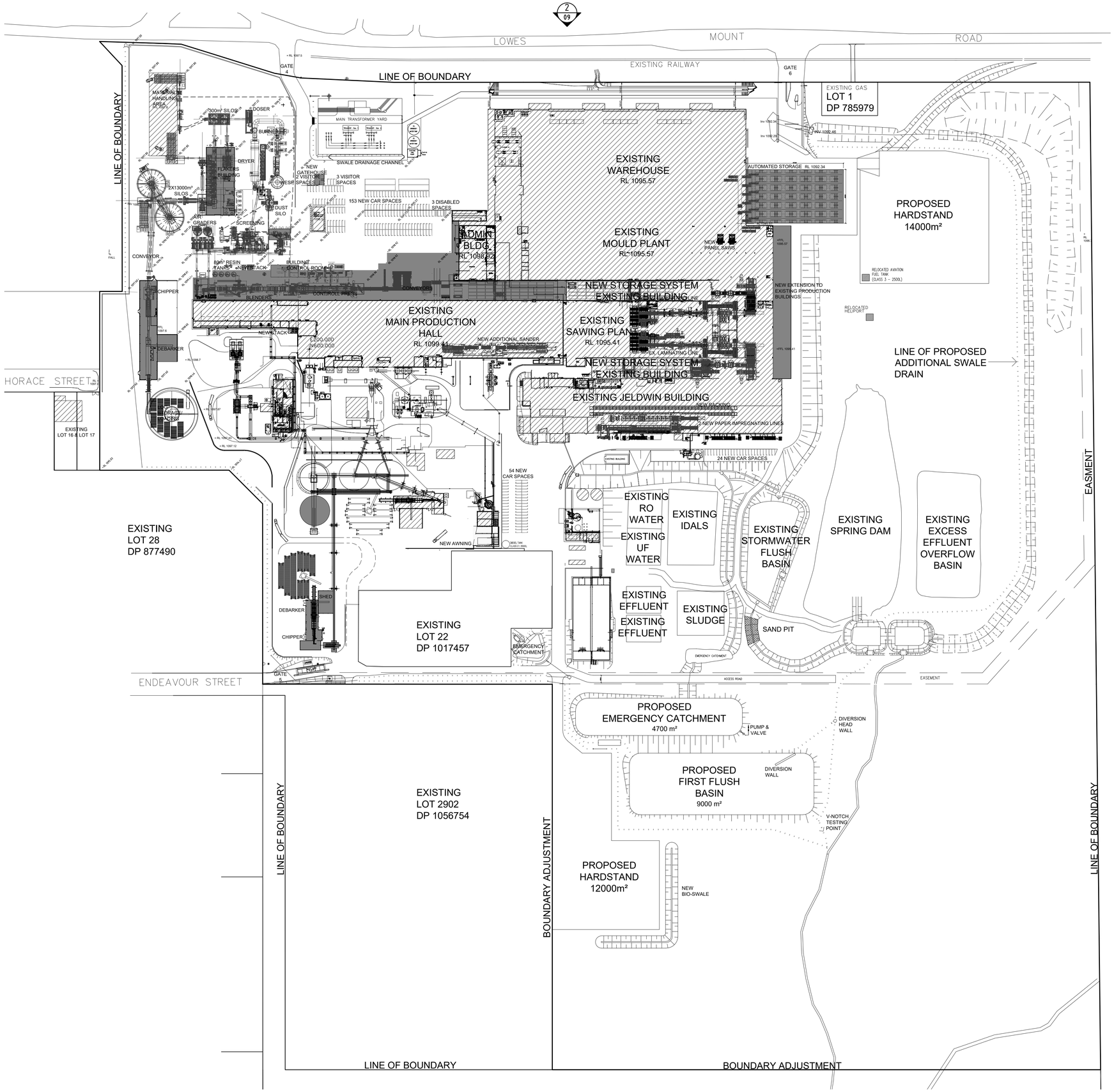
Visibility Assessment
- MODERATE number of potential viewers
- SHORT distance of view
- SHORT period of view

A new on grade car park will be constructed on the left of the photograph below behind the existing gas infrastructure. This will not be visible from the street. The new warehouse will be built adjacent to the existing warehouse; the gatehouse will be demolished to make way for it. At 35m tall, the new warehouse will result in a high degree of visual contrast. As with View Point 16, this relates to scale rather than character.

Photograph from View Point

APPENDIX B

PLANS



NOTE:

LOT BOUNDARIES FOR CONSOLIDATION ARE NOT SHOWN ON THIS PLAN (FOR CLARITY) - REFER DA 04 CONSOLIDATION PLAN FOR DETAIL

REFER TO KEY PLAN FOR REFERENCES TO DOCUMENTATION OF NEW WORKS

LEGEND:

- EXISTING BUILDINGS
- PROPOSED NEW BUILDINGS
- NEW SWALE
- NEW PIPE
- VALVE

Issue	Description	Date	Drawn	Auth
P10	PRELIMINARY	13/5/16		
P9	PRELIMINARY	4/5/16		
P8	PRELIMINARY	27/4/16		
P7	PRELIMINARY	20/4/16		
P6	PRELIMINARY	18/4/16		
P5	PRELIMINARY	15/4/16		
P4	PRELIMINARY	12/4/16		
P3	PRELIMINARY	12/4/16		
P2		24/3/16		
P1		18/3/16		

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS.

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE PLAN

Scale
APPROX 1:1750 (@ A1)

Stage
DA

Project Number
19

Drawing Number
DA 02

Issue
P10

0 10 20 30 40 50 70 90m

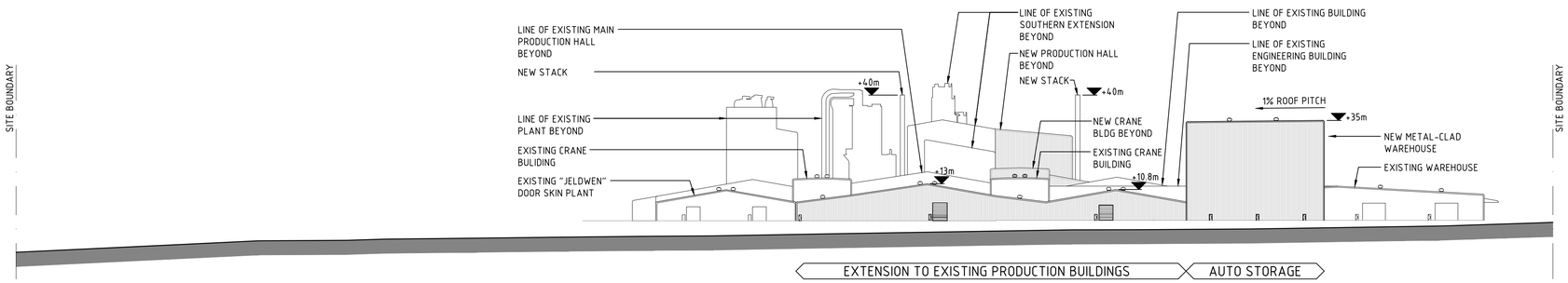
NOTE:

EXISTING GROUND LINES ARE SHOWN AT SITE BOUNDARY UNLESS NOTED OTHERWISE

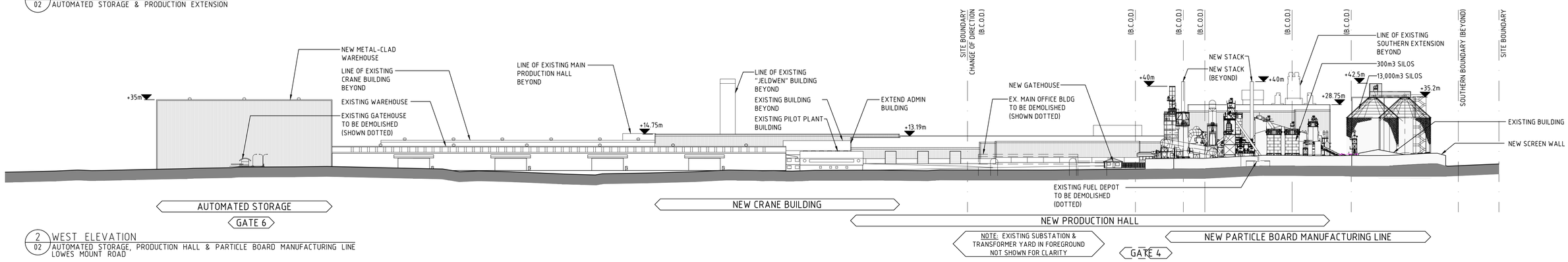
PLANT IN BACKGROUND IS SHOWN DIAGRAMATICALLY ONLY

LEGEND:

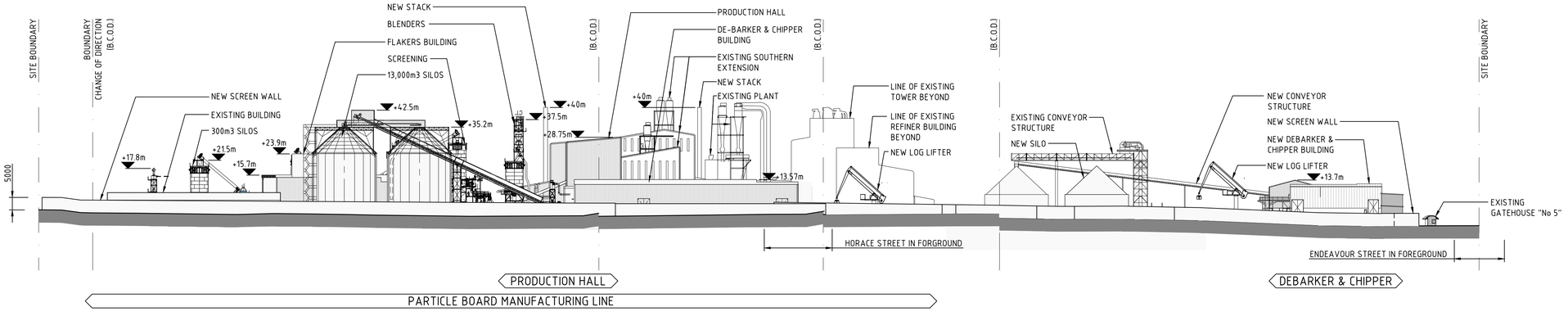
NEW WORKS:
WAREHOUSE & PRODUCTION BUILDINGS



1 NORTH ELEVATION
02 AUTOMATED STORAGE & PRODUCTION EXTENSION



2 WEST ELEVATION
02 AUTOMATED STORAGE, PRODUCTION HALL & PARTICLE BOARD MANUFACTURING LINE LOWES MOUNT ROAD



3 SOUTH ELEVATION
02 PRODUCTION HALL & PARTICLE BOARD MANUFACTURING LINE

Issue	Description	Date	Drawn	Auth
P4	PRELIMINARY	13/5/16		
P3	PRELIMINARY	13/5/16		
P2	PRELIMINARY	29/4/16		
P1	PRELIMINARY	20/4/16		

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Project
PROPOSED PARTICLE BOARD MANUFACTURING PLANT & ADDITIONAL WORKS

Location
124 LOWES MOUNT ROAD, OBERON
NEW SOUTH WALES

Drawing
SITE ELEVATIONS

Scale	Stage
1:1000 (@ A1)	DA

Project Number	Drawing Number	Issue
19	DA 09	P4

BIODIVERSITY ASSESSMENT REPORT

Borg Panels Timber Panel Processing Facility Expansion- Lowes Mount Road Oberon

PREPARED BY:

PEAK LAND MANAGEMENT

MAY 2016

PEAK LAND MANAGEMENT

Land management consulting services:

-Bushfire- **-Ecological-** **-Agricultural-**

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Cover Photo: View of subject site.

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AUTHOR DETAILS

PEAK LAND MANAGEMENT is an independent company specialising in providing quality consulting services in natural resource/land management including bushfire threat assessment. The company is a consultant member of the NSW Ecological Association and abides by their professional code of conduct and ethics, and licenced with Office of Environment and Heritage for survey and collection of threatened flora (SL 100640).

Mr Ted Smith is the Director of **PEAK LAND MANAGEMENT PTY LTD**. Ted has a Bachelor of Science Degree with Honours majoring in Physical Geography from the University of New South Wales, and a Graduate Diploma in Design for Bushfire Prone Areas from the University of Western Sydney. He is a qualified experienced Ecologist; Certified Bushfire Practitioner (FPA Aust-17671), accredited BioBanking Assessor with Office of Environment and Heritage (Accreditation No. 0043) under Part 7A of the TSC Act, and has a Certificate IV in Assessment and Workplace Training.

Ted Smith was the author of this work, and conducted all fieldwork. This report is consistent with the NSW Biodiversity Offsets Policy for Major Projects methodology being the Framework for Biodiversity Assessment (FBA).

1.0 INTRODUCTION AND BACKGROUND

PEAK LAND MANAGEMENT has been engaged by Borg Construction (referred to hereafter as Borg) to prepare a Biodiversity Assessment Report (BAR) to accompany an EIS for a proposed expansion to the existing timber panel processing facility located at Lots 1 and 2 DP 1085563, Lot 26 DP 1200697, Lot 24 DP 1148073 and part Lot 1 DP 1076346 Lowes Mount Road, Oberon (referred to hereafter as "subject site" or "development site"). Photos are shown in Appendix 4.

1.0.1 Background

The current site has approval for a medium density fibre board plant under DA 27/95, however the overall site has been under various ownership for much of its life. As such, the plant itself, and indeed, the approvals process has not benefited from a co-ordinated, structured approach. Since purchasing the site, Borgs have made a number of modifications in order to improve productivity, modernise the plants, improve site amenity and increase production levels.

In order to reflect these changes, remove land that does not form part of the operations, add additional lots and allow the increase in production, a new application is to be prepared. This will streamline the conditions of consent, and ensure that the conditions only apply to the Project. This will ensure ongoing compliance with relevant conditions, create an easier and simpler monitoring regime and remove conditions that do not apply to this particular facility, but apply to other facilities approved under the original DA.

In terms of the expansion itself, the current plant does not meet the increasing demand for Borg products, and the Project will ensure that Borgs is able to continue their growth and remain internationally competitive. This, combined with a need to modernise plant equipment and processes, has resulted in the need of an addition of a particleboard manufacturing facility for the site to guide future development and ensure the sustainable growth of the industry.

1.0.2 Project objectives

The object of the Project is to

- Allow for the construction of a dedicated Particle Board Manufacturing Line to allow Borg to continue their growth and remain internationally competitive;
- Provide additional capacity within existing buildings to expand production capacity;
- Modernise the existing facility;
- Allow for expansion to Lot 1 and 2 DP 1085563 for the purposes of a chip processing facility;
- Allow for a boundary adjustment part of Lot 1 DP 1076346 for the purposes of an expansion to the plant including emergency detention basin, first flush basin, and hardstand for vehicles which will allow improved water management including emergency spill management,
- Allow for expansion over Lot 24 DP 1148073 to enable an overflow carpark and to maintain access around the site after construction of the automated warehouse.

- Rationalise the current Conditions of Consent that apply to a number of different lots, all under fragmented ownership and operation;
- Allow for an increase in production, with a commensurate increase in staff levels.

1.0.3 Biodiversity Assessment Report (BAR)

The proposal has been assessed by the NSW Government Department of Planning and Environment, and the Secretary's Environmental Assessment Requirements (SEARs) issued which stipulate this project will be assessed under the NSW Biodiversity Offsets Policy for Major Projects. The Framework for Biodiversity Assessment (FBA) must be used by the proponent to assess all biodiversity values on the development site.

This BAR will form the basis for an application for a BioBanking Statement, in conjunction with the BioBanking Calculator statement and attached shape files, which has been prepared to account for impacts over native vegetation, as quantified by 'Ecosystem Credits" under the FBA.

Sources of information referenced within this report include:

- NSW Planning Viewer (NSW Department of Planning and Environment 2015);
- Bionet Atlas of NSW Wildlife (NSW Office of Environment and Heritage 2015);
- Protected Matters Search (Commonwealth Dept. Of the Environment 2015);
- SIX maps vegetation channel 2015
- Native vegetation (Office of Environment and Heritage VIS 2015)
- Mitchell Landscapes of the Oberon Area
- SIX Maps (LPI 2015)
- BioBanking assessor tools (Office of Environment and Heritage 2015)
- NSW Office of Environment and Heritage Threatened Species Profile Database

Previous reports of relevance to the development site include:

- Vegetation surveys were viewed through the SIX maps Vegetation Channel including:
  - FE-CRA-STHN_REVISED05_e3858
  - FE_CRA_STHN_REVISED05_P_3859
  - FOREST TYPES NSW_E_4026
  - CWLACH06_VIS_3844
  - CWLACH08_3813
  - CWLACH_P1750_VIS_3815
- Vegetation survey data analysed and downloaded:
  - Combined extant vegetation for Central West Catchment, 2008 Update VIS ID 3813.

Plot based vegetation and habitat assessment survey data was collected in accordance with the FBA 2014. This data was collected in August 2015 & March 2016 by PEAK LAND MANAGEMENT over the development site and surrounds. A reconnaissance survey was undertaken over some vegetation types within the 1000Ha circle.

1.1 Development site

The site is located in a rural area, on the northern outskirts of Oberon (Fig. 5). It is accessed from Lowes Mount Road. The existing Borg Panel Facility site is around 55Ha (includes existing facility, roads, dams and all of development proposal area). Around 7.5Ha of this land is proposed to be used directly for the expansion development footprint. The proposed development expansion area is located primarily over disturbed land (Fig. 1 & 2). It does not include any expansion over the dams to the north of the existing buildings.

It is located within the Oberon LGA and is currently zoned IN1 Heavy Industrial under the Oberon LEP 2013. The surrounding land to the east of the development footprint, owned by Borg, but not affected by this proposal, is zoned RU1 Primary Production. The proposed development is consistent with the Oberon LEP 2013.

The development site, site boundaries and proposal are shown on the Proposed development map (Fig. 1) and Site Map (Fig. 4).

1.2 Landuse History

The existing subject site is severely disturbed, with most native vegetation under and around the existing facility being cleared, and exotics or planted species occurring around the northern, western and parts of the eastern sides of the site. Activities which have occurred include industrial building construction and associated hardstands/roadworks, channel excavation/drainage line modification works, construction of numerous stormwater detention and processed water dams, earthworks, site contamination, and some planted landscape vegetation primarily for aesthetics and a wind break (being both exotic and some limited native trees).

The proposed areas of expansion occur primarily over disturbed land with no native species present, being formerly levelled/modified (all numbers as shown in Fig 1 including all of proposed carpark- numbered 30, southern parts of the hardstand, emergency & first flush basins -no's 31, 32 & 33). The remainder of the hardstand, emergency & first flush basins are located over modified native Grassland.

This site was affected by an underground tank rupture over an adjoining industrial facility located over Lot 11 DP 1017456 (upstream, over the western side of Lowes Mount Road) in the 1960's (pers. Comm. Victor Bendevski, Borg). The tank leaked Organo Chloride Pesticides (OCP) into the local creek system. The pollutant ran through this site, and entered King Stockyard Creek downstream of the subject site (Fig. 3). Since that date the tank, channels, and the creek system have been remediated.

A new creek channel (see Fig. 1) was excavated from the subject site directly to the creek (from the large stormwater dam), which is located around 50m from the proposed first flush basin. Water leaving the subject site is tested regularly by water monitoring (both groundwater- using piezometers, and surface water). These results are available if required from Borg. Borg have approval to discharge stormwater from the stormwater dams directly into the new creek channel when it is raining.

A series of dams are present over the site to capture all stormwater runoff from the site and surrounds, including dam 1 marked onto Fig. 1. Stormwater from these dams, including Endeavour Road, runoff directly into King Stockyard Creek when full, by way of a culvert pipe/part man made overland swale along the boundary of Lots 26/2902/1. The original creek channel (as shown in Figure 3) no longer exists, having been filled in years past. Water can be polluted from the runoff residue coming from the site, or upstream, hence the need for both the proposed emergency detention basin and first flush detention basin.

The remaining dams shown in Fig's 1 & 2 are for processed water coming directly from the manufacturing plant, and are highly polluted. This water is treated (filtration/reverse osmosis), and sent back to the plant for re-use. It does not enter the environment.

The upper reaches of King Stockyard Creek to the north of the site have been cleared in the past, grazed, and is now dominated by willows, and a host of other weeds. Very few native species are present. A small shade/shelter belt of various native trees is planted to the north of King Stockyard Creek, some 300m from the development site, which are unaffected by this proposal.

Figure 1a: Proposed expansion footprint (from Borg 2016)

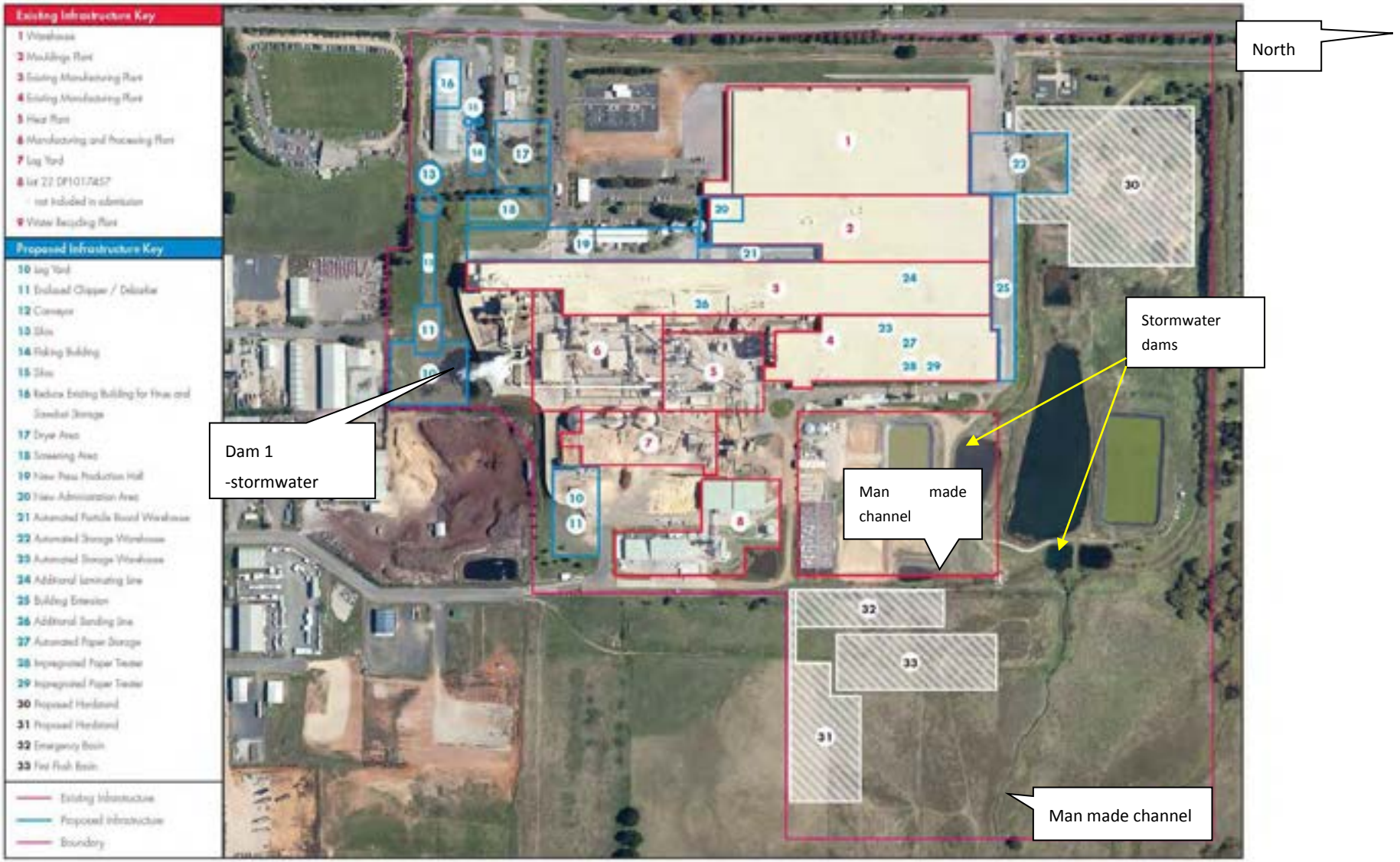


Figure 1b: Proposed expansion footprint site plan (from Borg 2016)

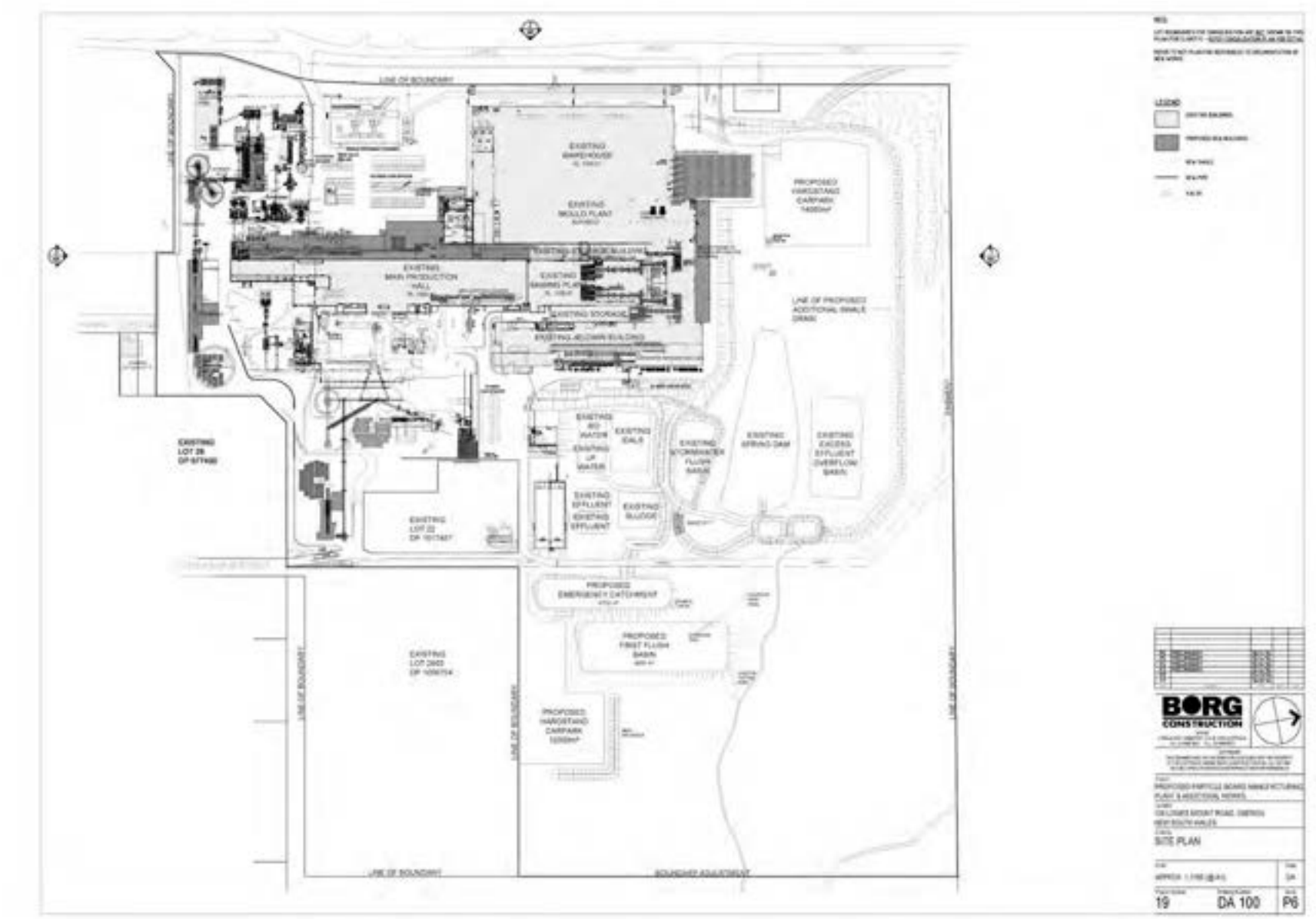


Figure 2: Aerial of site and surrounds (from Borg)

Figure 3: Topographic map of site and surrounds (from Department of Lands SIX Maps)

Figure 4: Site map

Figure 5: Locality Map

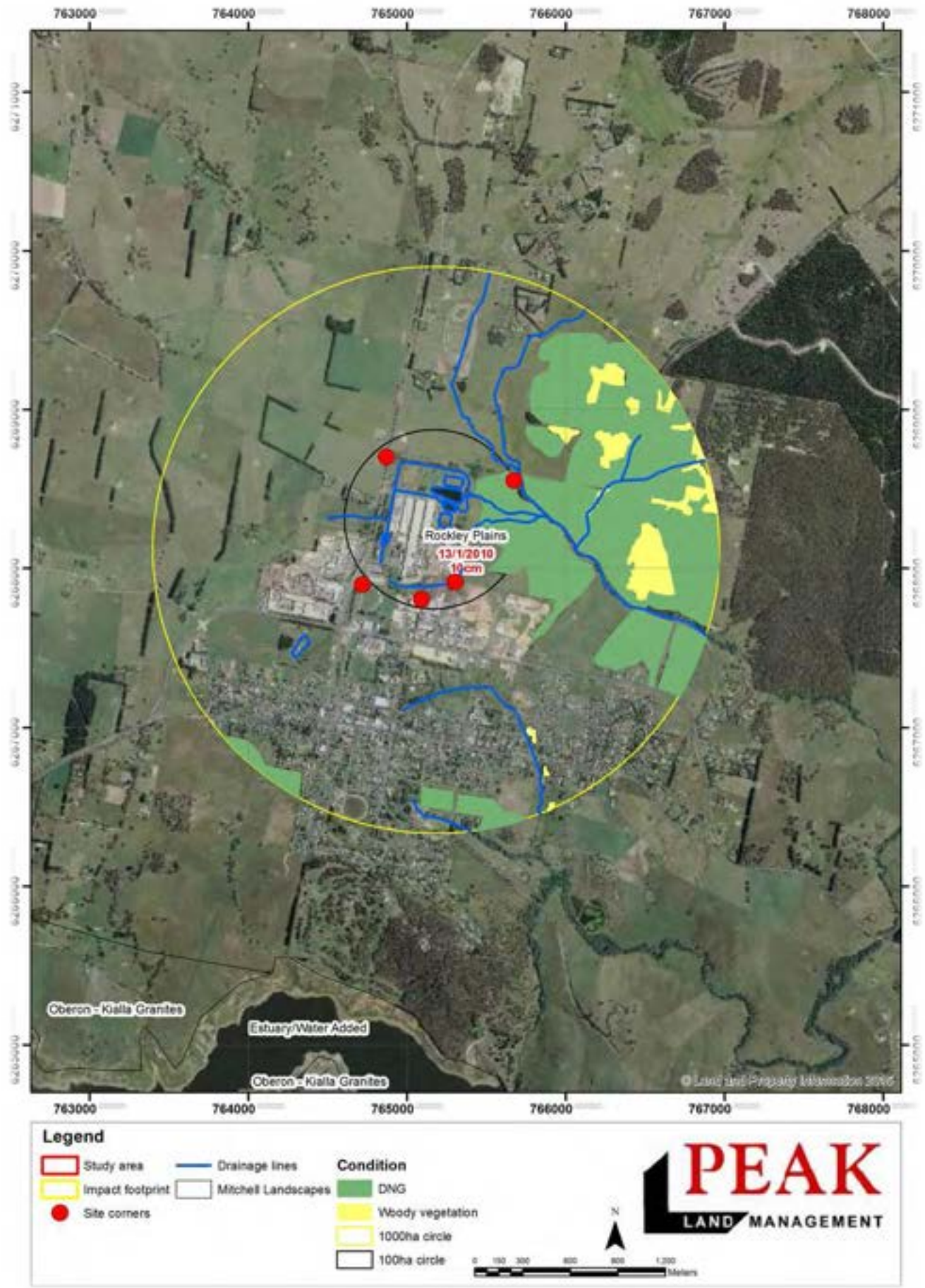
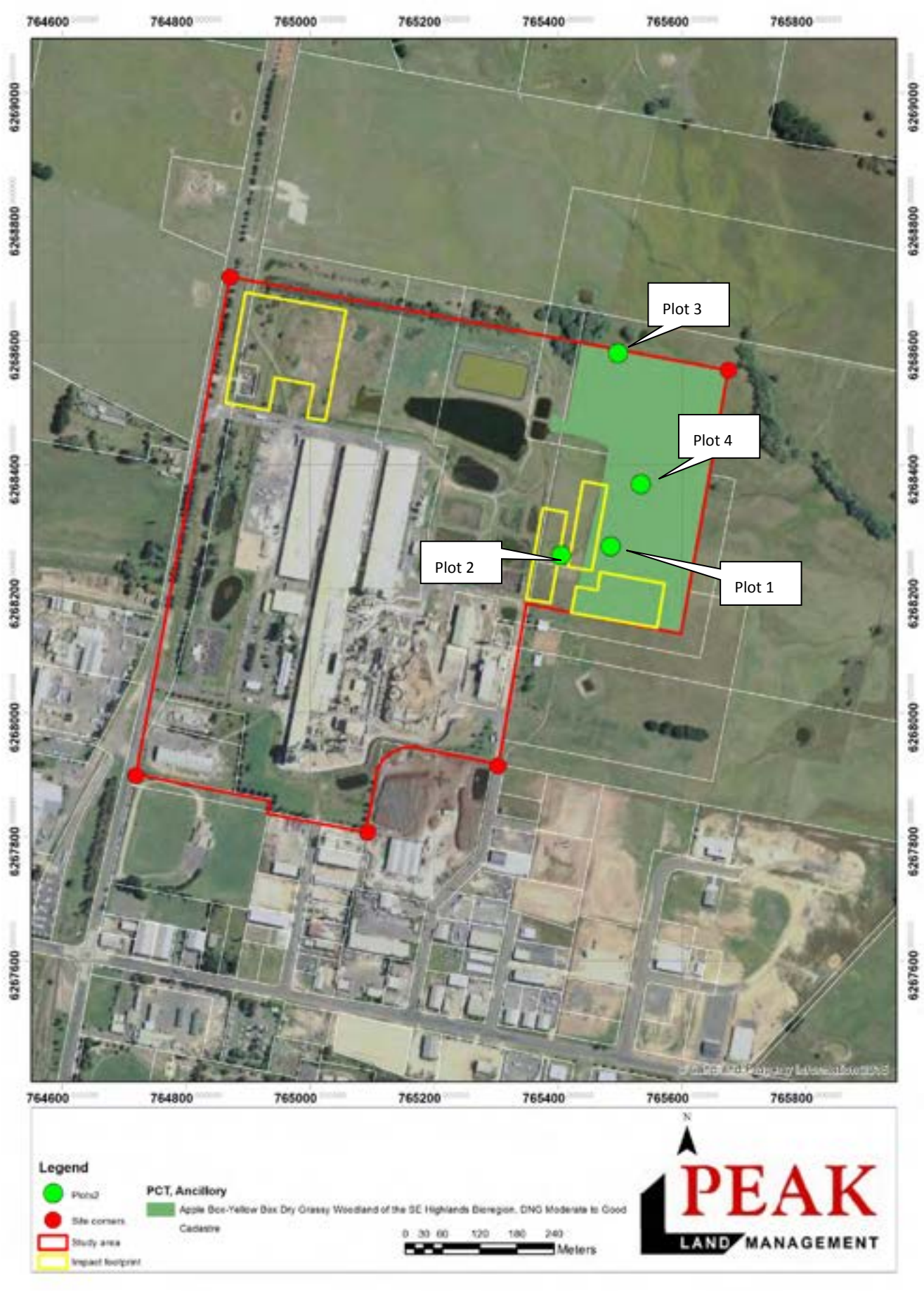


Figure 6: Plot locations. Note:- only Plot 1 data used in this assessment



2.0 LANDSCAPE FEATURES

In accordance with the FBA a number of features are assessed within and surrounding the development site in order to describe the landscape features and to calculate the final landscape score. Provided below are details related to IBRA region and subregion, NSW landscape regions (Mitchell Landscapes), rivers, streams, estuaries, wetlands, and surrounding native vegetation extent and the existence of state and regionally significant biodiversity values.

2.1 IBRA regions and IBRA subregions

The development site is located entirely within the Oberon IBRA subregion (Version 7), and within the South Eastern Highlands IBRA region (Version 7).

2.2 NSW Landscapes (Mitchell Landscapes)

The development site is located entirely within the NSW landscape region of the "*Rockley Plains*" Mitchell Landscape (V3).

The Rockley Plains landscape is described as :

Low rolling hills on plateau surface with Silurian and Ordovician slate, phyllites, felspathic sandstones and interbedded volcanics. General elevation over 1000m, relief to 150m. Red and yellow texture-contrast soils with often with prominent bleached A2 horizons. Mixed eucalyptus forest and woodlands including peppermints, stringybark, candlebark, white gums and snow gum. Cold air drainage hollows with grasslands and swamps. SEH Oberon Basalts.

It is classed as an over cleared Landscape, being 62% cleared (from VIS).

2.3 CMA Region and subregion

The development site is located entirely within the Oberon CMA Subregion, and within the Central West CMA Region.

2.4 Rivers, streams and estuaries

As described, streams in this area have been modified significantly, due to the existing Borg Facility location Fig's 3 & 5). Stormwater runoff is now diverted around the facility, both around its northern and southern extents.

Water now flows overland through a grass swale to the southern dam (marked as Dam 1 in Figure 1) from an urbanised/industrialised catchment. Runoff from this dam then flows overland through a grass swale to the Borg road entrance from Endeavour Street. The stream shown over the development site (Lot 1 DP 1076346) no longer exists, with underground pipes being located from the end of Endeavour Street (which picks up stormwater from both Borg, and the public road system). This water flows through two pipes, one via easement being directed to Kings Stockyard creek from the road runoff, and the other to a small dam

located over the development site for the Borg runoff water. The Borg water from this small dam then overflows through a manmade open grassed stormwater channel into Kings Stockyard Creek, via another man made channel over the northern part of the development site which will not be affected by any proposed works.

Dam 1 is to be removed as part of this proposal, which is polluted with first wash runoff directly entering it from the Borg facility (see photos Appendix 4) and runoff from the industrialised catchment area on the western side of Lowes Mount Road. It has no native species growing over it.

The development site is therefore within 10m of a mapped 1st Order stream riparian zone, but as the stream no longer exists, and channels are man-made, and has little ecological value being degraded and containing formerly highly polluted water, it has not been assessment further.

The proposal will improve water quality by capturing and treating polluted stormwater runoff residue coming from the Borg site, upstream industrial areas, and Endeavour Road, hence the need for both the proposed emergency detention basin and first flush detention basin.

2.5 Native Vegetation extent

A layer of native vegetation cover is required for each assessment circle (100Ha and 1000Ha) to assess the impact of the development on native vegetation. The extent of native vegetation on the development site and immediate surrounds has been mapped (Fig 5), in combination with imagery obtained from LPI's Six Viewer, and informed by reconnaissance survey undertaken by the consultant over parts of this land. It is also informed by vegetation mapping from *Combined extant vegetation for Central West Catchment, 2008 Update VIS ID 3813*.

The footprint of the development is shown on the Project Proposal Map (Fig. 1) and Site Map (Figure 5). It is approximately 7.46Ha in total. All calculations were determined using GIS (Arcmap V9.2). For the purposes of the BioBanking Statement, a total loss of 1.1Ha of native vegetation was estimated to be directly impacted (ie removed) by the proposed development. Plant community types (PCT) are discussed further below.

2.6 Local and important wetlands

No local or regional wetlands are considered to be present over the site. It is noted that stormwater dams present are not considered natural wetlands, and are polluted. Other dams over the site are processed water holding dams, extremely polluted, and water is re-used on site with no offsite disposal from these processed water dams. All dams are located upstream of the proposal. One polluted stormwater dam (marked as Dam No 1 in Figure 1) is to be removed for the proposal, as the proposed first flush detention basin will now capture and treat this water.

2.7 State, regional and local biodiversity links

No state, regional, or local biodiversity links are present.

2.8 Landscape value score components

The landscape value was assessed as per the FBA 2014 and the Tool using plot data entered. The inner circle was 100Ha, and outer circle 1000Ha. The circles were centred on the middle of the Borg Facility.

Method applied

The landscape value was assessed in accordance with the FBA 2014, by the BioBanking Calculator (The "Tool"), measuring:

a) Percent native vegetation cover in the landscape;
b) Connectivity value;
c) Patch size;
d) Area to perimeter ratio.

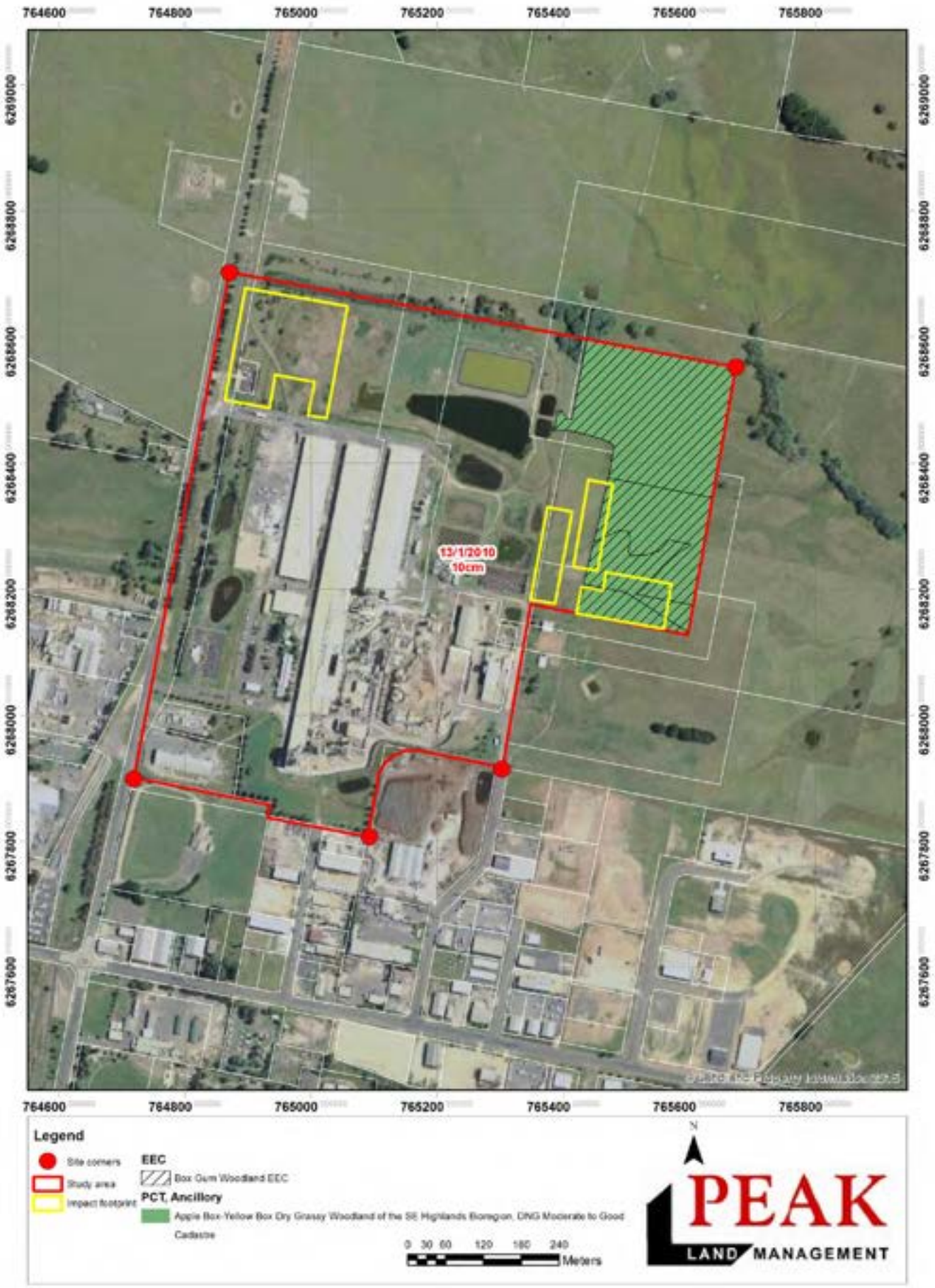
Percent native vegetation cover in the landscape

Table 14 of the BBAM was used to determine current and future scores. The native vegetation within the inner and outer circles (Figure 4), and the impact of the proposed development being loss of 1.1Ha of native vegetation in moderate-good condition was taken into account with the current and future percent native vegetation cover shown in Table 1.

Table 1: Percent (%) native vegetation cover estimates in the inner and outer assessment circles

Assessment Circle	Current (Ha)	Current (%)	Current score	Future (Ha)	Future)%)	Future score
Inner (100Ha)	12.31	11-15	2.25	11.24	11-15	2.25
Outer (1000Ha)	218.26	21-25	6.25	217.19	21-25	6.25

Figure 7: Vegetation zones and types over the development footprint and study area



Connectivity value

The development site is not part of a State or Regionally Significant Biodiversity Link, as identified by the "connectivity value classes" in Table 15 of Appendix 4 in the BBAM 2014.

Native vegetation on the subject site is part of a connecting link, but this resides along the site periphery, and will remain intact following the site development. The linkage width has been assessed as >100-500m before development, and the same after. In this case it comprises cleared vegetation, which has some native grassland groundcover, with very few scattered native trees.

The condition of the vegetation within the connection will also remain the same before and after the development, with an overstorey value assessed to be PFC < 25% of lower BM, and understorey PFC of mid-storey/ground cover at BM.

Patch size

Patch size as defined by BBAM is an area of native vegetation that:

a) *Occurs on the development site, and*
b) *Is in moderate to good condition, and*
c) *Includes native vegetation that has a gap of >100m from the next area of moderate to good condition native vegetation.*

Patch size may extend onto adjoining land that is not part of the development site.

In this case the patch size over the development site is limited to 1.1Ha, in moderate to good condition. It does however connect directly with vegetation in moderate to good condition. This vegetation (see Figure 4) patch size is 198 hectares in extent, due to presence of native grass understorey and woody vegetation further afield.

Area to perimeter ratio

As this development is not a linear shaped development, or a multiple fragmentation impact development, the area to perimeter ratio does not apply.

2.9 Landscape value score

Using the above data the final landscape score was calculated by the Tool to be 12.

3.0 NATIVE VEGETATION

3.1 Plant community types (PCT's) and threatened ecological communities

Desktop assessment determined that no meaningful vegetation communities (apart from cleared) has been mapped over the site by OEH. DEC 2006 mapped vegetation outside of the 1000Ha circle as PCT 730- Broad leaved Peppermint-Mountain Gum Dry Open Forest of the Central Highlands area of the South Eastern Highlands Bioregion. This vegetation was not present over the subject development site. This vegetation community was field referenced (mapped site inspected some 1.5kms north of the development site off Mt Lowes Rd), and found to be correct.

A web search was undertaken for Flora or fauna survey data on or around this site. A Flora survey for a granite quarry as conducted by Gingara Pty Ltd for a site located at Ferndale Road, Oberon, about 6kms east-south-east of Oberon township. This survey was located over a different soil landscape (Granite) and had a different vegetation type also being Broad leaved Peppermint-Mountain Gum Dry Open Forest of the Central Highlands area of the South Eastern Highlands Bioregion.

Field assessment determined native species over the development site, and surrounding area. The PCT tool was used to determine the PCT. As the site and surrounds are cleared, with very limited native overstorey remaining, no native mid storey, and limited native grassland species present, identification of the PCT was problematic. The presence of two remnant trees being Apple Box and Yellow Box, and native grass understory was noted. This tool highlighted a number of potential communities, with **Apple Box – Yellow Box Dry grassy Woodland of the SE Highlands Bioregion** being considered the most applicable PCT (BVTID CW102/LA103, PCTID 654).

This community is classified as an Endangered Ecological Community in NSW being equivalent to *White Box Yellow Box Blakely's Red Gum Woodland* (from http://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10837).

It is also a listed Commonwealth EPBC Critically Endangered Ecological Community being *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.*

In this case however it is not considered to be a Commonwealth Critically Endangered Ecological Community over the development site as defined by the Scientific Committee as it contained:

- <12 native non grass species;
- No important species.

In summary the EPBC committee states (from http://www.environment.gov.au// box-gum.pdf):

The Committee considers that areas in which an overstorey exists without a substantially native understorey are degraded and are no longer a viable part of the ecological community. Although some native species may remain, in most of these areas the native understorey is effectively irretrievable. In order for an area to be included in the listed ecological community,

a patch must have a predominantly native understorey. The size and life-form of understorey species are such that viable populations can exist in very small areas (Prober & Thiele 1993). Therefore, in order to be the listed ecological community, an understorey patch, in the absence of overstorey trees, must have a high level of native floral species diversity, but only needs to be 0.1 hectares or greater in size. A patch in which the perennial vegetation of the ground layer is dominated by native species, and which contains at least 12 native, non-grass understorey species (such as forbs, shrubs, ferns, grasses and sedges) is considered to have a sufficiently high level of native diversity to be the listed ecological community. At least one of the understorey species should be an important species (e.g. grazing-sensitive, regionally significant or uncommon species; such as Kangaroo Grass or orchids) in order to indicate a reasonable condition.

3.1.1 Apple Box – Yellow Box Dry grassy Woodland of the SE Highlands Bioregion

This community varies in condition and extent over the study area, being in moderate-good condition where it occurs in a small area of 1.1Ha over the subject development site. It has around 70% native understory cover present, being dominated by native grasses including Snow Grass *(Poa sieberiana subsp sieberiana)*, and exotic pasture grasses and weeds. It is therefore considered a NSW Endangered Ecological Community.

It also occurs extensively away from the development site, being a mix of moderate to good condition vegetation, and weed /pasture affected/cleared being <50% cover and low condition. No red flag variation is required for this proposal, as it is a Major Project.

3.1.2 Other vegetation

The remaining vegetation over the study area and development site has been classified as "Cleared". It consists of exotic pasture/lawn/gardens/industrial lands, poplar trees, 2-3 planted ornamental *Acacia dealbata* trees, pine trees, planted native vegetation including a windbreak/shelter belt some 300m from the development site to the north which comprises mixed Eucalypt species, and a windbreak/privacy shelter belt of Eucalypt species along part of the southern boundary near Lowes Mount Road which is to be retained.

The entire development site is extensively disturbed from former clearing, earthworks, pollution, polluted water runoff, slashing, grazing and weed invasion. All vegetation occurring over the grounds of Borg Panels/over the development site (with the exception of 1.1Ha of native vegetation described above) is planted/weeds being described as cleared.

3.2 Vegetation zones

3.2.1 Survey effort

Pre survey design including aerial photo analysis, consultation with Borg, Design Partnership, Office of Environment and Heritage, Bionet, and vegetation database research occurred prior to on site survey. A stratified survey design consisting of four plots, and meander transect over the entire development site and surrounds occurred to enable all vegetation types and habitat to be assessed. A site survey was undertaken on Friday 21st August, 2015. Weather was fine, being around 8-10^{0}C in the morning, warming up to 22^{0}C in the afternoon. A light

frost was present early but quickly dissipated. A second survey was undertaken on the 17th March, 2016. Weather was fine, around 18-20^{0}C.

Note: - as first survey occurred in winter, with frost damaged grass, some native flora species and fauna species may not have been present at this time of the year, and frost damage to grasses/lack of seed impeded grass species identification in some cases. The second survey occurred when grass was seeding, and not frost damaged, allowing better grass identification.

The survey comprised a flora, and daytime fauna survey & fauna habitat survey, over 8 hours on the first survey, and 3 hours on the second survey by Ted Smith, (Ecologist/Botanist PEAK LAND MANAGEMENT). Flora survey results are shown in Appendix 1. Four plots were assessed (Figures 6 & 8). Plot 1 data was only used within in the BioBanking Calculator tool as required under the FBA (Table 3) being 1 transect/plot per 2Ha, or 1 transect/plot if vegetation is in low condition. In this case the impact over native vegetation within the development site was <2Ha, so 1 plot was considered adequate for the BioBanking Assessment.

Plot 1 was located over the development site where some impact was anticipated over native vegetation. Plot 2 was located over another part of the development site that had no discernible native vegetation present, which was found to be true, and the results were not used in the Tool. Plot 3 was located near a creek line over 300m north of the development footprint site. It was located there to gather background native vegetation data in order to help ascertain the PCT. Data was not used in the BB calculator tool, but was used to help in PCT identification. Plot 4 was located near the northern area of the proposed first flush basin, and contained similar species diversity & condition to Plot 1 (see Appendix 1).

All flora and habitat survey data was measured according to the BioBanking field data sheets (Feb 2009). Plot one comprised a 50m long transect, and 20 x 20m quadrat. All plants and habitat attributes were measured as per the FBA and BBAM methodology outlined within the field data sheets (Appendix 5). Floristic data is shown in Table 2 for all plots.

In addition to quadrats/transects a meander transect occurred over the entire development site, and wider area within and beyond the 100Ha circle, principally to identify extent of cleared/native vegetation, species of scattered native trees located over 300m from the development site, and any native understory. This data assisted in PCT identification, determining extent of native vegetation over development site, and habitat assessment.

Table 2: Floristic survey data collected at development site

Attribute	Survey Requirement
Stratum (and layer)	All species recorded occurred in the understory grassland stratum
Growth Form	Grass & Herb & Sedge
Species name	A full list of species recorded for each plot is shown in Appendix 3.
Cover	See Appendix 5. Overall cover was 100%, comprising both weeds and native species.
Abundance rating	See Appendix 5. Weeds dominated Plot 1.

3.2.2 Condition classes, subcategories and areas

Apple Box – Yellow Box Dry grassy Woodland of the SE Highlands Bioregion within the development site was assessed as belonging to one vegetation zone, being Moderate to Good Condition (Table 3).

All vegetation that was exotic, was classed as "cleared" vegetation zone.

A description of each vegetation zone and the total area of each are provided in Table 3. Figures 7 & 8 show the spatial arrangement of these zones, and their relationship to the development footprint.

Table 3: Vegetation types and zones, a description and area within development site

Plant Community Type (PCT)	Vegetation Zone	Description	Area (ha)
Apple Box – Yellow Box Dry grassy Woodland of the SE Highlands Bioregion (PCT 654)	Low Condition	<50% native understorey, no native trees or shrubs, heavily modified from clearing/grazing/pasture improvement/weeds	1.1
Other vegetation	Cleared	Includes all land that is planted with exotic vegetation (ie *Pinus radiata* and exotic grasses)	6.36
Total Area			**7.46**

3.2.3 Use of local data

Other local data was not used in this assessment as there was no identified local data apart from that collected by PEAK LAND MANAGEMENT during survey.

3.3 Assessing site value

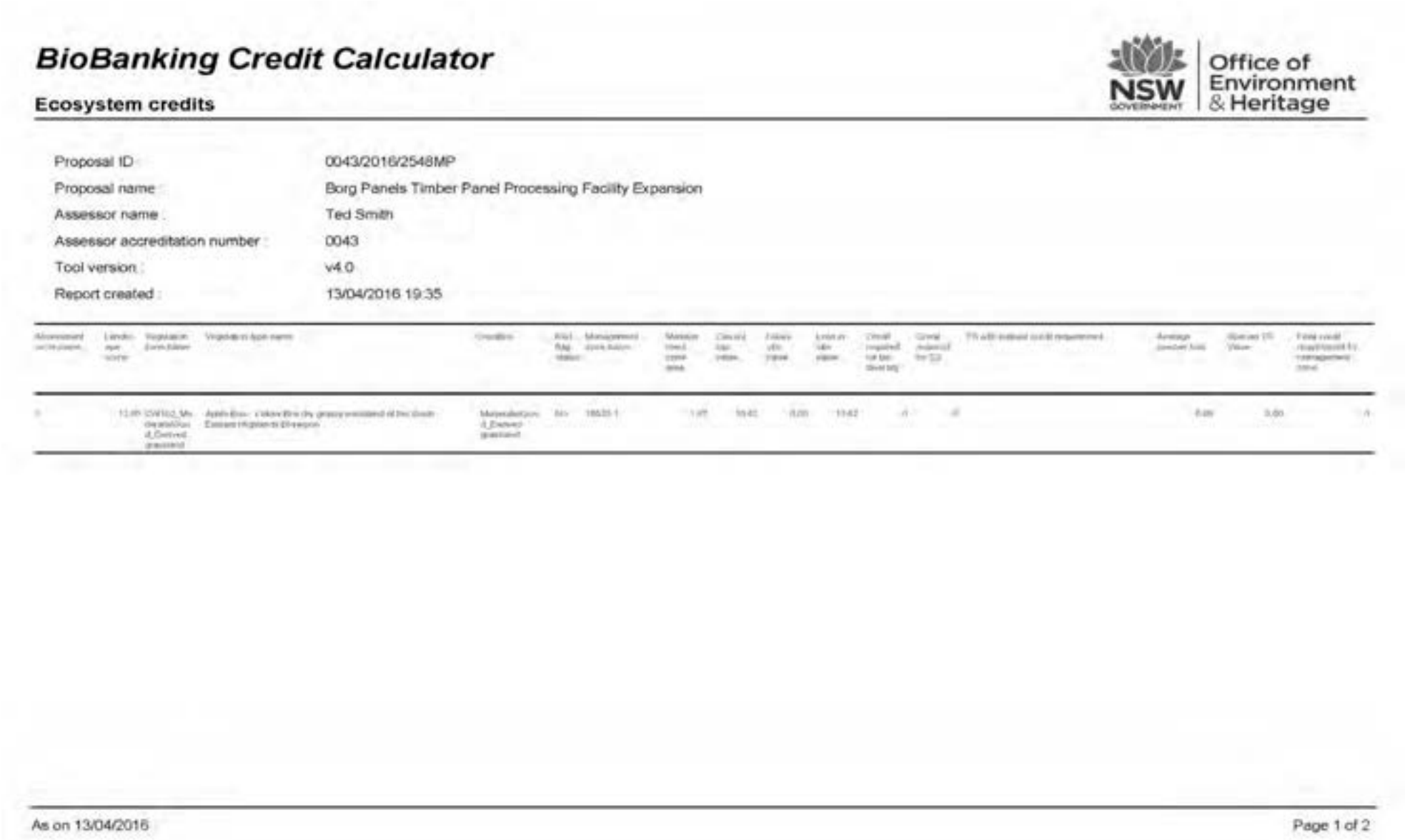
The current site value score was calculated by the Tool to be 10.42 for the development site (Fig. 8). The future score is calculated to be 0, due to loss of 1.1Ha of native vegetation.

As the site score is less than 17 , and the PCT present within the development site is not listed as an Endangered Ecological Community (as in low condition), then according to the FBA:

- *no further assessment of native vegetation is required, and*
- *an assessment of threatened species that can be predicted by habitat surrogates (ecosystem credits) in accordance with Section 6.3 of the FBA is not required, and*
- *an assessment of threatened species that cannot be predicted by habitat surrogates is undertaken in accordance with the FBA Sections 6.4 and 6.5.*

In this case no then no further assessment of vegetation is required.

Figure 8: BioBanking Credit calculator showing site value score



BioBanking Credit Calculator

Ecosystem credits

NSW GOVERNMENT | Office of Environment & Heritage

Proposal ID :	0043/2016/2548MP
Proposal name :	Borg Panels Timber Panel Processing Facility Expansion
Assessor name :	Ted Smith
Assessor accreditation number :	0043
Tool version :	v4.0
Report created :	13/04/2016 19:35

1	13.85	CWS12_Mo derate/Good_Derived grassland	Apple-Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion	Moderate/good_Derived grassland	84	18535.1	1.67	10.42	0.00	11.62	0	0		0.00	0.00	0

BioBanking Credit Calculator

Species credits

NSW GOVERNMENT Office of Environment & Heritage

Proposal ID :
Proposal name :
Assessor name :
Assessor accreditation number :
Tool version : v4.0
Report created : 13/04/2016 19:35

Scientific name	Common name	Species TG value	Identified population?	Can Id. popn. be offset?	Area / number of loss	Negligible loss	Red flag status	Number of credits
			No					

4.0 THREATENED SPECIES

4.1 Identifying threatened species for assessment

4.1.1 Ecosystem credit species

Ecosystem credit species are predicted based on habitat surrogates. No ecosystem credit species are predicted for this site. No further assessment is therefore required for ecosystem credit species.

4.1.2 Species Credit species

Geographic and habitat features

Threatened species that cannot reliably be predicted to occur on a development site based on PCT, distribution and habitat criteria are identified by the Threatened Species Profile Database (TSPD) as species credit species.

Species credit species predicted to occur over this development site following assessment of geographic and habitat features in the tool, such as site location (IBRA subregion), PCT and condition, patch size and the area of surrounding vegetation within the 1000Ha circle are shown in Table 5. Table 4 provides the answer to each question for the development site. Where the answer is yes, the species is retained in the assessment.

Table 4: Assessment of geographic/habitat features (from the Tool)

Do any of the following features occur on the area to be assessed? Tick the box wherever the feature occurs, or is likely to occur in the area to be assessed. Leave blank if the feature does not occur.

Impact?	Common name	Scientific name	Feature
☐	Large-eared Pied Bat	*Chalinolobus dwyeri*	land containing escarpments, cliffs, caves, deep crevices, old mine shafts or tunnels
☐	Brush-tailed Rock-wallaby	*Petrogale penicillata*	rocky outcrops/cliffs in Bathurst CMA subregion
☑	Green and Golden Bell Frog	*Litoria aurea*	land within 100 m of emergent aquatic or riparian vegetation
☐	Booroolong Frog	*Litoria booroolongensis*	land within 100 m of stream or creek banks
☑	Southern Bell Frog	*Litoria raniformis*	land within 100 m of emergent aquatic or riparian vegetation
☐	Pink-tailed Legless Lizard	*Aprasia parapulchella*	land containing surface rocks (embedded or loose)

The BioBanking Calculator has determined the following species require survey:

Table 5: Species requiring survey as generated by the Tool

Booroolong Frog (*Litoria booroolongensis*)
Brush-tailed Phascogale (*Phascogale tapoatafa*)
Green and Golden Bell Frog (*Litoria aurea*)
Koala (*Phascolarctos cinereus*)
Regent Honeyeater (*Anthochaera phrygia*)
Silky Swainson-pea (*Swainsona sericea*)
Squirrel Glider (*Petaurus norfolcensis*)

The FBA states that candidate species must be identified from these Species credit species generated in Table 5 by the tool by an analysis of their:

- *the geographic distribution of the species is known or predicted to occur within the development site IBRA subregion, and*
- *the development site contains habitat features or components associated with the species, as identified in the TSPS, OR*
- *past surveys undertaken at the development site indicate that the species is present.*

A candidate species is not considered to be present on the development site where :

- *after carrying out an assessment of the habitat components the assessor determines that the habitat is substantially degraded such that the candidate species is unlikely to utilise the development site.*

4.1.3 Candidate species assessment

Table 6 shows an assessment of those features required by the FBA listed above for each candidate species identified in the tool. A further analysis of habitat requirements for each of these species as listed as possibly having suitable habitat within Table 5 & 6 (using both the threatened species profile database for each species, and on site habitat assessment) is shown in Table 7. All species information data is obtained from the Office of Environment and Heritage TSPD, and Bionet records. All habitat analysis data comes from the site survey.

Table 6: Predicted threatened species for the development site (from BioBanking Tool)

Species Credit Species	Geographic distribution of the species is known or predicted to occur within the development site IBRA subregion (from TSPS)	The development site contains habitat features or components associated with the species, as identified in the TSPS
Green and Golden Bell Frog	√	√
Southern Bell Frog	√	√
Koala	√	x No trees present, no suitable habitat
Brown Treecreeper (eastern subspecies)	√	x No trees present, no suitable habitat
Diamond Firetail	√	x No suitable habitat
Flame Robin	√	x No suitable habitat
Gang-gang Cockatoo	√	x No suitable habitat

Hooded Robin (south-eastern form)	√	x No suitable habitat
Little Eagle	√	√ Vagrant
Little Whip Snake	√	x No suitable habitat
Masked Owl	√	x No suitable habitat
Painted Honeyeater	√	x No suitable habitat
Powerful Owl	√	x No suitable habitat
Scarlet Robin	√	x No suitable habitat
Speckled Warbler	√	x No suitable habitat
Regent Honeyeater	√	x No suitable habitat
Square-tailed Kite		√ Vagrant
Varied Sittella		x No suitable habitat
Spotted-tailed Quoll		x No suitable habitat
Yellow-bellied Glider		x No suitable habitat
Squirrel Glider	√	x No suitable habitat
Brush-tailed Phascogale	√	x No suitable habitat
Eastern False Pipistrelle	√	√ Degraded habitat present
Yellow-bellied Sheathtail-bat	√	√ Degraded habitat present
Silky Swainson-pea- *Swainsona sericea*	√	x Degraded unsuitable habitat, not recorded during flora survey

Table 7: Threatened flora/fauna assessment of potential impact/habitat assessment.

Species	Comments	Likely level of impact	Legal status
Green and golden bell frog (*Litoria aurea*)	Office of Environment and Heritage TSPD state :- "Formerly distributed from the NSW north coast near Brunswick Heads, southwards along the NSW coast to Victoria where it extends into east Gippsland. Records from west to Bathurst, Tumut and the ACT region. Since 1990 there have been approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. These locations occur over the species' former range, however they are widely separated and isolated. Large populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bulrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.). • Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. • Some sites, particularly in the Greater Sydney region occur in highly disturbed areas.	Negligible	NSW-E, Commonwealth-V

- The species is active by day and usually breeds in summer when conditions are warm and wet.
- Males call while floating in water and females produce a raft of eggs that initially float before settling to the bottom, often amongst vegetation.
- Tadpoles feed on algae and other plant-matter; adults eat mainly insects, but also other frogs.
- Preyed upon by various wading birds and snakes.

Habitat	Details
Breeding Habitat	Any still, slow flowing natural waterbodies with some aquatic emergent vegetation, such as *Typha* spp., *Phragmites* spp., *Eleocharis* spp, etc. will use artificial waterbodies and non-native emergent veg.
Foraging Habitat	Amongst emergent aquatic or riparian vegetation and amongst vegetation, fallen timber adjacent to and within 500m of breeding habitat, including grassland, cropland and modified pastures.
Time of year species best detected	Detected after dusk when calling during the breeding season October-January

Threats:-

- Alteration of drainage patterns and stormwater runoff.
- A fungal pathogen known as Frog Chytrid Fungus.
- Predation by feral animals such as foxes.
- Herbicides and other weed-control measures.
- Road mortality, where populations are already small due to other threats.
- Predation by exotic fish such as Plague Minnow.
- Loss of suitable breeding habitat through alteration by infilling and destruction of wetlands.
- Current knowledge of the status of the population and threats to the population is poor.
- Species occurs on private land where land management practices may not be suitable for the species, eg. grazing and loss of breeding habitat.
- Overgrowth of native vegetation around breeding habitat is cooling pools making them unsuitable for frog breeding.
- Changes in salinity due to sea level rise. Frogs are unable to breed in waters with salt concentrations of greater than 6 parts per 1000".

It is associated with Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. It is known from Oberon CMA sub region. There is one individual old record from 1977 on Bionet located over 3kms from this site to the southeast in a different sub catchment. The development site is within 500m of stormwater dams. These man made dams and creeks around this site have had a history of contamination from organochlorine pesticides, and ongoing poor quality water runoff from an industrialised catchment area. The creeks and dams are grazed by goats, reducing riparian vegetation. Some weed spraying occurs from

<table>
<tr><td></td><td>time to time. No tadpoles or calls were heard or seen during site inspection. These dams and creeks will remain unaffected by the proposal. The majority of the development site is mown, or grazed, or completely cleared.

It is considered very unlikely that this species could be present due to these constraints.</td><td></td><td></td></tr>
<tr><td>Southern Bell Frog (Litoria raniformis)</td><td>Office of Environment and Heritage TSPD state:- “One of the largest frog species in Australia, these animals may reach up to 104 mm in length, with females usually larger than males. In NSW the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain and around Lake Victoria. A few yet unconfirmed records have also been made in the Murray Irrigation Area in recent years. The species is also found in Victoria, Tasmania and South Australia, where it has also become endangered.

• Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat.
• Breeding occurs during the warmer months and is triggered by flooding or a significant rise in water levels. The species has been known to breed anytime from early spring through to late summer/early autumn (Sept to April) following a rise in water levels.
• During the breeding season animals are found floating amongst aquatic vegetation (especially cumbungi or Common Reeds) within or at the edge of slow-moving streams, marshes, lagoons, lakes, farm dams and rice crops.
• Tadpoles require standing water for at least 4 months for development and metamorphosis to occur but can take up to 12 months to develop.
• Outside the breeding season animals disperse away from the water and take shelter beneath ground debris such as fallen timber and bark, rocks, grass clumps and in deep soil cracks.
• Prey includes a variety of invertebrates as well as other small frogs, including young of their own species.

<table>
<tr><th>Habitat</th><th>Details</th></tr>
<tr><td>Breeding Habitat</td><td>Still or slow flowing natural waterbodies with some aquatic emergent veg. such as Typha, Phragmites, and Eleocharis. Will use artificial waterbodies and non-native vegetation such as rice, Sagittaria spp.</td></tr>
<tr><td>Foraging Habitat</td><td>Emergent aquatic or riparian vegetation and vegetation adjacent to and within 500m of breeding habitat, including grassland, cropland and modified pastures.</td></tr>
<tr><td>Time of year</td><td>September to May, but detectability dependant on suitable</td></tr>
</table></td><td>Negligible</td><td>NSW-E, C/wealth- V</td></tr>
</table>

	species identifiable (if flora) or best detected (if fauna) conditions (refer http://www.environment.nsw.gov.au/resources/threatenedspecies/09213amphibians.pdf). Threats:- • Removal of ground cover, fallen timber, leaf litter, etc as a result of either fire, direct clearing, overgrazing, trampling, etc. • Lack of appropriate flooding regime i.e. flooding at the wrong time of the year, infrequent flooding eg. once every 5 or 10 years, waterbodies not lasting long enough for tadpoles to develop, etc. • Alteration to natural flooding regimes from irrigation and river regulation, which may either divert water away from previously flooded wetlands or cause some areas to become permanently flooded and no longer receive rising water levels to trigger breeding. • Predation on eggs and tadpoles from exotic fish species such as carp, goldfish and mosquito fish. • Possible introduction of amphibian diseases such as Chytrid fungus, which is a waterborne pathogen. • Introduction of chemicals (pesticides, defoliants, etc) either into waterbodies or directly onto animals. • Loss of aquatic and/or terrestrial habitat through draining of waterbodies or clearing for agricultural development. • Degradation of aquatic and/or terrestrial habitat from pollution or salinisation of waterbodies, removal of shelter sources, removal of aquatic vegetation eg. from farm dams, disturbance to waterside vegetation and decreased water quality from stock and pest animals eg pigs rooting up vegetation and muddying up the water. • Road kills, particularly during wet weather when animals are dispersing throughout the landscape and crossing high traffic areas such as The Kidman Way through the Coleambally Irrigation Area". It is associated with Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. It is known from Oberon CMA sub region. Development site is within 500m of creeks/dams. No trees, shrubs or fallen timber/leaf litter, and a thick mainly weedy grass understorey/or completely cleared, compacted and levelled/ mown grass which is not suitable habitat for this species occurs over the development site. There is no water or wet areas over the development site (apart from one very polluted first flush stormwater dam), with no native wetland species present, however there is Carex spps. There are no Bionet records. The man made dams and manmade/natural creeks around this site have had a history of a contaminated spill, and ongoing poor quality water runoff from an industrialised catchment area. Flooding regime is irregular over the storm water dams, and regulated so that they do not flood. The creeks and dams are grazed by goats, reducing riparian vegetation. Some weed spraying occurs from time to time. It is considered very unlikely that this species could be present due to these constraints.		
Little Eagle,	Birds of prey such as Little Eagle, Square tailed Kite and Spotted Harrier have large	Negligi	NSW-

Square Tailed Kite	foraging ranges and can migrate in search of food resources, and would be affected in only a very minor way by this proposal due to loss of some very minor foraging resources. No raptor nests were observed in any nearby trees, or recorded in either survey.	ble	E
Eastern False Pipistrelle	It is associated with Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. It is known from Oberon CMA sub region. Office of Environment and Heritage state • Prefers moist habitats, with trees taller than 20 m. • Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. • Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. • Hibernates in winter. The site has no trees, therefore no roosting habitat is present. No tree canopy is present, and habitat is dry, although creeks and dams are present so foraging/preferred habitat is partially present over the site. The loss of 1.1Ha of Grassland is not anticipated to make anymore than a negligible effect upon this species. There are no Bionet records within 10km of this site.	Negligible	NSW-E
Yellow-bellied Sheathtail-bat	It is associated with Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. It is known from Oberon CMA sub region. Office of Environment and Heritage state: • Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. • When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. • Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory. • Breeding has been recorded from December to mid-March, when a single young is born. • Seasonal movements are unknown; there is speculation about a migration to southern Australia in late summer and autumn. Habitat is therefore present. The loss of 1.1Ha of Grassland is not anticipated to make anymore than a negligible effect upon this species. There are no Bionet records within 10km of this site.	Negligible	NSW-E
Flora			
No threatened flora species were recorded	Despite an intensive search for Silky Swainson-pea-*Swainsona sericea* no plants were recorded. Office of Environment and Heritage TSPD state: "The Silky Swainson-pea is a prostrate or erect perennial, growing to 10 cm tall. The stems and leaves are densely hairy. The leaves are up to 7 cm long, composed of 5 - 13 narrow, pointed leaflets, each up to 15 mm long. The purple pea-shaped flowers are to 11 mm long, and are held in groups of up to 8 flowers, on a stem to 10 cm tall. The spring flowers are followed by hairy pods, up to 17 mm long. Best time to identify is Spring when flowering.	Negligible	NSW-V

	Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro. Also found in South Australia, Victoria and Queensland. **Habitat and ecology** • Found in Natural Temperate Grassland and Snow Gum *Eucalyptus pauciflora* Woodland on the Monaro. • Found in Box-Gum Woodland in the Southern Tablelands and South West Slopes. • Sometimes found in association with cypress-pines *Callitris* spp. • Habitat on plains unknown. • Regenerates from seed after fire. **Threats** • Loss and degradation of habitat and/or populations for residential developments. • Loss and degradation of habitat and/or populations by intensification of grazing regimes. • Loss and degradation of habitat and/or populations by invasion of weeds. • Loss and degradation of habitat and/or populations from road works (particularly widening or re-routing). • Loss and degradation of habitat and/or populations for agricultural developments. • Infrastructure developments such as the Googong to Murrumbidgee pipeline project are known to have destroyed populations of the Silky Swainson-pea". Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands. It is associated with Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion. It is not known, only predicted, from Oberon CMA sub region. There are no Bionet records within the search area. The history of grazing, clearing/ground disturbance, and weed invasion over this site makes the occurrence of this species very unlikely. It is not known from the Oberon CMA and habitat is degraded. Unlikely to be present.		
\Endangered ecological communities/populations	Department of Environment and Heritage 2006 Scientific Committee (EPBC) note: "*White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland, to be known informally as Box – Gum Grassy Woodland and Derived Grassland Endangered Ecological Community occurs over*	Low	

	around 250 000Ha in NSW, and also occurs in the ACT, Qld and Victoria. The loss of 1.1Ha of this Endangered Ecological Community, in poor condition, is not expected to affect its distribution or ongoing viability in this locality, or regionally.		

It is therefore concluded that due to the lack of habitat and degraded nature of the habitat, paucity of Bionet recorded sightings, and lack of impact over any "natural" existing dam or creek with riparian vegetation, or over any indigenous trees/shrubs, that these species would not occur over the development site. They are therefore removed as candidate species from the assessment.

Therefore no further assessment of these species is required, and its habitat is not present.

5.0 BIODIVERSITY CREDIT REPORT

5.1 Credit Profiles

5.1.1 Ecosystem Credits

No Ecosystem credits were required for this project as detailed in Appendix 7- BioBanking Credit Report.

5.1.2 Species Credits

No Species Credits were required for this project.

6.0 STAGE 2- IMPACT ASSESSMENT

6.1 Avoid and minimize impacts on biodiversity values

6.1.1 Site selection

The background to the project is outlined in Section 1.1.0 and 1.0.2 of this report. In summary the site was selected based upon the existing Borg Facility already in place. It is a large manufacturing facility, with established infrastructure. The development is seen as a natural extension of the plant, on land already primarily disturbed, and owned by Borg.

6.1.2 Planning

The development footprint was selected by Borg Manufacturing, in conjunction with consultant and industry input. It reflects the best economic and functional layout for the facility. Operationally the basins and hardstand (which is the only area of the footprint that impacts on native grassland) was seen as the best place to locate it, and there was no other land available to house these structures located downslope of the facility.

The development footprint is sited over existing cleared, disturbed land, with the exception of 1.1Ha over native grassland in moderate-good condition, which is an Endangered Ecological Community. This layout causes minimal impact over surrounding native vegetation, and fauna habitat. The total development footprint is approximately 7.5Ha.

There is not considered scope for alternative placement of the basins. Borg Manufacturing has undergone significant long term planning for these additions, and site rationalisation. All other development over the development footprint avoids any disturbance over these native grasslands.

Recommendations have been made in Section 7 of this report for the proponent to consider mitigating indirect impacts, and improving the offsite biodiversity of the greater Borg site.

6.1.3 Construction phase

The construction phase will be in accordance with a Construction Environmental Management Plan (CEMP). The CEMP will outline appropriate erosion and sediment control, no go zones (edge of footprint area), rubbish and waste facilities, compound and stockpile site locations, noise/light, operational hours, etc. Appropriate safeguards would be implemented, and all workers/contractors toolboxed before working on site, and following OHS/SWMS protocols.

6.1.4 Operational phase

Long term erosion and sediment control has been addressed within the proposal, with an emergency and first flush basins incorporated within the design. A detailed and effective stormwater runoff re-use /treatment/operational water treatment and re-use within the Borg facility is currently in place. Consultant reports will address these issues as part of the EIS. Further information was not available at time of writing.

6.2 Confirming development footprint

The development footprint is as shown in Figure 1.

6.3 Indirect impacts

Potential indirect impacts include:

- Erosion and sediment runoff into local creeks.
- Minimal loss of fauna habitat (1.1Ha of native grassland).
- Potential for noise, dust and light spill.
- Construction and operation impacts –
    - Trampling;
    - Rubbish dumping
    - Noise;
    - Light spill;
    - Weed encroachment;
    - Nutrient run off
    - Pest animals

These indirect impacts would be addressed during the construction phase under the CEMP, and include dust suppression through regular watering, off site water monitoring, erosion and sediment control implemented and maintained over all bare areas /development footprint areas including stockpile sites, rubbish areas delineated and maintained, and no go zones over any area outside of the development footprint.

During the operational phase permanent erosion and sediment control, and nutrient control (ie a detention basin) has been addressed as part of the proposal. Light and noise spill is anticipated to be in keeping with the existing facilities operation.

Ongoing grazing of the paddocks off the development site is anticipated to continue in order to reduce bushfire threat close to the facility, and keep grassland managed. Some areas around the creek are recommended to be revegetated, and weeds controlled, however this is at the discretion of Borg, and the statutory authorities considering this proposal.

6.4 Thresholds for the assessment and offsetting unavoidable impacts

6.4.1 Landscape features

The impacts will:

- Not substantially reduce the width of vegetation in riparian buffer zones;
- Not impact on state biodiversity links;
- Not impact on important wetlands or their buffers;
- Not impact on local wildlife corridors.

6.4.2 Native Vegetation

The impacts are:

- Minor (removal of 1.1Ha) impact on a degraded Endangered Ecological Community and no impact on any Critically Endangered Ecological Community.

6.4.3 Species and Populations

The impacts will:

- Not impact on critical habitat;
- Not impact on critically endangered species or populations;
- Not impact on a threatened species or population.

6.4.4 Offset requirements

As the site score is <17, there is no requirement to determine any offset requirements under the FBA.

7.0 STAGE 3: BIODIVERSITY OFFSET STRATEGY

As the site score is <17, and impact over an Endangered Ecological Community is limited to around 1.1Ha, there are no offset requirements under the FBA.

The following recommendations (in no order of importance) if adopted will improve the biodiversity outcomes for this proposal:

- Implement standard erosion and sediment control measures over the development site whilst construction works are underway as part of CEMP.
- Retain all remaining native vegetation within proposed development site where feasible.
- Noxious weeds should be controlled/eradicated where feasible.

- Consider native revegetation within development site with endemic native species.
- Develop and implement a Vegetation Management Plan for the development site.

Report prepared by:

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PEAK LAND MANAGEMENT

DISCLAIMER: Whilst every effort is made to present clear and factual information based on current scientific data, on site field survey, and guidelines, no guarantee is made that all species have been identified on the site, or that all information is presented to the authorities satisfaction, or that the development will be approved as this is in the hands of the approving statutory authorities. Consequently no liability is accepted for losses, expenses or damages occurring as a result of information presented in this document.

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Winning, G., and Paul King, J. 2004. *A study of Squirrel Glider in a fragmented urban landscape, Newcastle, NSW.* HWR Limited.

Websites

The following legal acts and legislation were accessed through Australasian Legal Information Institute (http://www.austlii.edu.au/):

Environment Protection and Biodiversity Conservation Act 1999
Threatened Species Conservation Act 1995 and Threatened Species Legislation Amendment Act 2004
Native Vegetation Act (2003)
National Parks and Wildlife Act 1974 ,
Environmental Planning and Assessment Act (1979)
Water Management Act,2000
State Environmental Planning Policy 19, 44, 71, 14

Other Websites

The following websites have been viewed throughout the development of this report:

http://plantnet.rbgsyd.nsw.gov.au/search/simple.htm
http://imagery.maps.nsw.gov.au/
Google Earth and Maps
http://www.bionet.nsw.gov.au/
www.deh.gov.au
http://www.environment.gov.au/epbc/pmst/index.html- & Protected Matters Search
http:www.frogsaustralia.net.au/frogs/
http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed/noxious
http://www.ehp.qld.gov.au/wildlife/koalas/koala-ecology.html#claws_for_climbing
http://www.environment.nsw.gov.au/determinations
http://www.environment.nsw.gov.au/animals/Glidingpossums.htm
http://weeds.dpi.nsw.gov.au/WeedDeclarations/

Oberon Shire Council
http://www.rfs.nsw.gov.au/plan-and-prepare/1050-vegetation-clearing
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/box-gum.pdf
http://www.environment.gov.au/system/files/pages/dcad3aa6-2230-44cb-9a2f-5e1dca33db6b/files/box-gum.pdf
http://www.environment.nsw.gov.au/threatenedSpeciesApp/

Applications – iphone

- The Michael Morcombe eGuide to the Birds of Australia v1.4, 2010. Mydigitalearth.com
- Motion X GPS, 2015.
- Frogs of Australia. Hoskin, C.J, Grigg, G.C., Stewart, D.A. & Macdonald, S.L. 2015. Frogs of Australia (1.0.1/4139). (Mobile application software). Retrieved from http:www.ugmedia.com.au.

GLOSSARY OF TERMS

BBAM	BioBanking Assessment Methodology
Development site	The proposed Major Project area of land
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FBA	Framework for Biodiversity Assessment. NSW Biodiversity Offsets Policy for Major Projects
FM Act	*Fisheries Management Act 1994* (NSW)
IBRA region	A bioregion identified under the Interim Biogeographic Regionalization for Australia (IBRA) system, which divides Australia into bioregions based on their dominant landscape –scale attributes
IBRA subregion	A subregion of a bioregion identified under IBRA and based upon major catchment areas
LGA	Local Government Area
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act
Mitchell Landscape	Landscapes with relatively homogenous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250 000
NES	Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
Noxious Weeds Act	*Noxious Weeds Act 1993* (NSW)
PCT	Plant Community Type
Plot	An area within a vegetation zone in which site attributes are measured (both a 50m long transect, and 400m^2 quadrat)
OEH	Office of Environment and Heritage
NPW Act	*National Parks and Wildlife Act 1974* (NSW)
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
The Tool	BioBanking Calculator
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
TSPD	Threatened Species Profile Database
Vegetation Zone	A relatively homogenous area of native vegetation on a

	development site that is the same PCT and broad condition state
VIS	NSW Vegetation Classification database. The master vegetation community –level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW

APPENDIX 1: FLORA SPECIES RECORDED OVER PLOTS AND OFF SITE

Scientific Name	Common Name	Plots				Off site
Trees		**1**	**2**	**3**	**4**	
^Acacia dealbata	Silver wattle					x
^ Eucalyptus spps	Various planted species in shelter belt to north of study area and in grounds out of study area					x
Eucalyptus bridgesiana	Apple Box					x
Eucalyptus melliodora	Yellow Box					x
Sub Canopy/mid canopy	Nil					
Understorey: Shrubs/herbs						
Geranium homeanum	Native Geranium				x	x
Linum marginale	Native Flax				x	x
Ozothamnus diosmifolius	Pill Flower				x	x
Grasses						
Lachnagrostis filiformis subsp filiformis	Blown Grass				x	x
Poa labillardierei var. labillardierei	Tussock Grass			x	x	x
Poa sieberiana subsp sieberiana	Snow Grass	x	x	x		x
Sedges/water plants						
Carex appressa	Tall Sedge	x		x	x	x
Carex breviculmis	A sedge	x		x		x
Cyperus gracilis?	Slender Flat sedge				x	
Juncus continuus					x	x
Juncus usitatus		x		x	x	x
Ludwigia peploides subsp. *montevidensis*	Water Primrose					x
Persicaria hydropiper	Water Pepper				x	x
Phragmites australis	Native Reed			x		x
Typha orientalis	Bulrush					x
Ferns	Nil					
Vines and scramblers	Nil					
Orchids/epiphytes	Nil					
TOTAL NATIVE SPECIES (in plots)	**13**					
Weeds						
** Acetosella vulgaris*	Sheep Sorrel		x		x	x
** (2) Alternanthera philoxeroides*	Alligator Weed					x

* *Betula pendula*	Silver Birch					x
* *Bromus catharticus*	Prairie Grass				x	
* *Cirsium vulgare*	Spear thistle	x	x	x	x	x
* *Colchium autumnale*	Autumn Crocus				x	
* *Conyza bonariensis*	Flax leaved Fleabane				x	x
* *Crassocephalum crepidioides*	Thickhead		x			x
* *Cynodon dactylon*	Couch		x		x	x
* *Cyperus spps*						x
* *Dactylis glomerata*	Cocks Foot	x	x		x	x
* *Echium plantagineum*	Paterson's Curse				x	x
* *Gamochaeta coarctata*	Spiked Cudweed		x			x
* *Helminthotheca echioides*	Ox-tongue				x	
* *Holcus lanatus*	Yorkshire Fog	x	x			x
* *Hypochoeris radicata*	Flatweed		x		x	x
* *Isolepis spps*						x
* *Lolium rigidum*	Ryegrass				x	x
* *Modiola caroliniana*	Red-flowered Mallow		x			x
* *Paspalum dilatum*	Paspalum	x	x			x
* *Pennisetum clandestinum*	Kikuyu					x
* *Phalaris spps*	Phalaris	x	x		x	
* *Phyllostachys aurea*	Golden Bamboo					x
* *Pinus radiata*	Radiata Pine					x
* *Plantago lanceolata*	Lambs tongue		x		x	x
* *Poa annua*	Winter grass		x			x
* *Populus alba*	Poplar					x
* *Ranunculus spps*	A Buttercup		x			x
* *Richardia humistrata*	A Mexican Clover		x			x
* *(4) Rubus anglocandicans*	Blackberry				x	x
* *Rumex crispus*	Curled Dock				x	x
* *(4) Salix spps*	Willow					x
* *Setaria spps*	A Pigeon Grass	x	x		x	x
* *Sonchus oleraceus*	Common Sowthistle				x	x
* *Taraxacum officinale*	Dandelion		x		x	x
* *Trifolium dubium*	Yellow suckling clover		x			x
* *Trifolium repens*	White clover		x		x	x
* Unknown lawn grass			x			
TOTAL WEED SPECIES (in plots)	**31**					
TOTAL PLANTS (in plots):	**44**					
# Threatened species	Nil					
(R) ROTAP - Rare plant	Nil					
* Noxious weed (5) NSW DPI Class for Oberon LGA	**3**					
* Weed						
^ Planted						

APPENDIX 2: FAUNA DATA FOR SITE

COMMON NAME	
The following birds were observed, or heard either on or near the subject site, including flying overhead (common bird names from Pizzey & Knight, 1997):	
Black Duck	*Common Pigeon
*Starling	*Corella
*Sparrow	Little Grebe
Nankeen Kestrel	Australian Raven
Hardhead/White eyed Duck	Galah
Wood Duck	Black Shouldered Kite
Plover	Welcome Swallow
Pied Currawong	Purple Swamp Hen
Grey Teal	Eurasian Coot
Red Rumped Parrot	Australian Magpie
Blue Wren	Richards Pipit
Eastern Rosella	Crimson Rosella
Other fauna observed, or heard from calls/scats/footprints/scratch marks were:	
Wombat – burrows, scat	
*Goats -grazing part of development site	
Grey Kangaroo (x50) -recorded over surrounds	
Common Eastern Toadlet- *Crinea signifera*	
*Rabbit- recorded and scat	
Snake- unidentified	
+ Threatened spps listed under EPBC Act	
# Threatened spps listed under TSC Act	
* Exotic species	

APPENDIX 3: THREATENED FLORA & FAUNA SPECIES SEARCH RESULT (Over a 100 square kilometre area – NSW & National EPBC Species – from Bionet).

Note: this does not mean these species are found on the site.
Search area and some key local species records (koala only record in Bionet search):

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -33.61 West: 149.78 East: 149.94 South: -33.76] recorded since 11 Sep 1980 until 11 Sep 2015 returned a total of 1 records of 1 species.
Report generated on 11/09/2015 11:14 AM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic	Common Name	NSW status	Comm. status	Records	Info
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*		Koala	V,P	V	1	

APPENDIX 4: SELECTED PHOTOS OF SITE

Plot 1 – looking north. Dominated by *Poa sieberiana & Carex appressa,* but cleared of all native trees and mid storey.

Plot 1- looking southwest towards Borg facility

Plot 1- looking northeast

Plot 2 looking north showing and location of proposed Emergency Basin (numbered 32 in Fig 1- completely exotic and disturbed/levelled

Plot 3 – located near creekline, over 200m from development site

Plot 4, located over northern edge of proposed First Flush Basin (33). Man made channel in background

Extension area over hard pavement- northern side of Borg facility (numbered 22 & 30 in Fig 1)

Proposed carpark (30)- cleared and levelled, totally disturbed

Processed water and stormwater dams to north of Borg facility (not forming part of development site)

Grazed paddocks surrounding and over part of development site

Part of development site – numbered 32 in Fig 1

Development site – numbered 31,32 & 33. Plot 1 located in grassland behind existing disturbed ground.

Southern and western side of Borg Facility – cleared, exotic grassland and planted spps

Polluted stormwater dam (first flush from Borg facility), exotic grassland surrounds (numbered 10 & 11 in Fig 1)

FIRST
FLUSH 3
-
STORM
WATER

Western side of Borg factory –looking from Lowes Mount Rd

This row of planted Eucalypts to be retained (near 12 & 13 in Fig. 1)

Looking east from boundary of development site in foreground/mid ground over th eproposed hardstand/first flush basin

Looking south showing disturbed land and pine tree plantation (unaffected by proposal)

Creekline 300m north of development site dominated by Willows and Blackberry. Native grass & sedge understorey

Two Apple Box trees identified some 230m from dvelopment site

APPENDIX 5: PLOT 1 FIELD DATA

Site value:

Transect plot data sheet

(Start a new sheet for each vegetation zone)

Coordinates (GPS datum GDA94:_Plot 1_)

Transect / plot number	1
Easting	765481
Northing	6268243
Zone AMG	55H

Transect 10 points along 50-m transect (see transect tally table for % foliage cover variables)

Native over-storey cover (%)	0
Native mid-storey cover (%)	0
Native ground cover (grasses) (%)	60
Native ground cover (shrubs) (%)	0
Native ground cover (sedges) (%)	10
Exotic plant cover (%)	30

Larger sampling area

Native plant species richness [1]	4
Number of trees with hollows [2]	0
Over-storey regeneration [3]	0
Total length of fallen logs (m) [2]	0

Site value:

Transect tally table

CMA area:	CMA subregion	Recorder	Date
Central West	Oberon	Ted Smith	8.4.16

Proposal ID	Proposal name	Zone ID
0043/2016/2548MP	Borgs	Plot 1

Vegetation formation	Grassy Woodlands
Vegetation class	Southern Tableland Grassy Woodlands
Vegetation type	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion

Condition (low or mod/good)	**Zone descriptor** (optional)	**Geographic/habitat features** (tick after printing step 2 of Credit Calculator)
Low		x

Transect number_1_____	Number of hits (tally)	%
Native over-storey cover (%)		0
Native mid-storey cover (%)		0
Native ground cover (grasses) (%)	15	60
Native ground cover (shrubs) (%)		0
Native ground cover (other-sedges) (%)	5	10
Exotic plant cover (%)	30	30

Plot 1

Native over-storey species list At 10 points along the 50-m transect	Regen-eration (√) (zone)	**Native mid-storey species list** (>1m to <over-storey) At 10 points along the 50-m transect	**Native ground cover (grasses) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (shrubs) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Native ground cover (other) species list** (ground stratum <1m) At 50 points along the 50-m transect	**Exotic plants species list** At 50 points along the 50-m transect	**Fallen logs** (min. 10 cm diameter x 50 cm long) (20 x 50m plot)
0	0	0	30 hits – all *Poa sieberiana*	0	5 hits- all sedges- *Carex appressa, Carex breviculmis, Juncus usitatus*	15	0
Total number of species =0 Foliage cover (%) =0 Benchmark value (%FC) =15-25 Average crown diameter =0 Average foliage cover (%) =0 Number of trees =0 Sample area =Plot 1 **Whole zone** Number of trees with hollows =0 Sample area =Plot 1 Benchmark value =1							
		Total no of species =0	Total no of species =1	Total no of species =0	Total no of species =3	Total no of species =6	Total (m) =0
		Foliage cover (%) =0	Foliage cover (%) =60	Foliage cover (%) =0	Foliage cover (%) =10	Foliage cover (%) =30	Benchmark (m) =35

APPENDIX 6: COMMUNITY CONDITION BENCHMARKS FOR APPLE BOX - YELLOW BOX DRY GRASSY WOODLAND OF THE SOUTH EASTERN HIGHLANDS BIOREGION (FROM VIS)

Vegetation Formation	Grassy Woodlands	Grassy Woodlands
Vegetation Class	Southern Tableland Grassy Woodlands	Southern Tableland Grassy Woodlands
Vegetation Type	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion	Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion
Vegetation type ID (BVTID)	CW102	LA103
Benchmark Variation	None	None
Default Condition	Yes	Yes
Native plant species richness	30.00	30.00
Native over storey cover min	15.00	15.00
Native over storey cover max	25.00	25.00
Native mid storey cover min	5.00	5.00
Native mid storey cover max	8.00	8.00
Native ground cover grass min	8.00	8.00
Native ground cover grass max	60.00	60.00
Native ground cover shrubs min	3.00	3.00
Native ground cover shrubs max	5.00	5.00
Native ground cover other min	3.00	3.00
Native ground cover other max	10.00	10.00
Number of trees with hollows	1.00	1.00
Total length of fallen logs	35.00	35.00
CMA Percentage cleared %	95	95
Benchmark source		
Benchmark	Benchmarks updated as part of general	

comments	review in 2012	
Benchmark reference site		

APPENDIX 7: BIODIVERSITY CREDIT REPORT

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 8/04/2016 Time: 4:17:16PM Calculator version: v4.0

Major Project details

Proposal ID:	0043/2016/2548MP
Proposal name:	Borg Panels Timber Panel Processing Facility Expansion
Proposal address:	124 Lowes Mount Road Oberon NSW 2787
Proponent name:	Borg Panels Pty Ltd
Proponent address:	2 Wella Way Somersby NSW 2250
Proponent phone:	0243409827
Assessor name:	Ted Smith
Assessor address:	PO Box 3083 MEREWETHER NSW 2291
Assessor phone:	02 4963 3323
Assessor accreditation:	0043

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion	1.07	0.00
Total	1.07	0

Credit profiles

1. Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion, (CW102)

Number of ecosystem credits created 0

IBRA sub-region Oberon - Central West

Offset options - Plant Community types	Offset options - IBRA sub-regions
Apple Box - Yellow Box dry grassy woodland of the South Eastern Highlands Bioregion, (CW102) Yellow Box - Blakely's Red Gum grassy woodland on the tablelands, South Eastern Highlands Bioregion, (CW328)	Oberon - Central West and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

AHIMS Web Services (AWS)

Extensive search - Site list report

Purchase Order/Reference : Borg Panels Oberon

Client Service ID : 172742

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status	SiteFeatures	SiteTypes	Reports
44-6-0027	Oberon 1 (01);	AGD	55	765120	6267920	Open site	Valid	Artefact : -	Open Camp Site	1087,1105
	Contact	**Recorders**	Helen Brayshaw,Mary Dallas Consulting Archaeologists					**Permits**		
44-6-0028	Oberon 2 (02);	AGD	55	765000	6267970	Open site	Valid	Artefact : -	Open Camp Site	1087,1105
	Contact	**Recorders**	Helen Brayshaw,Mary Dallas Consulting Archaeologists					**Permits**		
44-6-0029	Oberon 3 (03);	AGD	55	764990	6268010	Open site	Valid	Artefact : -	Open Camp Site	1087,1105
	Contact	**Recorders**	Helen Brayshaw,Mary Dallas Consulting Archaeologists					**Permits**		
44-6-0030	Oberon 4 (04);	AGD	55	765060	6267980	Open site	Valid	Artefact : -	Open Camp Site	1087,1105
	Contact	**Recorders**	Helen Brayshaw,Mary Dallas Consulting Archaeologists					**Permits**		

Report generated by AHIMS Web Service on 12/05/2015 for Andrew Neil for the following area at Lat, Long From : -33.6971, 149.8522 - Lat, Long To : -33.688, 149.8667 with a Buffer of 200 meters. Additional Info : Environmental Impact Assessment. Number of Aboriginal sites and Aboriginal objects found is 4

This information is not guaranteed to be free from error omission. Office of Environment and Heritage (NSW) and its employees disclaim liability for any act done or omission made on the information and consequences of such acts or omission.

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : BPO200

Client Service ID : 172742

Andrew Neil

21 Jusfrute Drive
West Gosford 2250

Attention: Andrew Neil

Email: andrew.neil@thedesignpartnership.com.au

Date: 12 May 2015

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -33.6971, 149.8522 - Lat, Long To : -33.688, 149.8667 with a Buffer of 200 meters, conducted by Andrew Neil on 12 May 2015.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

4	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (http://www.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Office of Environment and Heritage and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date .Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

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