Bombala Sawmill

Section 75W Modification

Environmental Assessment

August 2014

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Submission of an Environmental Assessment

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

	Submission of an Environmental Assessment (EA) Prepared under Section 75W of the *EP&A Act*
EIS Prepared by	
Names:	Karl Rosen Evan Smith
Qualifications:	BSc (Hons) …. BEng(Env)
Address:	GHD, Level 15, 133 Castlereagh Street Sydney, NSW 2000
Development Application	
Proponent Name	Dongwha Timbers
Proponent Address	1 Sandy Lane, PO Box 146, Bombala NSW 2632
Land to be Developed	Bombala Sawmill located on Lot 2 DP 1016573 and Lot 27 DP 1061792
Proposed Development	Modification of PA 07_0161 for installation of 18 MW boiler to replace the use of three gas fired boilers and an existing wood fired boiler currently approved at the site
Environmental Assessment	An EA is attached which was prepared under Section 75W of the EP&A Act
Declaration	We certify that we have prepared the contents of this EA and to the best of our knowledge:
	• The statement contains all available information that is relevant to the environmental assessment of the proposed development
	• The information contained in the statement is neither false or misleading
Signatures	 Karl Rosen 22nd of August 2014  Evan Smith 22nd of August 2014

Executive Summary

Dongwha Timbers propose to modify the existing project approval to install a new wood-fired boiler within its existing saw milling facility located south-west of Bombala in the Monaro Region of NSW.

The proposal involves the installation of an 18 megawatt (MW) boiler to replace the use of three gas fired boilers and an existing wood fired boiler currently approved at the site. The new boiler would be designed to comply with statutory emissions requirements and be supplied with clean timber residual products currently generated by the sawmill operations at the site. The proposal will allow Dongwha to proactively manage their ongoing energy costs and residual timber management requirements.

The proposal represents an alteration to the development as described in the original project application and therefore requires approval from the NSW Minister for Planning in the form of a modification under Section 75W of the Environmental Planning and Assessment Act, 1979 (EP&A Act).

The Bombala Sawmill currently produces up to 800 tonnes of wood residue per day as a by-product of milling activities. Wood residue products, including fresh sawdust, pine bark, dried wood shavings and fresh woodchips are temporarily stored in purpose built bunkers on site prior to being transported off-site for sale or disposal.

Approximately 21,500 tonnes of sawdust together with 5,000 tonnes of dried wood shavings and 7,500 tonnes of fresh pine bark are currently produced per year as a by-product from the mill's operations. The demand for sawdust in the local market is typically low so sawdust tends to be held in the bunkers at the site until it is transported to Sydney and Canberra for sale. The mill also produces approximately 48,000 tonnes per annum (tpa) of woodchips which are predominantly sold to Visy for use in their pulp and paper mill located at Tumut.

The original major project application included retaining an existing 2.5 MW wood-fired boiler at the site together with installation of two new 10 MW gas fired boilers and transfer of a 3.5 MW gas fired boiler from a Tasco facility in Geelong.

The installation of an 18 MW wood fired boiler to allow use of timber residue products is considered to have a number of benefits including:

- Beneficial re-use of a residual timber product within the mill operations
- Use of renewable timber resource in place of consumption of fossil fuels
- Demand for residual timber will not be driven by external market forces
- Proactive management of residue product stockpiles to minimise dust emissions from the site
- Minimising heavy vehicle movements associated with the transport of waste products
- Improved safety performance by minimising interaction between mobile plant operations and road haulage vehicles.

The proposal will result in limited changes to the majority of site operational processes and is considered consistent with the objects of the EP&A Act.

The proposal will improve the efficiency of the sawmill operations by minimising operating costs associated with natural gas consumption and transport of residual timber products. The ongoing viability of the operations will ensure employment is maintained together with associated indirect benefits to sustaining the local and regional economy.

Results of the air quality impact assessment show that the emissions from the proposed 18 MW wood fired boiler will meet the Clean Air Regulation Group 6 limits and also the EPA Impact Assessment Criteria at all identified receivers.

The use of the timber residue products as a fuel source will result in a considerable reduction in heavy vehicle movements required for waste removal from the site. The proposal is anticipated to improve the amenity of local residents living on the main transport routes through Bombala, by reducing the number of heavy vehicle movements required for the transport of residual timber products.

The proposal will also replace the use of fossil fuels with a renewable timber resource resulting in a considerable reduction in greenhouse emissions from the sawmill operations.

Potential environmental impacts associated with the proposal are not considered significant and can be appropriately managed through the adoption of the proposed management procedures.

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Abbreviations

Abbreviation	Definition
AHIMS	Aboriginal Heritage Information Management System
DECC	NSW Department of Environment and Climate Change
DGRs	Director General's Requirements
DP&E	NSW Department of Planning and Environment
DPI	NSW Department of Primary Industries
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
EA	Environmental Assessment
EP&A Act	*NSW Environmental Planning and Assessment Act, 1979*
EP&A Regulation	*NSW Environmental Planning and Assessment Regulation 2000*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act, 1999*
EPL	Environmental Protection License
GHD	GHD Pty Ltd
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
OEMP	Operational Environmental Management Plan
RMS	NSW Roads and Maritime Authority
SEPP	State Environmental Planning Policy

1. Introduction

1.1 Background

Dongwha Timbers (Dongwha) propose to modify the existing project approval to install a new wood-fired boiler within its existing saw milling facility located south-west of Bombala in the Monaro Region of NSW. The new wood-fired boiler involves the installation of a 18 megawatt (MW) boiler to replace the use of three gas fired boilers and an existing wood fired boiler currently approved at the site (hereafter referred to as "the proposal").

The Bombala sawmill comprises log sorting, greenmill operations, moulder operations, kiln or steam autoclave for drying of timber and timber preservation. The sawmill operates under an Environmental Protection Licence (EPL) number 11205.

Dongwha are progressively implementing a major expansion of the sawmill in accordance with the Project Approval (PA 07_0161) issued under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). PA 07_-161 requires the development and ongoing operations to be undertaken in accordance with the conditions of approval together with the description of the proposed development provided within the environmental assessment supporting the original project application.

It is now proposed to replace four boilers approved in the project approval with a single 18 MW wood-fired boiler (i.e. the proposal). The new boiler would be designed to comply with statutory emissions requirements and be supplied with clean timber residual products currently generated by the sawmill operations at the site. The proposal will allow Dongwha to proactively manage their ongoing energy costs and residual timber management requirements.

The proposal represents an alteration to the development as described in the original project application and therefore requires approval from the NSW Minister for Planning in the form of a modification under Section 75W of the EP&A Act.

This environmental assessment (EA) has been prepared by GHD Pty Ltd (GHD) to support the application to the Department of Planning and Environment (DP&E) to modify the existing approval under Section 75W of the EP&A Act. The EA provides a description of the proposal, reviews the applicable legislative framework and includes a detailed assessment to determine the potential environmental impacts of the proposal. The EA subsequently proposes management measures to be implemented to mitigate any impacts associated with the proposal.

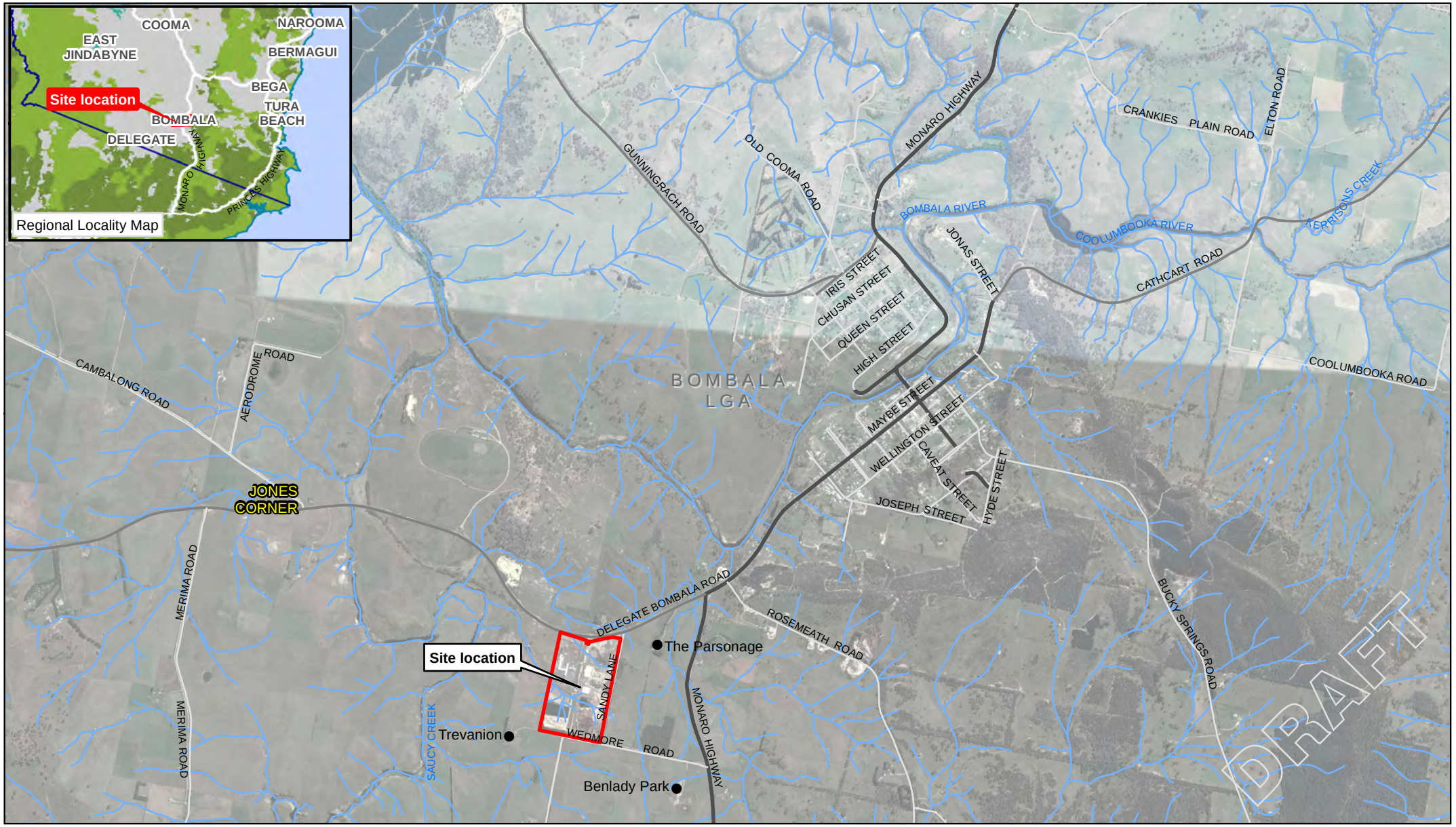
1.2 The proponent

Dongwha is a global manufacturer of wood materials with timber processing and marketing operations in Korea, Hong Kong, New Zealand, Malaysia, Vietnam, U.A.E, Japan, United States and Australia.

1.3 Site location

The Bombala timber mill is located between Sandy Lane and Delegate Road approximately two kilometres south west of Bombala in the Monaro region of NSW as shown on Figure 1-1. The site is located within the following allotments:

- Lot 2 DP 1016573.
- Lot 27 DP 1061792.



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Legend

- Site Location
- Highways
- Major Roads
- Other Roads
- Waterways

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number	21-23466
Revision	A
Date	25 Jun 2014

Regional context

Figure 1.1

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Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung

1.4 Existing approval

1.4.1 Approval history

Timber processing operations commenced at the site in 1979 and have been subject to more than 20 development consents throughout the progressive development of the site.

A major expansion of the sawmill operations was approved as PA 07_0161 on 7 September 2010 by the NSW Minister for Planning under Part 3A of the EP&A Act, 1979. The major project application was accompanied by an EA prepared by The Fifth Estate and Peter J Ramsay and Associates on behalf of Willmott Timbers titled "Expansion of Bombala Integrated Sawmilling and Value Adding Facility" (referred to as the Sawmill Expansion EA throughout this environmental assessment). A detailed description of historical timber processing operations at the site is provided in Section 5 of the Sawmill Expansion EA.

A condition of the Project Approval included that all previous consents were effectively surrendered within 12 months of the determination and PA 07_0161 is now the only applicable project approval for the operations. A modification to PA 07_0161 was granted in February 2012 following the acquisition of the operations by Dongwha, which allowed for alternate construction staging and modification to a number of approval conditions.

The proposal will result in an alteration to the boiler configuration described in the EA, as referenced in Condition 2 of Schedule 2 in the Project Approval. The proposal will also require modification to Condition 5 of Schedule 3 in the Project Approval to align with Environment Protection Authority (EPA)'s Clean Air Group 6 limits for a biomass boiler installed after 1st September 2005 as specified within Schedule 4 of the Protection of the Environment Operations (Clean Air Regulation).

1.4.2 Need for modification

The Bombala Sawmill currently produces up to 800 tonnes of wood residue per day as a by-product of milling activities. Wood residue products, including fresh sawdust, pine bark, dried wood shavings and fresh woodchips are temporarily stored in purpose built bunkers on site prior to being transported off-site for sale or disposal.

Approximately 21,500 tonnes of sawdust together with 5,000 tonnes of dried wood shavings and 7,500 tonnes of fresh pine bark are currently produced per year as a by-product from the mill's operations. The demand for sawdust in the local market is typically low so sawdust tends to be held in the bunkers at the site until it is transported to Sydney and Canberra for sale. The mill also produces approximately 48,000 tonnes per annum (tpa) of woodchips which are predominantly sold to Visy for use in their pulp and paper mill located at Tumut.

The original major project application included retaining an existing 2.5 MW wood-fired boiler at the site together with installation of two new 10 MW gas fired boilers and transfer of a 3.5 MW gas fired boiler from a Tasco facility in Geelong.

The installation of an 18 MW wood fired boiler to allow use of timber residue products is considered to have a number of benefits including:

- Beneficial re-use of a residual timber product within the mill operations
- Use of renewable timber resource in place of consumption of fossil fuels
- Demand for residual timber will not be driven by external market forces
- Proactive management of residue product stockpiles to minimise dust emissions from the site
- Minimising heavy vehicle movements associated with the transport of waste products

- Improved safety performance by minimising interaction between mobile plant operations and road haulage vehicles.

1.4.3 Existing compliance

Dongwha are implementing the staged expansion of the sawmill in accordance with PA 07_0161. The project approval includes a number of conditions which to be implemented as part of the progressive construction and operation of the sawmill. It is understood that Dongwha are implementing conditions applicable to the current stage of the expansion, subject to the following clarifications which have been previously raised with the DP&E.

Condition 5 of Schedule 4 of the project approval requires that

Within 2 years of this approval and every 3 years thereafter, unless the Director General directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project.

Dongwha have written to DP&E with initial correspondence dated 12th of July 2012 and subsequently on the 13th of November 2013, requesting that the timing of the audit be delayed. This was as result of delays in completing a number of project components associated with the expansion and in progressing the issuing of a new Environment Protection Licence (EPL) from the EPA. Dongwha have requested that the date for undertaking the assessment be bought into line with the issuing of the updated EPL.

Condition 26 of Schedule 3 requires that:

The proponent shall ensure the entire wood stockpile is removed from the site and appropriately reused or disposed of by June 2013, or a time otherwise agreed to by the Director-General, in accordance with the Dust and Wood Residue Monitoring and Management Plan for the site dated 30th September 2011 prepared pursuant to condition 4 of this schedule and approved by the Director-General's delegate on 23rd December 2011.

Dongwha have written to DP&E on the 14th of November 2013, outlining the volumes of wood residues removed from the previous stockpile areas and the volumes estimated to be remaining at the site. The volume of material removed from the site has exceeded the total stockpile size estimated in the approved Dust and Wood Residue Monitoring and Management Plan and therefore an extension of time for removal of the additional material was requested in accordance a pollution reduction program being negotiated as part of the sites EPL. The current proposal will facilitate the use of residual timber within site operations and will therefore assist in achieving compliance.

Condition 8 in Schedule 3 of the project approval includes noise limits which must not be exceeded by noise generated by the operation of the mill. Compliance monitoring undertaken by Day Designs Pty Ltd in September 2013 found that the level of noise emissions from the site exceeded the acceptable noise limits at the two closest receptor points ('Parsonage' and 'Trevanion') on some occasions. Whilst noise complaints had been received from the landowner of the Parsonage, no complaints have been received from the owner of Trevanion.

Noise exceedances measured at the Parsonage were due to the operation of the log in feed and sorting chain at the Green Mill. Dongwha Timbers has implemented delaying the start up time of the sorting chain until 7am and are investigating other potential acoustic treatments to minimise noise at the receiver concurrently with this approval modification process. It should be noted that no further complaints have been received since the changes to the sorting change start up time have been implemented at the site.

Noise exceedances measured at Trevanion (114 Wedmore Road) were due to the operation of the Green Mill and Dry Mill. Dongwha are investigating further additional acoustic treatments

and undertaken negotiations with the affected receiver concurrently with this approval modification process.

1.4.4 Alternatives

A number of alternatives were considered as part of the development of the boiler and heat plant configuration. Alternatives included maintaining the boiler configuration proposed in the original project application, installation of two 10MW wood fired boilers and installation of a single 18MW wood fired boiler.

Base Case – Original Proposal

The original proposal involved retaining an existing 2.5 MW wood-fired boiler at the site together with installation of two new 10 MW gas fired boilers and transfer of a 3.5 MW gas fired boiler from a Tasco facility in Geelong.

One of the new 10 MW natural gas fired boilers has been installed as part of the initial stages of the sawmill expansion and the mill currently operates with this new boiler together with the original wood fired 2.5 MW boiler. The 10 MW boiler consumed 66,000 gigajoules (GJ) of natural gas in 2013 for the operation of three 50 m^3 timber drying kilns. The mill's gas demand is predicted to increase to 107,000 GJ in 2014 to supply steam to the four new kilns which are being installed as part of the approved sawmill expansion project.

Maintaining the proposed boiler configuration would result in the continued consumption of natural gas and the ongoing limitations associated with operating cost, regularity of gas supply and greenhouse gas emissions generated by the consumption of a fossil fuel. Operation of the gas fired boilers would also involve continued reliance on heavy vehicles for the transport of residual timber to external markets and will not assist with proactive management of the residual timber products.

Two 10MW wood fired boilers

Consideration of two 10MW wood fired boilers as a direct replacement of the individual gas fired boilers servicing the Green off-sawn (GOS) kilns and the redry kilns was also undertaken. This option would maintain the benefits associated with the management and reuse of residual timber supplies whilst minimising greenhouse gas emissions and heavy vehicle movements associated with the transport of waste products. Compliance with EPAs Clean Air Group 6 limits would also be easier to achieve for biomass boilers with a reduced capacity as the emission limits apply to individual discharge points and not cumulatively across the site.

Installation of two boilers would result in considerably higher construction and ongoing operational costs associated with the requirement for emission controls, telemetry and PLC systems, water supply and residual timber feed systems for multiple installations.

Single 18 MW wood fired boiler

Dongwha have selected a single 18 MW wood-fired boiler as the preferred option for the heat plant configuration. A 18MW boiler has been assessed as suitable to meet the energy requirements for both the GOS kilns and the redry kilns and will have considerably lower cost than multiple installations. The boiler will be designed to achieve compliance with EPAs Clean Air Group 6 limits and will allow for the proactive management of residual timber products and a reduction in heavy vehicle movements and greenhouse emissions from the current approved boiler configuration.

Several options were considered for the location of the proposed boiler within the sites including locations in the vicinity of the GOS kilns, the redry kilns and the residual timber bunkers. Locating the boiler in close proximity to the residual timber bunkers in the western portion of the

site was considered preferable in terms of minimising material handling and disruption to site operations.

A steam pipeline is proposed to provide an above ground connection between the boiler with the GOS and redry kilns. A steam pipeline is considered to have a greater thermal efficiency than hot water in the transfer of the required heat and energy to the kilns.

2. Proposal description

2.1 The proposal

The proposal includes the replacement of the four boilers previously approved in PA 07_0161 with one 18 MW wood-fired boiler.

The new boiler would be installed in the north-western side of the mill adjacent to the existing residual timber bunkers as shown in Figure 2-1.

It is estimated that the proposed 18 MW wood-fired boiler would require approximately 43,000 tonnes of wood residue per annum. This is anticipated to be supplied from the wood residues produced onsite and in hierarchy provided in Table 2-1 .

Table 2-1 Proposed fuel source for the wood-fired boiler

Wood residue	Quantity (tonnes)
Fresh sawdust	21,525
Dried wood shavings	5,183
Fresh pine bark	7,616
Fresh woodchips	8,631
Total	**42,955**

Residual timber would be transferred from the residual handling bunkers by Front End Loader (FEL) to a receival hopper for the new boiler. The 18 MW boiler would include the following elements:

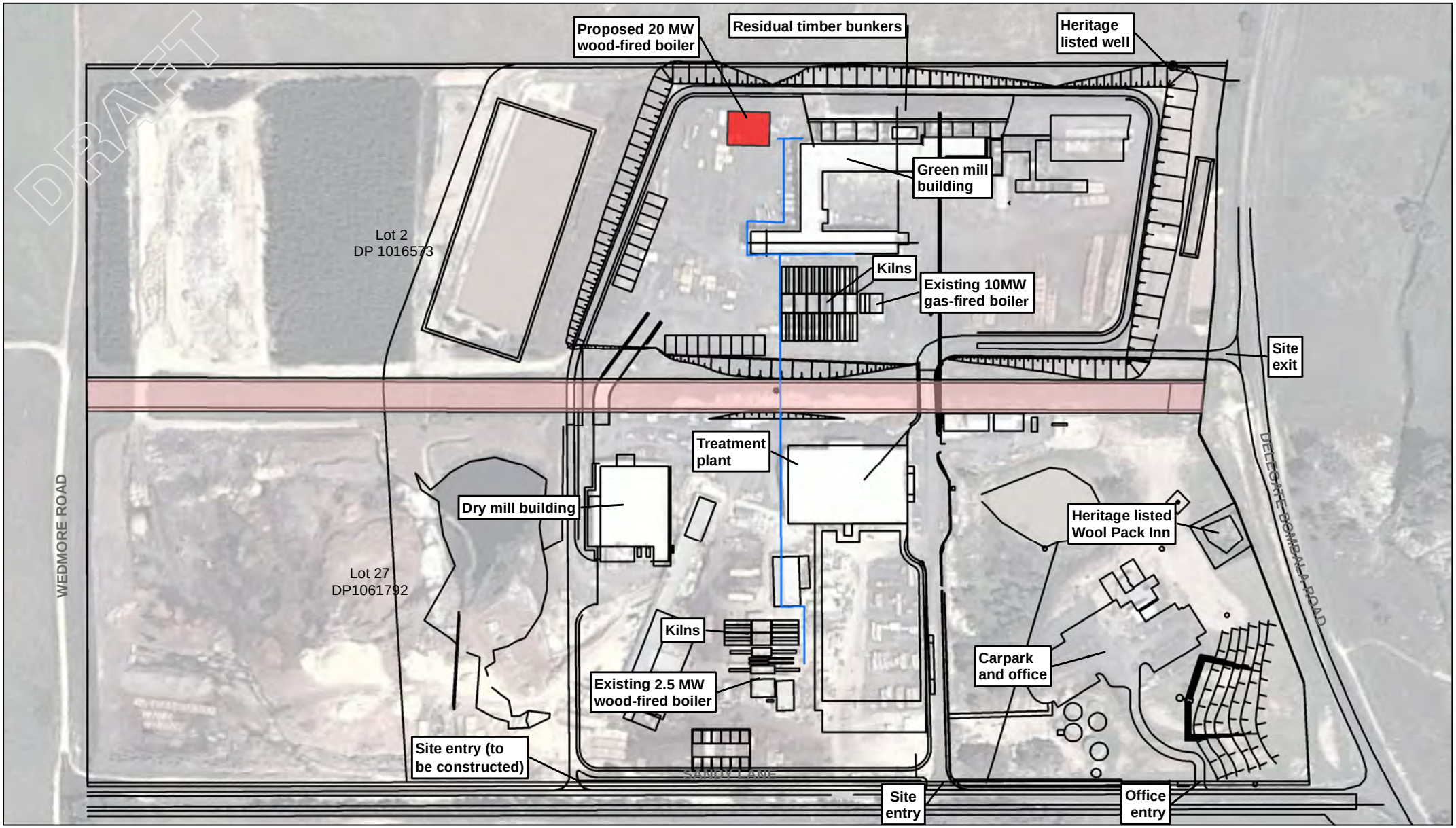
- Biomass feed system
- Gasification combustion process
- Feedwater pump system
- Emission controls system.

The approximate footprint of the proposed boiler is 25 metres by 25 metres with a height of approximately 10 metres.

The boiler will be designed to comply with the relevant EPA Group 6 limits included in Schedule 4 of the Protection of the Environment Operations (Clean Air) Regulation 2010.

An above ground pipeline will also be installed to deliver steam from the new boiler to both the Green off-sawn (GOS) kilns to achieve the target moisture content for the green timber and the redry kilns for treated timber. The pipeline is anticipated to be approximately 300 mm diameter steel pipeline elevated above ground level operations on supports or attached to the existing sawmill building structures.

The proposal would be located entirely within the previously approved sawmill site as shown in Figure 2-1. The site has been previously disturbed as a part of the progressive development of the site and the ground surface consists of hardstand, concrete or pavement.



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0 12.5 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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LEGEND

- Boiler location
- Gas easement
- Steam pipeline indicative alignment
- Site Layout

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number	21-23466
Revision	A
Date	22 Aug 2014

Site layout

Figure 2.1

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Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung

2.2 Construction

2.2.1 Staging

Construction activities for the boiler installation are likely to be undertaken in two stages. Enabling works including assessment of the bearing capacity of the foundation, establishment of formwork and associated infrastructure such as water supply is anticipated to be completed over a period of approximately 24 weeks.

The installation and commissioning of the boiler is anticipated to be completed over a period of 10 to 12 weeks. It is anticipated that many boiler components will be constructed off-site in modules and transported to the site for final assembly and configuration.

2.2.2 Equipment

Construction equipment likely to be required for the boiler installation is similar to the range of equipment considered within the assessment for the sawmill expansion EA and typical for the construction of an industrial style facility. Equipment used is likely to include:

- Excavator
- Concrete pump
- Delivery and concrete trucks
- Front end loader
- Compressor
- Hoist or crane
- Concrete cutter
- Jackhammer
- Hammer drill

Construction would be anticipated to generate up to around 15 two way heavy vehicle movements per day associated with the transportation of construction machinery, equipment and materials to the site and for the removal of waste and the existing boiler components.

3. Statutory planning context

3.1 Environmental Planning and Assessment Act

3.1.1 Approval framework

Approval for expansion of the mill was granted by the Minister for Planning in 2010 under the former Part 3A of the EP&A Act.

Part 3A of the EP&A Act was repealed and a new assessment system for projects of State significance commenced in NSW on 1 October 2011. Despite this, Schedule 6A of the EP&A Act contains transitional arrangements for the repeal of Part 3A. Under Schedule 6A an approved project is considered a transitional Part 3A project and Part 3A of the EP&A Act (as in force immediately before the repeal of that Part) continues to apply to and in respect of a transitional Part 3A project.

Therefore Section 75W of Part 3A continues to apply for the purposes of modification and the request for modification of this consent is made under section 75W of the EP&A Act to the DP&E for approval by the Minister.

Section 75W of the EP&A Act applied to ministerial approvals (included in part below):

75W Modification of Minister's approval

(1) In this section:

> ***Minister's approval*** *means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
>
> ***modification of approval*** *means changing the terms of a Minister's approval, including:*
>
> *(a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
>
> *(b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*

(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.

(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.

(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.

The intention to submit a Section 75W modification to PA 07_0161 was provided to the NSW DP&E on the 29th of April, 2014. This included provision of a Preliminary Environmental Assessment (PEA) which included an overview of the proposal and a high level risk assessment

to provide consideration of the potential impacts associated with the proposal. The application for modification and PEA was subsequently formally lodged on the DP&E's major projects website on the 21st of May, 2014 following further liaison and correspondence with DP&E planning staff.

Secretary's Environmental Assessment Requirements (SEARs) for the preparation of the EA for the proposed modification were subsequently issued by the DP&E on the 27th of June, 2014 and are included for reference in Appendix A.

3.1.2 State Environmental Planning Policy (Major Development) 2005

The sawmill expansion project was defined as a Major Project for which Part 3A applies for the initial project application in 2009. The mill expansion met the definition of a class of development included within Schedule 1 of the Major Development SEPP which included:

4 Timber milling, timber processing, paper or pulp processing

Development that employs 100 or more people or has a capital investment value of more than $30 million for the purpose of:

(a) milling plants, sawmills, wood-chipping or particle board manufacture, or

(b) manufacture of paper, pulp, cardboard or newsprint, or

(c) paper recycling, or

(d) wood preservation, or

(e) charcoal plants,

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

As described above, although Part 3A of the EP&A Act has been repealed, Section 75W still applies for the purpose of modification to the approval.

3.1.3 State Environmental Planning Policy (Infrastructure)

The sawmill expansion project was considered a traffic generating development requiring consultation with the roads authority under Division 17, clause 104 of the State Environmental Planning Policy (Infrastructure) due to the area of the site being developed.

The proposed boiler installation being assessed within the proposed modification has a small footprint contained entirely within the approved site and is not considered to trigger the definition of a traffic generating development. Heavy vehicle movements to and from the site are predicted to decrease as wood residue will be used to fuel the proposed boiler which otherwise would need to be transported off-site as discussed in Section 5.3.

3.1.4 State Environmental Planning Policy 33 – Hazardous and Offensive Development

SEPP 33 presents a systematic approach to planning and assessing proposals for potentially hazardous and offensive development for the purpose of industry or storage. Through the policy, the permissibility of a proposal to which the policy applies is linked to its safety and pollution control performance. The policy ensures that only those proposals which are suitably located, and able to demonstrate that they can be built and operated with an adequate level of safety and pollution control are permitted to proceed.

SEPP 33 applies to any proposals which fall under the policy's definition of 'potentially hazardous industry' or 'potentially offensive industry'. Potentially hazardous industries refer to developments which involve handling, storing or processing a range of substances which

without appropriate operating measures would pose a significant risk in relation to human health, life, property or the biophysical environment. Potentially offensive industry includes a development which if the development were to operate without appropriate management and mitigation would emit a polluting discharge in a manner which would have a significant adverse impact in the locality or on existing of future development. A proposal cannot be considered to be a hazardous or offensive industry unless it is first identified as potentially hazardous or offensive industry respectively.

The sawmill expansion project was considered a potentially hazardous industry due to the requirement to store and use a range of chemicals on site for use in the timber process and associated activities. A detailed Preliminary Hazard Analysis (PHA) was therefore undertaken as part of the Sawmill Expansion EA and identified the following high risk scenarios:

- Loss of containment or spills from chemicals used in the treatment plant
- Operational noise associated with the log store, debarker and transport
- Onsite vehicle collision associated with vehicle movements at the log store, debarker, transport incoming, finish store and dispatch
- Collection of dust on hot machinery resulting in a fire of explosion in the sawmill, stacker, dry mill and planer operations
- Noise from trucks entering or leaving the site.

The PHA concluded that with the adoption of the management controls proposed for the mill, there will be no unacceptable risks to surrounding land users and the expanded operations were not considered a hazardous or offensive industry.

The proposal does not introduce the requirement for storage or use of any additional hazardous materials than previously assessed within the PHA and would not trigger the SEPP 33 screening criteria in its own right. The proposed boiler will replace the four boilers previously approved at the site and is not considered to introduce a new hazard to the site that would alter the conclusions of the PHA. The proposal will improve management of residual waste and reduce traffic movements and will therefore assist in managing a number of the risks identified in the initial PHA.

SEPP 33 states that in most cases compliance with the EPA requirements should be sufficient to demonstrate that the proposal is not an offensive industry. The information provided throughout this EA satisfies these requirements and demonstrates that the proposal is not considered an offensive industry.

3.1.5 State Environmental Planning Policy 55 – Remediation of Land

SEPP 55 provides for a statewide planning approach to the remediation of contaminated land and aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment by:

(a) specifying when consent is required, and when it is not required, for a remediation work,

(b) by specifying certain considerations that are relevant in rezoning land and in determining development applications in general and development applications for consent to carry out a remediation work in particular,

(c) by requiring that a remediation work meet certain standards and notification requirements.

Some legacy contamination issues were identified during initial investigations and are being managed as part of the overall sawmill redevelopment project. The proposed boiler installation does not trigger a change in land use or land zoning or require any additional remediation work at the site.

3.1.6 Bombala Local Environmental Plan 2012

Under the Bombala LEP 2012, the proposed site is zoned RU1 Primary Production. The objectives of the RU1 zoning are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within the zone and land uses within adjoining zones.
- To enable other land uses that are associated with primary industry and that require an isolated or rural location or that support the tourism industry.

The sawmill fulfils the definition of a rural industry which is permissible with consent under the Bombala LEP 2012. However the sawmill expansion project was defined as a Major Project for which Part 3A applied and the proposal is therefore being assessed as a modification in accordance with Section 75W of the EP&A Act.

The proposal is located entirely within the boundary of the approved sawmill site and is considered to be consistent with the objectives of the RU1 land zoning by improving the sustainability and operating efficiency of the sawmill operations.

3.2 Protection of the Environment Operations Act

The objectives of the *Protection of the Environment and Operations Act 1997* (PoEO Act) are to protect, restore and enhance the quality of the environment, in recognition of the need to maintain ecological sustainable development.

The PoEO Act provides for an integrated system of licensing and contains a core list of activities requiring Environmental Protection Licenses (EPL) from the Environmental Protection Authority (EPA). These activities are called 'scheduled activities' and are listed in Schedule 1 of the Act.

The Bombala Sawmill operations meet the definition of scheduled activities for wood or timber milling or processing and wood preservation and operation under the provisions of EPL 11205. A modification to the EPL will also be required as a consequence of the modification to the project approval.

The PoEO Act also includes requirements for the protection against water, air and noise pollution, waste disposal and incident reporting requirements for actual or potential pollution incidents.

The Protection of the Environment (Clean Air Regulation) 2010 (Clean Air Regulation) provides regulatory measures to control emissions from wood heaters, open burning, motor vehicles and fuels and industry. The regulation outlines the grouping of activities and plant into 6 groups based on when the activities commenced operation. EPAs Clean Air Group 6 standards of concentrations for a biomass boiler installed after 1st September 2005 are specified within Schedule 4 of the Clean Air Regulation. The applicable Group 6 limits for the proposal are listed in Table 3-1.

Table 3-1 Standards of concentration

Pollutant	Standard of concentration (mg/m3)
Solid Particles	50
Nitrogen dioxide ($NO_{2)}$	500
Carbon dioxide (CO)	125
Volatile organic compounds (VOCs)	40
Dioxins and furans	0.1

3.3 Commonwealth legislation

3.3.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) requires the approval of the Commonwealth Minister for the Environment for actions that may have a significant impact on matters of national environmental significance. The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land. Matters of national environmental significance under the Act comprise:

- World Heritage areas.
- National Heritage Places.
- Ramsar wetlands of international importance.
- Threatened species or ecological communities listed in the EPBC Act.
- Migratory species listed in the EPBC Act.
- Commonwealth marine environments.
- Great Barrier Reef Marine Park
- Nuclear actions
- A water resource in relation to a coal seam gas or large coal mining development.

The proposal is located entirely within the approved development boundary for the Bombala Sawmill and is not considered to have potential to impact up any matters of national environmental significance hence a referral under the EPBC Act is not considered to be warranted.

4. Issue Identification

4.1 Stakeholder consultation

Consultation and liaison with government agencies has been integral in refining the proposal and development of the assessment methodology for the completion of the EA. Consultation has been undertaken with DP&E, EPA and Bombala Council throughout the preparation of the EA.

The intention to submit a Section 75W modification to PA 07_0161 was provided to the NSW DP&E on the 29th of April, 2014. This included provision of a Preliminary Environmental Assessment (PEA) which included an overview of the proposal and a high level risk assessment to provide consideration of the potential impacts associated with the proposal. The application for modification and PEA was subsequently formally lodged on the DP&E's major projects website on the 21st of May, 2014 following further liaison and correspondence with DP&E planning staff.

Secretary's Environmental Assessment Requirements (SEARs) for the preparation of the EA for the proposed modification were subsequently issued by the DP&E on the 27th of June, 2014 and are included for reference in Appendix A.

Dongwha's Compliance Manager has met with the EPA's Head of Operations for the South East Region for discussion associated with the proposed modification together with compliance with noise criteria within the project approval and the EPL. The key issue raised by the EPA in regards to the proposed modification was compliance with the EPAs Clean Air Group 6 standards of concentrations for a biomass boiler installed after 1st September 2005 in accordance with the Clean Air Regulation as shown in Section 3.2.

Dongwha's Compliance Manager has also met with Bombala Council's Planning and Development Manager. Council indicated they would like the EA to outline compliance with objectives of the Bombala LEP 2012 as outlined in Section 3.1.6.

Direct consultation with the local community has primarily been undertaken in relation to consideration of noise treatments for the overall mill operations which are not specifically related to the proposed modification.

The proposed boiler is located entirely within the existing footprint of the existing mill and is considered beneficial to the local community, particularly in regards to a reduction in heavy vehicle movements associated with the transport of residual timber products.

Near neighbours have therefore been informed of the proposed modification by letter box drop. A copy of the letter is provided in Appendix B, which includes a description of the proposal and contact details to request any further information regarding the proposal.

4.2 Environmental risk assessment

A preliminary environmental risk assessment was undertaken at the commencement of the investigation to screen the potential environmental impacts that may arise as a result of the proposed modification and submitted to the DP&E as part of the PEA for the project.

The analysis was undertaken in the form of a preliminary, desktop-level risk assessment, to broadly assess the potential environmental risks that may arise as a result of the construction and operation of the proposed modification to identify key areas for the assessment and assist in streamlining the assessment process. Key issues identified within the risk assessment include air

and noise emissions, which have therefore been adopted as the key issues for assessment within this EA.

The risk assessment from the PEA has been reproduced below.

4.3 Methodology

The environmental risk analysis for the proposed modification involved:

- Identifying environmental aspects.
- Identifying the source of potential risks associated with each of these aspects.
- Identifying the potential impact associated with each risk.
- Evaluating the likelihood of occurrence and consequence of each risk with the definitions provided below.
- Assigning a risk ranking.
- Identifying priority issues for the EA.

The potential risks were given a ranking with regard to the likelihood of it occurring (assuming that the proposed modification is designed and implemented with standard environmental controls) in accordance with the definitions provided in Table 4-1 and Table 4-2.

Table 4-1 Likelihood of occurrence definitions

Likelihood	Description
Almost certain	Expected to occur in most circumstances
Likely	Will probably occur in most circumstances
Possible	Could occur
Unlikely	Could occur but not expected
Rare	Occurs only in exceptional circumstances

Potential risks were given a ranking with regard to the perceived consequence if left unmanaged, in accordance with the following definitions:

Table 4-2 Consequence of impact

Consequence	Definition
Extreme	Irreparable/long-term damage/ widespread environmental effects may include major pollution incident, unauthorised damage to significant cultural or heritage sites. Occurrence may result in significant regulatory intervention
High	Serious damage to the environment, medium-long term impact, rehabilitation at considerable expense. Possible legal non-compliance and/or damage to corporate reputation.
Medium	Localised, short term damage/disturbance to the environment requiring relatively short-term remedial action (<1 month)
Low	Noticeable impact on the natural environment/corporate reputation requiring little to no remedial action
Negligible	Negligible impact on the environment which is difficult to notice and does not require remedial action

Based on the assessment of likelihood and consequence, a foreseeable impact/risk was assigned a risk rating. This enabled higher rating risks to be identified early in the process for the purpose of focusing the preliminary environmental assessment process. The matrix shown in Table 4-3 was used to prioritise potential environmental risks as either category A, B or C.

Table 4-3 Impact priority matrix

	Consequence level				
Likelihood level	**Negligible**	**Low**	**Medium**	**High**	**Extreme**
Almost certain	*Medium*	*High*	*Extreme*	*Extreme*	*Extreme*
Likely	*Low*	*Medium*	*High*	*Extreme*	*Extreme*
Possible	*Negligible*	*Low*	*Medium*	*High*	*Extreme*
Unlikely	*Negligible*	*Negligible*	*Low*	*Medium*	*High*
Rare	*Negligible*	*Negligible*	*Negligible*	*Low*	*Medium*

4.4 Environmental risk analysis

Table 4-4 provides the environmental risk analysis for the proposed modification. It includes:

- A summary of the potential key impacts/risks (columns 2 and 3).
- Likelihood of occurrence and consequence levels (columns 3 and 4).
- The risk rankings that were assigned (column 5).
- A discussion regarding the findings of the risk analysis (column 6).

Table 4-4 Preliminary environmental risk analysis results

Environmental aspect	Source of risk	Potential impact (without mitigation)	Likelihood	Consequence	Risk rating	Discussion
Air emissions	Emissions from proposed 18 MW wood-fired boiler	NO_x and PM_{10} emissions exceeding the relevant criteria.	Possible	High	High	The new wood-fired boiler would be designed to comply with the EPA Group 6 limits. An air quality assessment is proposed to be undertaken as part of the EA. This would include a quantitative assessment of emissions from the proposed modification and a comparison against the relevant EPA criteria.
		Impacts on nearby sensitive receivers.	Unlikely	High	Medium	Air modelling would be undertaken as part of the EA to compare the potential emissions against the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005).
	Sawdust stockpiles	Dust emissions causing nuisance to sensitive receptors.	Rare	Medium	Low	The proposed modification would utilise the sawdust as the main fuel source for the boiler, which would reduce the volume of sawdust stored onsite and hence the potential for dust generation. Dust generation would be considered in the air quality assessment.
	Air emissions (dust and exhaust) during construction.	Dust and exhaust emissions causing nuisance to sensitive receptors.	Possible	Medium	Medium	Construction activities would be minor and temporary in nature. With the implementation of standard controls provided in the original EA, potential impacts on air quality during construction would be appropriately minimised. Emissions during construction are considered to be negligible due to the small scale of the proposed modification and the implementation of standard controls. No further assessment on construction dust is proposed as part of the EA.

Environmental aspect	Source of risk	Potential impact (without mitigation)	Likelihood	Consequence	Risk rating	Discussion
Traffic and transport	Operation of construction equipment and vehicles	Increase in traffic on the local road network as a result of construction activities.	Possible	Medium	Medium	The proposed modification would result in a minor increase in traffic during construction, which would be managed with the implementation of standard traffic controls provided in the original EA. The generation of traffic during construction is considered to be negligible due to the small scale of the proposed modification and the implementation of standard controls. No further assessment on construction traffic is proposed as part of the EA.
	Movement of heavy vehicles during operation	Increase in traffic as a result of operation impacting safety and traffic along the local road network.	Unlikely	Medium	Negligible	Heavy vehicle movements to and from the site are predicted to decrease as wood residue would mostly be used to fuel the boiler. The reduction in heavy vehicle movements would result in an improvement in traffic and safety on the local road network. As the proposed modification would result in an improvement to traffic during operation, further traffic analysis of projected vehicle movements would be undertaken as part of the EA to quantify likely improvements to the local road network.
Noise	Noise emissions from the proposed 18 MW wood-fired boiler	Noise emissions during operation exceed noise limits and affect sensitive receptors.	Unlikely	High	Medium	The original EA which assessed the operation of four boilers operating 24 per day and 7 days per week, concluded that the operation of the facility would be below the *Industrial Noise Policy* (DECC, 1999) noise criteria. It is unlikely that operation of the proposed modification would create a significant additional noise source at the site. Analysis of sound power levels from the proposed boiler in comparison with the approved project would be undertaken in the EA.

Environmental aspect	Source of risk	Potential impact (without mitigation)	Likelihood	Consequence	Risk rating	Discussion
	Operation of construction equipment and vehicles	Noise emissions exceeding noise limits and affecting sensitive receptors.	Unlikely	High	Medium	Construction activities would generate only minimal noise emissions as the proposed modification would be undertaken within the existing facility shielded from surrounding land uses. With the implementation of standard controls provided in the original EA, potential noise impacts during construction would be appropriately minimised.
	Movement of heavy vehicles during operation	Noise emissions exceeding noise limits and affecting sensitive receptors.	Unlikely	High	Medium	Heavy vehicle movements to and from the site are predicted to decrease as wood residue would mostly be used to fuel the boiler. The reduction in heavy vehicle movements would result in an in improvement in traffic noise from the site and the local road network. No further assessment on operational traffic noise is proposed as part of the EA.
Flora and fauna	Damage to flora and fauna from equipment, vehicles, site sheds during construction.	Loss of habitat and degradation to landscape.	Unlikely	Low	Negligible	No endangered species have previously been recorded on site. The proposed modification would be undertaken within the boundary of the existing mill. No flora or fauna would be impacted by the proposed modification. No further assessment on flora and fauna is proposed as part of the EA.

Environmental aspect	Source of risk	Potential impact (without mitigation)	Likelihood	Consequence	Risk rating	Discussion
Heritage	Impacts on items of Aboriginal and non-Aboriginal heritage significance.	Encounter and disturb items of cultural heritage during construction and operation.	Unlikely	Medium	Low	Items previously identified in the original EA include two sites of potential heritage value (Wool Pack Inn ruins and a filled well). These items would not be impacted by the proposed modification. One Aboriginal site, previously identified within the site and is understood to have been relocated as part of the original PA. Impacts on previously unidentified cultural heritage items are considered unlikely due to the level of subsurface disturbance of the site. In the unlikely event that items of potential heritage significance are encountered, procedures provided in the original PA would be implemented. No further assessment on heritage is proposed as part of the EA.
Odour	Odour from the wood-fired boiler	Odour emissions impacting nearby sensitive receivers	Unlikely	Low	Negligible	The proposed modification is not likely to result in an increase in odours from the site. The proposed odour management measures in the original EA would be implemented in the event that odour complaints are received. The EA would consider potential odour from the boiler.
Chemical usage and storage	Chemicals used during construction and maintenance of the proposed modification.	Chemical spill or leak during transport or usage, impacting on soil, groundwater or stormwater.	Possible	Medium	Medium	The proposed modification is will not result in additional impacts from chemical usage and storage to those considered in the original EA. No treated timber residual products will be used in the boiler operations.

Environmental aspect	Source of risk	Potential impact (without mitigation)	Likelihood	Consequence	Risk rating	Discussion
Soil	Erosion of soils during construction.	Sedimentation of adjacent drainage lines and dust generation impacting nearby receivers.	Unlikely	Medium	Low	The proposed modification is unlikely to result in additional impacts to soils to those considered in the original EA. Construction activities would be minor and temporary in nature. There is only minimal potential for disturbance of soils during construction as a result of the construction of ancillary infrastructure required for the boiler. With the implementation of standard controls provided in the original EA, potential impacts on soils during construction would be appropriately minimised.
Surface water	Impacts to water quality	Contamination of surface water or ground water during construction activities.	Possible	Medium	Medium	The proposed modification is unlikely to result in additional impacts to water quality to those considered in the original EA. Impacts to water quality during construction would be adequately managed with the implementation of controls provided in the original EA.
Water usage	Water usage for the boiler	Increase in water demand for the site.	Unlikely	Medium	Low	The proposed modification is unlikely to result in an increase in water usage.
Wastewater	Wastewater generation from the boiler	Increase in wastewater generated from the boiler.	Unlikely	Medium	Low	The proposed modification is unlikely to result in an increase in wastewater generation.
Solid waste	Waste generation as a result of the proposed modification	Increase in the generation of solid waste from the site.	Unlikely	Medium	Low	The proposed modification would result in a reduction in wood residue waste removed from the site. A quantitative analysis is proposed to be undertaken as part of the EA to demonstrate the reduction of waste from the mill operations.
Socio-economic	Construction of the proposed boiler.	Impacts to local community through increased noise and traffic.	Unlikely	Medium	Low	Construction activities would be minor and temporary in nature and would be appropriately mitigated with the implementation of controls provided in the original EA. No further assessment on the community is proposed as part of the EA.

Environmental aspect	Source of risk	Potential impact (without mitigation)	Likelihood	Consequence	Risk rating	Discussion
	Emissions from the boiler	Impacts to the local community as a result of reduced air quality.	Unlikely	High	Medium	As discussed above, air modelling would be undertaken as part of the EA to compare the potential emissions against the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (DEC, 2005). If exceedances are predicted, additional controls would be incorporated into the design to ensure that the relevant criteria is met. As described above, emissions would be considered in the air quality assessment proposed to be undertaken as part of the EA.
Visual amenity	Visibility of the proposed boiler.	Impacts to the visual amenity of the surrounding area.	Unlikely	Medium	Low	The proposed modification would be located within the existing facility and is consistent with the existing land use/operations of the facility. There would be no visual impacts on adjoining lands. No further assessment on visual amenity is proposed as part of the EA.

5. Impact assessment

5.1 Air quality

5.1.1 Existing approval

A detailed assessment of air emissions was undertaken as part of the sawmill expansion EA and subsequently as part of a preparation of an Air Emissions Management Plan (Dongwha Timbers, 2012). The assessments identified a range of potential pollutant emission sources from the sawmill operations including:

- Wood fired and natural gas boilers emitting Nitrogen oxides (NO_2), Particulate Matter (PM_{10}) and ($PM_{2.5}$), Sulfur dioxide (SO_2), Carbon monoxide (CO), Volatile organic compounds (VOCs) and Polycyclic aromatic hydrocarbons (PAH).
- Treatment plant including potential emissions of arsenic, copper, chromium and ammonia;
- GOS kilns emitting heat, water vapour and odour
- Re-dry kilns emitting heat, water vapour, odour, arsenic, copper, chromium and ammonia.
- Overall site operations generating dust from processing of timber, vehicle movements and construction activities.

Any emissions from the sawmill have potential to impact upon a small number of rural residential properties in the locality surrounding the site as shown on Table 5-1 and Figure 5-1.

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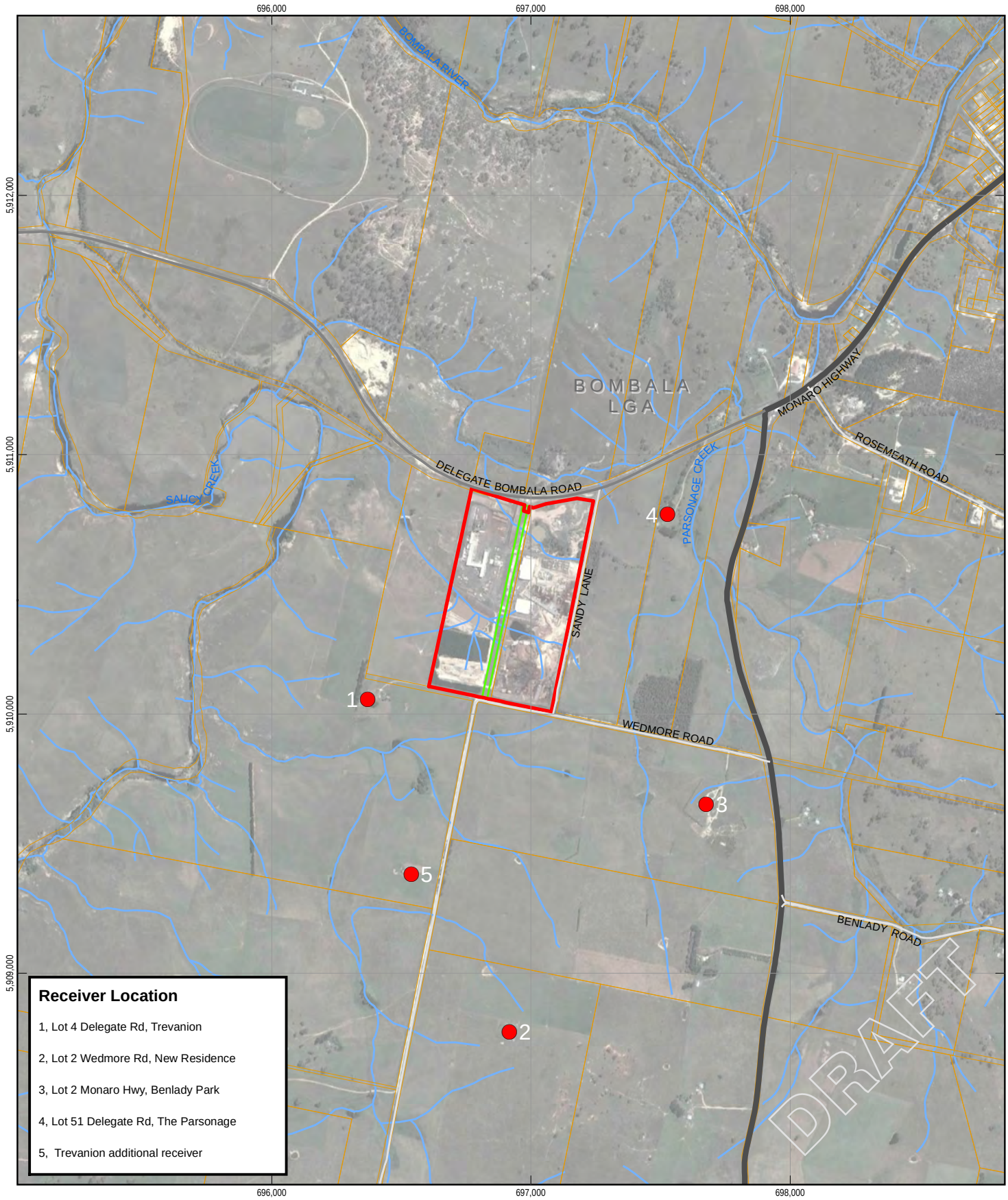
Table 5-1 Residential receivers in the vicinity of the Bombala sawmill

Receiver	Receiver ID	Receiver Address	Easting/northing (m)
Residential	01	Trevanion	696369, 5910057
Residential	02	New Residence	696917, 5908773
Residential	03	Benlady Park	697676, 5909651
Residential	04	The Parsonage	697527, 5910769
Residential	05	Trevanion additional receiver	696543, 5909384

The previous assessments indicated that all emissions associated with the sawmill expansion project would fall within the applicable standard of concentration of emissions to atmosphere and fall well within the impact assessment criteria at nearby receivers.

It was noted that the existing wood fired boiler was installed during the original establishment of the sawmill, and emissions were above the Group 4 solid particle standard of concentration specified in the EPA regulations. It was not considered to be economically feasible to modify the boiler to meet Group 6 limits, so multi-cyclones were installed on the boiler as a part of the sawmill expansion project to improve emission controls and achieve compliance with Group 4 criteria.



LEGEND

Receiver Location | Lot | Highways | Secondary Roads

Site Location | Gas Easement | Major Roads | Other Roads

Waterways

Paper Size A4

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number	21-23466
Revision	A
Date	14 Jul 2014

Air quality sensitive receivers

Figure 5-1

N:\AU\Sydney\Projects\21\23466\GIS\Maps\Deliverables\21_23466_Z004_AirQuality_A4_RevA.mxd Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung

The dispersion modelling undertaken as part of the project approval indicated that all pollutants were well below the respective impact assessment criteria for nearby receivers, none of which were considered to be adversely impacted by the proposal. A detailed air quality assessment has been undertaken to determine if the revised boiler configuration, would alter the performance of the approved project and is presented in full in Appendix C and the results summarised below.

The air quality assessment has focused on the pollutant emission sources associated with the operation of the wood and gas fired boilers as described above to determine the potential for any modification or alteration to the previously determined impacts associated with the proposal.

5.1.2 Local Climate

The local climate is similar to that of the broader Monaro Tableland region with cold winters with frequent frost and mild summers. The local climate at the Dongwha site is affected by broader regional patterns of synoptic pressure and wind with embedded weather systems and influences the dispersion of pollutants from the site.

The mean daily maximum temperatures range from 25.4 °C in summer to 10.6 °C in winter, and the mean daily minimum temperatures range from 10.7 °C in summer to -0.2 °C in winter. The area experiences significant diurnal and seasonal variations in meteorological conditions.

According to meteorological data, the average rainfall in the region is 596 mm (Bureau of Meteorology). Average monthly rainfall ranges from between 28 mm and 75 mm, and the driest months are in winter and early spring, with the higher rainfalls experienced between November and March.

A TAPM generated meteorological dataset has been used within the air quality assessment, to provide a link between large scale synoptic patterns and local land use and topography to assess dispersion. Details of annual and seasonal wind patterns and atmospheric stability which can influence dispersion are presented in Appendix C.

5.1.3 Air quality criteria

The Clean Air Regulation provides regulatory measures to control emissions from wood heaters, open burning, motor vehicles and fuels, and industry. The regulation outlines the grouping of activities and plant into 6 groups based on when the activities commenced operation. Group 6 applies to activities that commence operation after 1 September 2005 as a result of an environment protection licence granted under the POEO Act pursuant to an application made on or after 1 September 2005.

Schedule 4 of the Clean Air Regulation includes standards of concentration for scheduled premises: general activities and plant, which are relevant to the proposed wood fired boiler at Dongwha Bombala. The applicable Group 6 limits for the proposal are listed in Table 5-2. In accordance with the regulations, demonstration of compliance with either the CO or VOC standard of concentration (but not both) is necessary.

Table 5-2 Standards of concentration

Pollutant	Standard of concentration (mg/m^3)
PM_{10}	50
$PM_{2.5}$[1]	50
NO_2	500
CO	125
TVOC[2]	40
Dioxins and furans	0.1

The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales ('the Approved Methods') (DEC, 2005) lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in NSW. Impact assessment criteria must be applied at the nearest existing or likely future off-site sensitive receptor. For PAH, TVOC and dioxins and furans, the impact assessment criteria applies at and beyond the site boundary. Impact assessment criteria for the proposal are listed in Table 5-3.

Table 5-3 Impact assessment criteria

Pollutant	Averaging period	Concentration (mg/m^3)	Predicted impact
PM_{10}	24-hour	0.050	100th percentile
$PM_{2.5}$[3]	24-hour	0.050	100th percentile
NO_2	1-hour	0.246	100th percentile
SO_2	1-hour	0.570	100th percentile
CO	1-hour	30	100th percentile
TVOC[4]	1-hour	3.2	99.9th percentile
Dioxins and furans	1-hour	2.0E-9	99.9th percentile
PAH	1-hour	0.0004	99.9th percentile

[1] $PM_{2.5}$ criterion taken as PM_{10}
[2] TVOC modelled as n-hexane
[3] $PM_{2.5}$ criterion taken as PM_{10}
[4] TVOC modelled as n-hexane

5.1.5 Potential impacts

Estimated emissions

An emissions inventory has been developed for both the approved boiler configuration which includes the operation of three gas fired boilers and the existing 2.5 MW wood fired boiler together with the proposed 18 MW wood fired boiler.

The following assumptions were made in relation to the existing natural gas boilers:

- The energy content of natural gas is 39.7 MJ/m^3
- The weight to volume of natural gas is 0.74 kg/m^3
- The rate of gas for boiler 1 and 4 (both 10MW) is 25.2 GJ/hr
- The rate of gas for boiler 2 (3.5MW) is 8.8 GJ/hr
- Boiler type for all gas boiler is tangential fired.

The following assumptions were made in relation to the wood fired boilers:

- The rate of wood for the existing wood boiler is 0.93 t/hr
- The rate of wood for the proposal wood boiler is 4.9 t/hr
- The fuel used as per the EET Manual is wood/bark fired.

Existing situation

The current approved boiler discharge points are as follows:

- DP1 – Boiler 1, 10 MW (gas) located on the western of the site
- DP2 – Boiler 2, 3.5 MW (gas) located on the western portion of the site
- DP3 – Boiler 3, 2.5 MW (wood) located on the eastern portion of the site.
- DP4 – Boiler 4, 10 MW (gas). Locatedon the eastern portion of the site.

A summary of the boiler discharge points is presented below in Table 5-4.

Table 5-4 Summary of approved boiler discharge points

Parameter	DP1	DP2	DP3	DP4
Fuel	Natural gas	Natural gas	Wood	Natural gas
Size (MW)	10	3.5	2.5	10
Stack height (m)	13	10	12	13
Stack tip diameter (m)	0.87	0.55	0.58	0.87
Exhaust discharge temperature (ºC)	140	225	255	140
Discharge velocity (m/s)	10	10.3	7	10

A summary of the existing boiler discharge emissions is presented in and has been calculated using the NPI emission factors.

Table 5-5 Summary of approved boiler discharge point emissions

Parameter	DP1	DP2	DP3	DP4
PM_{10} (g/s)	0.021	0.0073	0.22	0.021
$PM_{2.5}$ (g/s)	0.021	0.0073	0.11	0.021
NO_x as NO_2 (g/s)	0.48	0.17	0.37	0.48
SO_2 (g/s)	0.0046	0.0016	0.044	0.0046
CO (g/s)	0.068	0.024	1.05	0.068
VOC (g/s)	0.016	0.0054	0.03	0.016
Dioxins and furans (ng/s)	0.014	0.0049	3.7	0.014
PAH	0.0000018	0.00000063	0.00046	0.0000018

Proposal

The proposal involves the following:

- Removal of Boilers DP1, DP2, DP3 and DP4.
- Installation of a new Boiler 5, 18 MW (wood). Located at the western portion of the site adjacent to the residual timber bunkers.

The proposed boiler stack details are summarised in Table 5-6 below.

Table 5-6 Summary of proposal boiler discharge points

Parameter	DP5
Fuel	Wood
Size (MW)	20
Stack height (m)	13
Stack tip diameter (m)	2.2
Exhaust discharge temperature (ºC)	160
Discharge velocity (m/s)	9

A summary of the proposed boiler discharge emissions is presented in Table 5-7. This has been based on burning 4.9 tonnes of wood per hour in the 18 MW boiler.

Table 5-7 Summary of proposal boiler discharge point emissions

Parameter	DP5 (g/s)	DP5 (mg/m^3)	Reference
PM10	1.079	50	Class 6 limit
PM2.5	0.59	27.2	NPI
NOx as NO2	8.630	400	Boiler supplier
SO2	0.232	10.7	NPI
CO	2.697	125	Class 6 limit
VOC	0.863	40	Class 6 limit
Dioxins and furans	2.157 ng/s	0.1 ng/m^3	Class 6 limit
PAH	0.002	0.112	NPI

There is a potential for an increase in emissions in a number of parameters (particularly PM, NO_x and CO) as a result of the alternate combustion process and the size of the proposed wood fired boiler. The new 18 MW boiler will be designed to ensure that the emissions from the proposal will meet the EPA's class 6 emission standards.

Dispersion Modelling

Dispersion modelling was undertaken using Ausplume version 6.0 which was configured to model the situation in accordance with the estimated emissions, relevant topography and physical building characteristics and representative meteorological data.

Key components of the model configurations are summarised below:

- 12 month TAPM derived meteorological data for the period January 2009 – December 2009 for the Dongwha site
- A 5 km x 5 km square receptor grid, centred over the Dongwha site, using a grid resolution of 50 metres
- An averaging period of one hour or 24 hours
- Three site buildings were included in the model
- Horizontal and vertical dispersion were parameterised according to equations for the Pasquill-Gifford curves
- A surface roughness height of 0.4 metres (rolling rural) was used.

The dispersion modelling was conducted to predict the pattern of maximum off-site ground level concentrations resulting from stack emissions from the site during operation of the proposal. Previous investigations undertaken at the site indicate the significant emission sources at the site emit a different range of potential pollutants, so only the boilers were considered in this assessment which represents the element of the proposed modification.

All modelling was undertaken in accordance with the NSW Approved Methods for Level 2 assessment and the results presented in Table 5-8. Results of the modelling are shown graphically in pollutant contours in Appendix C.

Table 5-8 Predicted maximum pollutant concentrations at sensitive receivers

Receiver	Model Predictions	Assessment Criterion
Particulate matter - PM_{10} 24 hour µg/m^3		
1	0.79 µg/m^3	50 µg/m^3
2	0.97 µg/m^3	50 µg/m^3
3	1.30 µg/m^3	50 µg/m^3
4	2.39 µg/m^3	50 µg/m^3
5	0.90 µg/m^3	50 µg/m^3
Particulate matter - $PM_{2.5}$ 24 hour µg/m^3		
1	0.57 µg/m^3	50 µg/m^3
2	0.48 µg/m^3	50 µg/m^3
3	0.66 µg/m^3	50 µg/m^3
4	2.45 µg/m^3	50 µg/m^3
5	0.47 µg/m^3	50 µg/m^3
Carbon Monoxide - CO 1 hour mg/m^3		
1	0.0142 mg/m^3	30 mg/m^3
2	0.0083 mg/m^3	30 mg/m^3
3	0.0013 mg/m^3	30 mg/m^3
4	0.0011 mg/m^3	30 mg/m^3
5	0.0010 mg/m^3	30 mg/m^3
Nitrogen Oxides - NO_2 1 hour µg/m^3		
1	45.3 µg/m^3	246 µg/m^3
2	26.5 µg/m^3	246 µg/m^3
3	41.0 µg/m^3	246 µg/m^3
4	36.4 µg/m^3	246 µg/m^3
5	34.9 µg/m^3	246 µg/m^3
Sulfur dioxide SO_2 1 hour µg/m^3		
1	1.21 µg/m^3	570 µg/m^3
2	0.71 µg/m^3	570 µg/m^3

Receiver	Model Predictions	Assessment Criterion
3	1.10 µg/m^3	570 µg/m^3
4	0.97 µg/m^3	570 µg/m^3
5	0.94 µg/m^3	570 µg/m^3
Volatile Organic Compounds VOC 1 hour mg/m^3		
Property boundary	0.019 mg/m^3	3.2 mg/m^3
1	0.0032 mg/m^3	3.2 mg/m^3
2	0.0051 mg/m^3	3.2 mg/m^3
3	0.0026 mg/m^3	3.2 mg/m^3
4	0.0033 mg/m^3	3.2 mg/m^3
5	0.0027 mg/m^3	3.2 mg/m^3
Dioxins and furans DFs 1 hour mg/m^3		
Property boundary	8.4E-11 mg/m^3	2E-9 mg/m^3
1	1.4E-11 mg/m^3	2E-9 mg/m^3
2	9.0E-12 mg/m^3	2E-9 mg/m^3
3	1.1E-11 mg/m^3	2E-9 mg/m^3
4	1.4E-11 mg/m^3	2E-9 mg/m^3
5	1.1E-11 mg/m^3	2E-9 mg/m^3
PAH 1 hour mg/m^3		
Property boundary	0.00004 mg/m^3	0.004 mg/m^3
1	0.000008 mg/m^3	0.004 mg/m^3
2	0.000008 mg/m^3	0.004 mg/m^3
3	0.000006 mg/m^3	0.004 mg/m^3
4	0.000008 mg/m^3	0.004 mg/m^3
5	0.000007 mg/m^3	0.004 mg/m^3

The air quality impact assessment shows that the maximum predicted concentrations that may occur as the result of the operation of the 18 MW wood fired boiler are expected to comply with the impact assessment criteria at all surrounding receivers and the site boundary where relevant. The predicted levels for most pollutants are one or more orders of magnitude below the respective impact assessment criterion.

The proposal is also anticipated to reduce the potential for dust emissions associated with the storage and transport of residual timber and emissions associated with a reduction in road haulage as discussed in Section 5.3.

5.1.6 Mitigation measures

The design of the boiler will be undertaken to achieve compliance with the EPAs Clean Air Group 6 standards of concentrations for a biomass boiler installed after 1st September 2005 as specified within Schedule 4 of the Clean Air Regulation.

5.2 Noise

5.2.1 Existing Environment

Background noise levels and assessment criteria

A detailed assessment of noise emissions was undertaken as part of the sawmill expansion EA by Marshall Day Acoustics (MDA). Ambient noise monitoring was undertaken to determine the existing background noise levels in the absence of any industrial noise sources to quantify impacts and develop assessment criteria for the expansion of the mill.

Unattended noise monitoring was undertaken from the 2nd of July 2008 to the 10th of July 2008 and recorded background ambient noise levels of less than 30 dB(A) which are typical noise levels for a rural environment.

The EPA's Industrial Noise Policy (INP) provides a framework and process for deriving noise criteria for consents and licences. The INP provides two forms of noise criteria with the aim of achieving environmental noise objectives. The intrusive noise criteria involves setting a noise goal relative to the existing acoustic environment and the amenity criteria aims to protect the amenity of particular land uses in the surrounding area.

In accordance with the INP, the project specific noise levels reflect the most stringent noise level requirements of both the intrusive and amenity criteria. Applying the most stringent requirement as the project specific noise levels ensures that both intrusive noise is limited and amenity is protected. The operational project specific noise criteria for the site was 35 dB(A) for all time periods assessed at the surrounding residential receivers and this criteria has been adopted as part of Condition 9 of Schedule 3 in the project approval.

The Interim Construction Noise Guideline (released by DECCW July 2009) sets out noise management levels for residential receivers and sensitive land uses in proximity to construction activities. The guidelines include management levels for residential receivers including guidance for Noise Affected receivers where the Laeq(15minute) is greater than 10dB above the background level during standard construction hours and guidance for Highly Affected receivers where the Laeq (15minute) is above 75dB. A construction noise limit of 40 dB(A) has been adopted as part of Condition 9 of Schedule 3 in the project approval.

Existing operations

The site operations contribute to noise emissions through a combination of noise sources with the dominant noise sources from wood chipping, moulding, paling, rounding and milling. The boilers and several other noise sources on the site operate 24 hours a day 7 days a week.

The original sawmill expansion EA which assessed the operation of the site and concluded that the operation of the facility would be below the Industrial Noise Policy (EPA, 2000) noise criteria with the exception of The Parsonage during the day-time and evening period.

During the night–time period the original sawmill expansion EA concluded that the operation of the facility would be below the Industrial Noise Policy (EPA, 2000) noise criteria at all receivers and the noise level predicted at The Parsonage was 31 dB(A).

Compliance monitoring undertaken by Day Designs Pty Ltd in September 2013 found that the level of noise emissions from the site exceeded the acceptable noise limits at the two closest

receptor points ('Parsonage' and 'Trevanion') on some occasions. Whilst noise complaints had been received from the landowner of the Parsonage, no complaints have been received from the owner of Trevanion.

Noise exceedances measured at the Parsonage were due to the operation of the log in feed and sorting chain at the Green Mill. Dongwha Timbers has implemented delaying the start up time of the sorting chain until 7am and are investigating other potential acoustic treatments to minimise noise at the receiver concurrently with this approval modification process.

Noise exceedances measured at Trevanion (114 Wedmore Road) were due to the operation of the Green Mill and Dry Mill. Dongwha are investigating further additional acoustic treatments and undertaken negotiations with the affected receiver concurrently with this approval modification process.

5.2.2 Potential impacts

Operation

The proposed modification is to replace two 10 MW boilers with a 18 MW wood-fired boiler. Wood-fired boilers have blower fans which generate noise therefore an assessment of the noise impacts to the surrounding residential receivers has been undertaken with respect to the proposed boiler modifications.

The existing boilers on the site were measured to have a blower fan noise source sound power level of 98 dB(A)[5]. Dominant noise sources on the site which operate during the day-time and evening period are from wood chipping, moulding, paling, rounding and milling and were each measured to have noise source sound power levels ranging from 104 dB(A) to 111 dB(A). Where a noise source is 10 dB(A) or more below another noise source the logarithmic contribution from that source of noise is not significant, therefore the existing boilers do not significantly contribute to the site noise emissions during the day-time and evening period and would not be audible at the surrounding residential receivers.

The boilers operate during the night-time period when the dominant noise sources from the site are not operational. During the night-time period the existing boilers were assessed in the original sawmill expansion EA to comply with the noise criteria of 35 dB(A). The highest predicted residential receiver noise level during the night-time period was 31 dB(A) at The Parsonage. The 18 MW wood-fired boiler blower fans would be selected so that the noise source levels are lower than the existing boiler noise source sound power levels of 98 dB(A) to ensure the night-time noise criteria of 35 dB(A) is achieved at all surrounding sensitive receivers.

Therefore, the proposed modification to alter the boiler type and location would not affect the acoustic amenity of the residential receivers surrounding the site during any time periods.

Heavy vehicle movements to and from the site are predicted to decrease as wood residue would mostly be used to fuel the boiler. The reduction in heavy vehicle movements would result in an in improvement in traffic noise from the site and the local road network.

Construction

Construction activities would be undertaken over a period of 24 weeks during the recommended standard construction hours. Plant and equipment needed for the construction work would be determined during the construction planning phase. The anticipated plant and equipment used is shown in Table 5-9 with the corresponding noise levels at various distances. Noise level data

[5] (Marshall Day Acoustics 28 October 2009)

has been obtained from AS24366 and based on distance attenuation, atmospheric absorption and ground absorption.

Table 5-9 Construction plant and equipment noise levels at distance, dB(A)

Plant and equipment	Noise level				
	10 m	600 m	800 m	1000 m	1200 m
Excavator	79	32	29	27	25
Concrete pump	80	33	30	28	26
Delivery and concrete trucks	80	33	30	28	26
Front end loader	85	38	35	33	31
Compressor	73	26	23	21	19
Hoist or crane	77	30	27	25	23
Concrete cutter	89	**42**	39	37	35
Jackhammer	93	**46**	**43**	**41**	39
Hammer drill	90	**43**	40	38	36

Note: **Bolded** results indicate exceedance of THE construction noise management level of 40 dB(A).

Jack hammering concrete cutting and hammer drilling have the potential to exceed the noise affected construction noise management level of 40 dB(A) at the Parsonage and Trevanion which are located at 780 m and 560 m respectively from the boiler construction area. The use of this equipment would be extremely limited during the construction period due to the existing hardstand surface and industrial style of the installation. However, nearby receivers should be notified as to the timing and duration of the construction works prior to commencing work. The noise mitigation measures in the following section will be implemented where feasible and reasonable. All other receivers are over 1200 m from the boiler construction activities and should not exceed the construction noise management level of 40 dB(A).

Construction traffic would be anticipated to generate up to around 15 two way heavy vehicle movements per day associated with the transportation of construction machinery, equipment and materials to the site and for the removal of waste and the existing boiler components. This equates to approximately 3 heavy vehicle movements per hour which should not significantly impact receivers on the traffic route from a noise perspective.

5.2.3 Mitigation measures

Operation

The 18 MW wood-fired boiler blower fans would be selected so that the noise source sound power level is lower than the existing boiler noise source sound power levels.

Construction

The following noise mitigation measures will be implemented during construction:

- Noise generating construction activities will be undertaken in accordance with the Interim Construction Noise Guideline (DECC, 2009). The standard hours for construction work shall be in accordance with the Guideline:
  - 7:00 am – 6:00 pm Monday to Friday
  - 8:00 am – 1:00 pm Saturdays
  - no work on Sundays or Public Holidays.

[6] Australian Standard, AS2436 – 2010, Guide to noise and vibration control on construction , demolition and maintenance sites

- Noise mitigation and management strategies shall be documented and implemented in accordance with the Construction Environmental Management Plan. This shall include:
  - recording of noise complaints
  - awareness training of staff and contractors in environmental noise issues
  - scheduling construction stages to minimise multiple use of the noisiest equipment or plant items near noise sensitive receptors
  - the positioning of plant items to reduce noise emissions to noise sensitive receptors.
- Plant shall be turned off when not in use. For example, trucks should not be left idling if not operational.
- Machines found to produce excessive noise would be removed from site or stood down until repairs or modifications can be made.

5.3 Traffic and transport

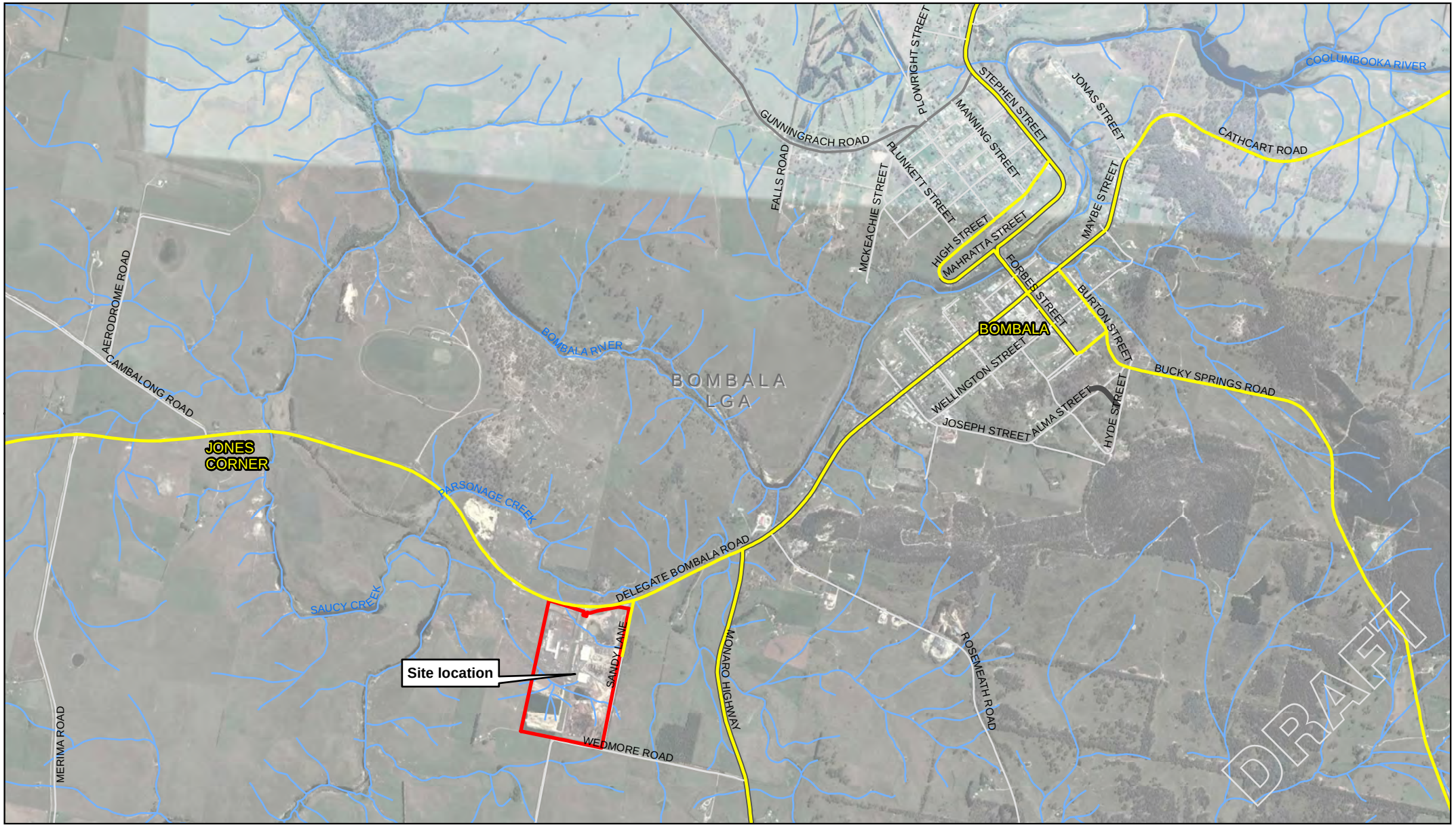
5.3.1 Existing approval

The site is located approximately two kilometres southwest of Bombala, with access available from Sandy Lane and the Delegate Bombala Road. Separate site entrances are maintained for heavy vehicles entering the sawmill site and light vehicles for access to the office and carpark. A separate site access has been provided as part of the expansion project to allow heavy vehicles to exit directly to the Delegate Bombala Road providing for a circulating one way network of heavy vehicles within the site.

The Delegate Bombala Road (MR93) links the town centre of Delegate to the Monaro Highway located approximately 800 metres to the east of the Bombala Sawmill. The Monaro Highway is classified as State Highway (number 23) and runs in an approximate north-south alignment through the centre of Bombala. Sandy Lane is classified as a local road and runs along the eastern boundary of the site predominantly servicing the existing mill site and a small number of neighbouring properties as shown on Figure 5-2.

The majority of major roads in the local area have all been constructed or modified to accommodate heavy vehicle activity which is associated with commercial forestry activities in the region. The majority of inbound logs come from forests located to the south of the site and the majority of finished products and timber residue products are transported to the north through the township of Bombala.

The major highway network utilises the main street of Bombala with full commercial and residential frontages. There are no restrictions on semi-trailer access to the surrounding road network. The majority of roads surrounding the site are also classified B-doubles routes, which includes the main street and number of local roads within the urban areas of Bombala as shown on Figure 5-2.



Paper Size A4

0 250 500 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Site Location
- Heavy Vehicle Routes
- Highways
- Major Roads
- Other Roads
- Waterways

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number	21-23466
Revision	A
Date	25 Jun 2014

Surrounding Road Network

Figure 5.2

N:\AU\Sydney\Projects\21\23466\GIS\Maps\Deliverables\21_23466_Z003_Heavy_Vehicle_Route_LS_A4_RevB.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung

A detailed traffic assessment was undertaken as part of the sawmill expansion EA, which included the predicted daily truck movements from the proposed development. The assessment found that at full production, heavy vehicle movements would consist of approximately 92 two way movements per day consisting of 46 in-bound logging trucks with 16 outbound product trucks and 30 waste residue trucks.

The sawmill expansion project was predicted to result in the mill generated heavy vehicle traffic on the Delegate Bombala Road increasing to 21% of the total traffic on the road and amount to approximately nine to 10 trucks per hour over a 10 hour working day. The proportion of heavy vehicle traffic generated by the mill was predicted to dissipate once the trucks reached the Monaro Highway where truck movements would split and volumes would be more influenced by the regional road network. A summary of the total daily average truck movements on the local road network predicted in the sawmill expansion EA is reproduced in Table 5-10.

Table 5-10 Average daily truck movements predicted in EA

Summary of daily truck movements	Assumed 2008/2009	Full Production
Monaro Highway (N of Bombala)	19	43.5
Delegate Bombala Road west	4	4.5
Cann Valley Highway (S of Bombala)	10.5	35
Bucky Springs Road	0	8
Mount Darragh Road	1.5	1
Total Movements/day (two way)	35	92

Employment at the mill was predicted to increase from a workforce of 71 to 80 persons to 94 staff on site at full production with an associated small increase in vehicles accessing the site associated with staff movements. The peak arrivals and departures at the mill are not concurrent with the peak traffic flows on the Delegate Bombala Road.

The traffic assessment concluded that there was significant spare capacity on the local road network and the additional traffic movements associated with sawmill expansion project could adequately be serviced by the road network. Several potential improvements to the road network such as increased pavement widths and bridge and intersection specifications were identified within the road network.

5.3.2 Potential impacts

The proposal involves the replacement of three gas boilers proposed in the original project application and a small existing wood-fired boiler with a single 18 MW wood fired boiler. The proposal will result in the use of timber residues generated at the site as the primary fuel source and therefore result in a considerable reduction in the associated heavy vehicle movements for the removal of the waste products.

The majority of truck movements for the transport of timber residue products is currently to the north and pass directly through Bombala and other towns on the regional road network.

The use of the timber residue products as a fuel source for the proposed boiler will therefore result in a considerable reduction in heavy vehicle movements required for waste removal from the site. Based upon the bulk density and the volume of each timber residue it is estimated that there will be a reduction of 3642 heavy vehicles transporting waste product from the site per year as shown in Table 5-11 .

This would equate to an approximate reduction of 18 two way truck movements per day through the centre of the Bombala, based upon an assumed 50:50 split for semi-trailers and B-Doubles otherwise transporting waste from the site over 200 days per year.

Table 5-11 Estimated heavy vehicle movement reduction

Wood residue	Quantity (tonnes)	Assumed bulk density (kg/m^3)	Volume (m^3)	Heavy Vehicles
Fresh sawdust	21525	290	74224	1484
Dried wood shavings	5183	100	51830	1037
Fresh pine bark	7616	290	26262	525
Fresh woodchips	8631	290	29762	595
Total	42955		182078	3642

Notes: Assumed 50:50 split for semis and B-doubles with an average capacity of 50m^3

While all roads in the vicinity of the site have been previously assessed to have considerable spare capacity and are suitable for the use of semi-trailers and B-doubles, the proposal would reduce truck movements associated with waste disposal by approximately 60% at full production. This reduction in vehicle movements from the local road network would therefore be anticipated to result in improvements to the safety and amenity for local residence particularly in the urban areas of Bombala.

Construction would be anticipated to generate up to around 15 two way heavy vehicle movements per day associated with the transportation of construction machinery, equipment and materials to the site and for the removal of waste and the existing boiler components

The site is undergoing a progressive expansion in accordance with the original project approval, which was intended to include an additional 10 MW boiler and relocation of a 3.5 MW boiler from an alternate facility during this phase of the development to service additional kilns being established at the site.

Vehicles required for construction and delivery of materials and equipment associated with the proposed 18 MW boiler is not anticipated to be significantly greater than required for the approved project and would be adequately accommodated on the local road network.

5.3.3 Mitigation Measures

No additional mitigation measures are proposed as a part of the proposed modification.

5.4 Soils and water resources

5.4.1 Existing environment

The site has been extensively modified during the progressive implementation of the sawmill expansion project. The previous landform has been replaced by a combination of compacted hardstand, reinforced concrete beneath buildings and structures, and bitumen pavement on the sites internal road network.

Drainage to the site flows to established stormwater pond system located to the north and south of the site for treatment prior to discharge in accordance with EPL conditions. Receiving waters include Parsonage Creek to the north and Saucy Creek to the south of the site.

Previous investigations at the site identified legacy contamination issues associated with elevated levels of arsenic and chromium in the soils in the central area of the site, in the vicinity of the former copper chrome arsenate (CCA) treatment area. Elevated concentrations of arsenic, chromium and copper were also identified in groundwater monitoring wells and sedimentation ponds at the site.

Legacy contamination issues are been remediated and addressed as part of the overall sawmill expansion project in accordance with the existing consent.

5.4.2 Potential impacts

Installation of the boiler is anticipated to require minor excavation to establish footings for the boiler and pipeline supports during the construction and boiler installation process. Excavation will be minor as the site already consists of 300 mm compacted hardstand, re-enforced concrete and asphalt. The site is flat and it is not anticipated to be a significant risk of erosion or sediment laden run-off from the work area. Any run-off from the work area will drain to the southern treatment ponds and will not drain directly to receiving waters.

There is limited potential to disturb contaminated soils associated with previously identified legacy contamination issues. Soils in the central portion of the site near the former treatment plant are not anticipated to be disturbed by the proposal.

5.4.3 Mitigation measures

A soil, groundwater and surface water management plan has been previously developed for the sawmill expansion and will continue to be applied during the installation and operation of the proposal. Additional mitigation measures will include:

- Erosion and sedimentation controls would be installed and maintained in accordance with *Managing Urban Stormwater Guidelines* (Landcom 2004)
- Any potentially contaminated soils encountered during excavation would be classified and disposed of in accordance with the EPA's *Waste Classification Guidelines* (DECCW, 2009).

5.5 Flora and fauna

5.5.1 Existing approval

A detailed assessment of the potential ecological impacts associated with the expansion of the sawmill was provided in the sawmill expansion EA. The proposed location of the new wood-fired boiler and all associated infrastructure will be entirely within the existing footprint of the sawmill in an area which has been previously cleared for development and consists of hardstand, reinforced concrete and bitumen pavement.

No endangered species have previously been recorded on site.

5.5.2 Potential impacts

It is not anticipated that the proposal would have an impact on any flora or fauna.

5.5.3 Mitigation measures

No additional mitigation measures are proposed.

5.6 Heritage

5.6.1 Existing approval

An Indigenous heritage assessment for the site was undertaken as part of the sawmill expansion EA. The investigation included a search of the Aboriginal Heritage information Management System (AHIMS) database as well as a site visit to determine the condition of any heritage items. The assessment resulted in the discovery of artefacts in the form of seven stone shards from tools or toolmaking. It is understood that these were uncovered during previous excavation work.

It is understood that the heritage item has been relocated as part of the original project approval.

An AHIMS database search was carried out on 04 April 2014 and yielded no further results.

A non-Indigenous heritage assessment for the site was undertaken as part of the sawmill expansion EA. This assessment included a search of relevant databases and registers as well as a site visit to determine the condition of any heritage items. Two sites of potential heritage value were found to exist on site. These included the following:

- Ruins of a Wool Pack Inn (circa 1850)
- A filled in well (potentially associated with the inn).

An updated database and register search was carried out on 01 May 2014 and yielded no further results.

Both heritage sites are located within the boundary of the sawmill site approximately 25 metres away from Delegate Road.

5.6.2 Potential impacts

Both non-Indigenous heritage sites are located well outside the works footprint of the proposal (over 400 metres away) and would not be impacted by the construction or operations of the new boiler.

There is the potential for the discovery of both Indigenous and non-Indigenous heritage items during ground clearance and earthworks associated with the proposal. It is noted however that the proposal site has been significantly disturbed as a result of previous development and the potential for discovery is low.

5.6.3 Mitigation measures

It is not anticipated that the proposal would impact on the existing Indigenous or non-Indigenous heritage sites, therefore no additional mitigation measures are proposed.

The following mitigation measures would be implemented to minimise potential impacts to any heritage items which may be discovered during construction works:

- If an item (or suspected item) of Indigenous and non-Indigenous heritage is discovered during works, all work in that area would cease and the relevant regulator would be notified as soon as possible to determine the subsequent course of action.
- Construction activities and machinery would be restricted to designated work areas.

5.7 Waste generation

5.7.1 Existing Environment

A detailed analysis of the anticipated wastes and by-products generated at the site was undertaken for the sawmill expansion EA which included:

- General solid waste (non-putrescible) including steel waste and wood residue products
- General solid waste (putrescible) including general domestic waste from the sites workforce
- General hazardous waste from the bunded timber treatment operations and treated timber waste from the handling of treated timber following the treatment process
- Waste oils from maintenance activities within the workshop areas.

Wood residues including bark, untreated timber waste, woodchips, sawdust, pole waste and shavings made up by far the greatest volume of waste with an estimated 186,900 tpa of residual timber produced at maximum production at the sawmill.

5.7.2 Impact Identification

The proposed wood fired boiler will not result in a significant change to the overall site operational processes that would alter the volume of the waste streams generated at the site.

The proposal will however result in the reuse of up the 42955 tpa of residual timber products as a fuel source for the proposed boiler. This will provide a steady ongoing site demand for the residual timber products improving site efficiencies and reducing the reliance on an external market for residual timber products.

Treated timber waste products or hazardous waste will not be used as a fuel source for the boiler operations.

The proposal will result in additional fly-ash or soot as a by-product of the combustion process which would be reused or disposed in accordance with current practices.

The existing boilers at the site will be decommissioned and sold to an alternate facility or disposed of in accordance with EPA's *Waste Classification Guidelines* (DECCW, 2009).

5.7.3 Mitigation Measures

All waste disposal at the site will continue to be undertaken in accordance with the EPA's *Waste Classification Guidelines* (DECCW, 2009).

5.9 Greenhouse

5.9.1 Existing Approval

A detailed assessment of greenhouse gas emissions was undertaken as part of the original sawmill expansion EA. The site operations contribute to greenhouse emissions through a combination of energy use and activities such as transport and waste disposal. A summary of the greenhouse gas emissions predicted to be emitted directly and indirectly by the approved project are shown in Table 5-12.

The total estimated annual greenhouse emissions from the approved sawmill was estimated to amount to 91,303 t CO_2 equivalent per year (t $CO2_2$ e/year).

Table 5-12 Estimated annual greenhouse emissions from approved project

Greenhouse Gas Emission source	Quantity of Greenhouse Gas Emitted	
	Existing (t CO_2 e/year)	Proposed (t CO_2 e/year)
Natural gas consumption	0	34,773
Combustion of wood waste	118	118
Electricity use	8413	52,371
Transport fuels consumption	1413	3384
Waste to landfill	416	656
Total GHG emissions	**10360**	**91303**
Total energy related GHG emissions	**8531**	**87263**

5.9.2 Potential impacts

The major greenhouse gas emissions from the approved project were associated with electricity use and natural gas consumption. The proposal is not anticipated to have any impact upon electricity use and will replace the consumption of natural gas with biomass resulting in considerably less greenhouse emissions than the approved project.

Gas consumption within the three approved gas fired boilers was estimated to emit 34,773 t CO_2 equivalents per year. Combustion of wood waste is considered a biogenic process and does not result in the equivalent greenhouse emissions.

The proposed 18 MW boiler will have improved emissions controls compared to the existing 2.5 MW boiler and will be designed to comply with the EPA's Group 6 emission limits required for a biomass boiler installed after 1st of September, 2005. Based purely upon capacity of the proposed boiler the emissions associated with the combustion of wood waste would potentially increase from 118 to 850 tonnes of CO_2 e/year based upon the proposed boiler capacity.

However this would be more than offset by the reduction of 34,773 tonnes of CO_2 e/year in emissions from natural gas consumption together with a reduction in fuel consumption for the transport of residual waste products from the site.

5.9.3 Mitigation measures

No additional mitigation measures are proposed.

5.10 Visual amenity

The existing sawmill development is visible from a small number of rural residential receivers and from vantage points on the Delgate Bombala Road. The proposed boiler will located within the approved footprint and be visually integrated within the existing sawmill structures. The proposed boiler will replace four boilers originally proposed within the application and is not considered to introduce any additional visual impacts to surrounding receivers.

5.11 Socio-economic

The existing socio-economic setting of the area is discussed in detail in the sawmill expansion EA. Bombala has historically been associated with timber forestry and timber production and the ongoing expansion of the sawmill has resulted in the provision of additional jobs within the local community.

The proposal will improve the efficiency of the sawmill operations by minimising operating costs associated with natural gas consumption and transport of residual timber products. The ongoing viability of the operations will ensure employment is maintained together with associated indirect benefits to sustaining the local and regional economy.

The proposal is anticipated to improve the amenity of local residents living on the main transport routes through Bombala, by reducing the number of heavy vehicle movements required for the transport of residual timber products.

6. Environmental Management

6.1 Overview

Dongwha is committed to sound environmental management for all aspects of the sawmill operations and have implemented a number of environmental management and monitoring systems to guide the construction and operation of the expanded mill including:

- Construction environmental management plan
- Operational environmental management plan
- Emergency response plan
- Monitoring plans for traffic, noise, air, surface water, groundwater and a soil sampling program prior to the commencement of construction.

The sawmill expansion EA included a draft statement of commitments to provide a consolidated summary of all proposed environmental management and monitoring commitments to be adopted as a part of the overall project application. The statement of commitments also included the requirement to amend the EPL for the site and notification to WorkCover regarding the volume and type of dangerous goods stored at the site.

The SEARs for this proposed modification requested a consolidated summary of all environmental management and monitoring measures to be adopted at the site including highlighting relevant commitments from the original EA. The following section provides a consolidated summary of all proposed measures from the original project application, updated to reflect the measures proposed as part of this application and the new proponent and government agency details.

6.2 Environmental management and monitoring

Table 6-1 Statement of Commitments

Environmental Issue	Commitments	Timing	Project Application / Approval Modification
Consolidation of Consents	• Dongwha will surrender all existing consents pertaining to the site at or before all new equipment is commissioned, according to Table 7.	Construction and Operational Phases	Project Application
Safety and Hazard	• Update and maintain all documentation such as fire management and emergency plans, safety records and changes to operation practices and communicate changes to staff and contractors. • Conduct training and induction of all site personnel outlining safety hazard issues associated with construction and operation of the proposed mill. • Appropriate engineering controls, process monitoring and, physical inspections of all components of the storage tanks.	Construction and Operational Phases	Project Application
Noise	• Barriers and noise berms will be constructed along the eastern and southern boundaries of the site to mitigate potential noise impacts on the surrounding sensitive receptors. • Alternative reverse beepers will be fitted to mobile machinery to reduce the impact of this noise. • Noise control measures will be implemented during construction to ensure there are no adverse impacts on the residence to the north-east of the site. This may include fitting front end loaders and excavators with exhaust silencers or sourcing alternative quieter models. Other mitigation measures will include limiting the hours of noisy construction activities, establishing clear communication channels with the community and contractors, and appointing a site representative responsible for matters relating to noise. • Compliance with operation, traffic and construction noise limits, as outlined in the noise assessment report will be achieved.	Construction and Operational Phases	Project Application

Environmental Issue	Commitments	Timing	Project Application / Approval Modification
Noise	• The 18 MW wood-fired boiler blower fans would be selected so that the noise source sound power level is lower than the existing boiler noise source sound power levels. • Noise generating construction activities will be undertaken in accordance with the Interim Construction Noise Guideline (DECC, 2009). The standard hours for construction work shall be in accordance with the Guideline: o 7:00 am – 6:00 pm Monday to Friday o 8:00 am – 1:00 pm Saturdays o no work on Sundays or Public Holidays. • Noise mitigation and management strategies shall be documented and implemented in accordance with the Construction Environmental Management Plan. This shall include: o recording of noise complaints o awareness training of staff and contractors in environmental noise issues o scheduling construction stages to minimise multiple use of the noisiest equipment or plant items near noise sensitive receptors o the positioning of plant items to reduce noise emissions to noise sensitive receptors. o Plant shall be turned off when not in use. For example, trucks should not be left idling if not operational. o Machines found to produce excessive noise would be removed from site or stood down until repairs or modifications can be made.	Design and Commissioning Phases Construction Phase Construction Phase	Approval Modification
Waste	• Removal of the existing residual stockpiles on site. • Ensure that there are appropriate areas for the storage of wastes and wood residues, including the construction of bunkers for the containment of residues. • Handling and disposal of CCA contaminated waste in accordance with waste immobilisation approval from EPA.	Operational Phases	Project Application
Waste	• All waste disposal at the site will continue to be undertaken in accordance with the EPA's Waste Classification Guidelines (DECCW, 2009).	Construction and Operational Phases	Approval Modification
Chemical Storage and Handling	• Construction of a new undercover treatment plant with bunded concrete area to reduce the risk of chemical contamination of soil and groundwater. • Assign a dedicated forklift to the treatment plant to ensure that contaminated materials and chemicals are kept within sealed and bunded areas.	Construction Phase Operational Phases	Project Application

Environmental Issue	Commitments	Timing	Project Application / Approval Modification
Water Supply	• Dongwha will continuously investigate and implement water minimisation measures, including on-site reuse. • Dongwha will review and, if appropriate, support the Council's endeavours to increase the water security of Bombala.	Operational Phases	Project Application
Surface Water (Wastewater and stormwater)	• Re-design of the wastewater and stormwater management system in accordance with the Soil, Groundwater and Surface Water Management Plan, to maximise the reuse of clean water and appropriately manage and treat contaminated water. • Surface water monitoring will be undertaken on a biannual basis from each of the water storage bodies (six locations) and on a quarterly basis from the outlet of the activated carbon treatment vessel which will be installed to treat the steamer/kiln condensate. • The Soil, Groundwater and Surface Water Management Plan will be implemented. In particular wastewater from the steam/kilns will be treated prior to reuse at the site and a wetland will be constructed to capture and treat any stormwater runoff.	Design/ Construction Phase Design/ Construction Phase	Project Application
Air Quality (including odour)	• Re-design of the wastewater management system including decommissioning and removal of the southern pond to eliminate any associated odour issues. • Dust management measures including sealing of the site, dust suppression, removal of residual stockpiles and a new area for the storage of wood residues generated by the proposed mill. • Upon receipt of a complaint regarding odorous emissions, undertake an odour survey at the boundary of the site to ensure that all mitigation measures have been adequate and any odorous emissions have been eliminated. Should Dongwha receive on-going complaints regarding odorous emissions at the site, an external specialist will be engaged to conduct a detailed odour survey and identify the source of the odorous emission. • Multiclones will be installed on the wood fired boiler to minimise particulate emissions. • The wood fired boiler will be monitored during commissioning to ensure that the particulate control is adequate	Design/ Construction Phase Construction and Operational Phases Commissioning Phase	Project Application
Air Quality	• The design of the new 18 MW wood fired boiler will be undertaken to achieve compliance with the EPAs Clean Air Group 6 standards of concentrations for a biomass boiler installed after 1st September 2005 as specified within Schedule 4 of the Clean Air Regulation.	Design and Commissioning Phase	Approval Modification

Environmental Issue	Commitments	Timing	Project Application / Approval Modification
Traffic and Transport	• Undertake the required construction works for the Sandy Lane - Delegate Bombala Road intersection, and the new intersection onto Delegate Bombala Road.	Design/ Construction Phase	Project Application
Heritage	• Fence off the ruins of the Inn and associated filled in well to prevent encroachment of the site operations on the well.	Construction Phase	Project Application
Heritage	• If an item (or suspected item) of Indigenous and non-Indigenous heritage is discovered during works, all work in that area would cease and the relevant regulator would be notified as soon as possible to determine the subsequent course of action. • Construction activities and machinery would be restricted to designated work areas.	Construction Phase	Approval Modification
Soil and Water Impacts	• Remediation of contaminated soil present in the vicinity of the CCA treatment area will be undertaken following the demolition of this facility. • A preliminary soil sampling program will be performed prior to the construction of the proposed mill components. • Groundwater assessment will be performed to determine the extent of the contamination present at the site and the need for any active remediation of groundwater. • Ongoing soil and groundwater monitoring will be performed biannually at seven groundwater locations and ten soil sampling locations at the site, consistent with the EPL. Should additional wells be installed at the site, then these would also be incorporated into the groundwater monitoring program. It is expected that at least five additional groundwater monitoring wells will need to be installed at the site. • Construction of bunded areas for the storage and handling of chemicals to reduce the risk of chemical contamination of soil and groundwater.	Construction and Operational Phases Design/ Construction Phase Construction and Operational Phases Construction Phase	Project Application
Soil and Water Impacts	• Erosion and sedimentation controls would be installed and maintained in accordance with Managing Urban Stormwater Guidelines (Landcom 2004) • Any potentially contaminated soils encountered during excavation would be classified and disposed of in accordance with the EPA's Waste Classification Guidelines (DECCW, 2009).	Construction Phase	Approval Modification
Flora and Fauna	• Protecting the modified bushland north of the existing sawmill. • Planting of trees on both sides of the wetland at the drainage line as part of the implementation of the re-designed wastewater and stormwater management system. • Planting of the area to the north of the proposed sawmill be aimed at establishing habitat that is a simplified form of naturally occurring habitat in the local area. • Locally native plant species be used in revegetation and landscape works.	Construction and Operational Phases Design/Construction Phase	Project Application

Environmental Issue	Commitments	Timing	Project Application / Approval Modification
Construction	• Install appropriate sediment and erosion control measures to minimise potential impacts on stormwater leaving the site. • Prepare a Construction Environmental Management Plan. • Ensure physical segregation of operational and construction areas. • Develop and maintain a comprehensive planning schedule. • Contractors to undergo instruction on site procedures and company expectations.	Construction Phases	Project Application
Visual Amenity	• Landscaping will be carried out with a view to minimising any visual impacts of the development. • Building colours and finishes will aim to blend with the surrounding landscape. • Lighting will minimise glare offsite.	Operational Phase	Project Application
Operation	• Preparation of an Operational Environmental Management Plan.	Operational Phase	Project Application
Other Commitments	• Continue consultation with EPA during construction and operation of the proposed mill. • Continue consultation with DP&E during construction and operation of the proposed mill. • Ongoing consultation with the community regarding significant progress of the project via a number of channels, including local media and further letterbox drops.	Construction and Operational Phases	Project Application

7. Conclusion

The proposed modification includes the replacement of four boilers (gas-fired and wood-fired) with one 18 MW wood-fired boiler. The wood-fired boiler would be designed to comply with statutory emissions restrictions and allow Dongwha to proactively manage their ongoing energy costs and their residual timber wastes.

The proposal will result in limited changes to the majority of site operational processes and is considered consistent with the objects of the EP&A Act.

The proposal will improve the efficiency of the sawmill operations by minimising operating costs associated with natural gas consumption and transport of residual timber products. The ongoing viability of the operations will ensure employment is maintained together with associated indirect benefits to sustaining the local and regional economy.

Results of the air quality impact assessment show that the emissions from the proposed 18 MW wood fired boiler will meet the Clean Air Regulation Group 6 limits and also the EPA Impact Assessment Criteria at all identified receivers.

The use of the timber residue products as a fuel source will result in a considerable reduction in heavy vehicle movements required for waste removal from the site. The proposal is anticipated to improve the amenity of local residents living on the main transport routes through Bombala, by reducing the number of heavy vehicle movements required for the transport of residual timber products.

The proposal will also replace the use of fossil fuels with a renewable timber resource resulting in a considerable reduction in greenhouse emissions from the sawmill operations.

Potential environmental impacts associated with the proposal are not considered significant and can be appropriately managed through the adoption of the proposed management procedures.

8. References

DEC 2005 *The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*

DECCW, 2009 *Waste Classification Guidelines*.

DECCW, 2009. *Interim Construction Noise Guidelines (ICNG).*

Landcom, 2006: *Managing urban stormwater: Soils and construction Volume 1 (Blue Book), 4th Edition (Reprinted July 2006).*

NSW EPA (1999) *NSW Industrial Noise Policy.*

Marshall Day Acoustics (2009) *Dongwha Timbers Expansion Noise Impact Assessment*

The Fifth Estate 2009, *Environmental Assessment for a Major Project – Expansion of Bombala Integrated Sawmilling and Value-adding Facility*, prepared for Dongwha Timbers Pty Ltd, November 2009.

Appendices

Appendix A – Secretary Environmental Assessment Requirements

NSW GOVERNMENT | Planning & Environment

Contact: Ashley Cheong
Phone: 02 9228 2052
Fax: 02 9228 6466
Email: ashley.cheong@planning.nsw.gov.au

Mr Hong Lee
Dongwha Timbers
PO Box 146
Bombala NSW 2632

Dear Mr Lee

Secretary's Environmental Assessment Requirements (SEARs)
Proposed Modification – Dongwha Sawmill Expansion, Bombala (07_0161 MOD 2)

I refer to your request to modify project approval MP 07_0161 issued by the then Minister for Planning on 7 September 2010 for the expansion of the Dongwha Sawmill in Bombala.

The proposed modification will be assessed under Section 75W of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

I have attached a copy of the Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Assessment (EA) for the project.

The SEARs have been prepared based on the information you have provided to date. Please note that the Secretary may alter these requirements at any time.

Prior to exhibiting the EA that you submit for the project, the Department will review the document to determine if it adequately addresses the SEARs. The Department may consult with other relevant Government authorities in making this decision. If the Secretary considers that the EA does not adequately address the SEARs, the Secretary may require you to revise the EA.

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 EA. 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.

I would appreciate it if you would contact the Department at least two weeks before you propose to submit the EA. This will enable the Department to:

- confirm the applicable fee; and
- determine the number of copies of the EA required for reviewing purposes.

If you have any enquiries about these requirements, please contact Mr Ashley Cheong on the above details.

Yours sincerely

27/6/14

Chris Ritchie
Manager – Industry, Coastal & Regional Projects
As the Secretary's nominee

Secretary's Environmental Assessment Requirements

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

Application Number	MP 07_0161 MOD 2
Project	Replace a number of wood and gas fired boilers with a new wood fired boiler.
Location	1 Sandy Lane Bombala, NSW 2632 (Lot 2 DP 1016573, Lot 27 DP 1061792)
Proponent	Dongwha Timbers Pty Ltd
Date of Issue	19 June 2014
General Requirements	The Environmental Assessment (EA) must include: • an executive summary; • a detailed description of the following within the site and any associated areas: – historical operations/activities; – existing and approved operations/facilities, including any statutory approvals that apply to these operations/facilities; and – a description of the project in relation to any existing environmental management plans that may need to be updated. • a detailed description of the project, including: – need and justification for the project; – proposed modifications or upgrades to existing activities or infrastructure; – alternatives considered; – various components and likely staging; – how the project will interact with existing operations; and – plans of all proposed building works and operational flow diagrams. • demonstrate the status of compliance with existing conditions of approval for MP 07_0161; • consider all relevant environmental planning instruments, including justification for any inconsistencies with these instruments; • include a risk assessment of the potential environmental impacts of the amended project, identifying the key issues for further assessment; • provide 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 project, 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 project, including proposals for adaptive management and/or contingency plans to manage any significant risks to the environment. • include an updated consolidated summary of all proposed environmental management and monitoring measures, highlighting relevant commitments included in the original EA; • a conclusion, justifying the project on economic, social and environmental grounds, taking into consideration whether the project is consistent with the objects of the EP&A Act; and • a signed statement from the author of any written statement certifying that the statement contains all available information that is relevant to the environmental assessment of the project, and that the information contained in the statement is neither false nor misleading.
Key Issues	The supporting documentation must address the following specific matters: • **Air Quality and Odour** – including: - a quantitative assessment of all air quality (including odour) impacts

	of the project with a particular focus on potential impacts to nearby sensitive receivers; and - details of all management, mitigation and monitoring measures. • **Greenhouse Gas** – including an assessment of the potential greenhouse gas emissions of the project. • **Noise** – including: - an assessment of all demolition, construction, operational and transportation noise impacts with a particular focus on surrounding sensitive receivers; and - details of all management, mitigation and monitoring measures. • **Transport and Access** – including: - accurate predictions of the traffic volumes likely to be generated during construction and operation; and - an assessment of the impacts of this traffic on the safety and capacity of the surrounding road network. • **Waste Management** – including: - accurate estimates of the quantity, characterisation and classification of all waste/s generated during the construction and operation of the project; and - a description of the measures that would be implemented to ensure that any waste produced is appropriately handled, processed and disposed of.
Consultation	During the preparation of the EA, 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 the: • Environment Protection Authority; and • Bombala Council The EA must describe the consultation process and the issues raised, and identify where the design of the project has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.
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 project.

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

Aspect	Policy /Methodology
Air Quality	
Air Quality	Protection of the Environment Operations (Clean Air) Regulation 2010
	Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC)
	Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (DEC)
Greenhouse Gas	Clean Energy Legislation Amendment Act (CELA) 2012
	National Greenhouse and Energy Reporting (NGER) Act 2007
	NSW Greenhouse and Climate Change Action Plan
	National Greenhouse Accounts (NGA) Factors
	AGO Factors and Methods Workbook (AGO)
	Guidelines for Energy Savings Action Plans (DEUS)
Noise	
Noise	NSW Industrial Noise Policy (DECC)
	NSW Road Noise Policy (OEH, 2011)
	Interim Construction Noise Guideline (DECC)
	Environmental Noise Management – Assessing Vibration: a technical guide (DEC)
Transport and Access	
	State Environmental Planning Policy (Infrastructure) 2007
	Guide to Traffic Generating Development (RTA)
	Road Design Guide (RTA)
Heritage	
Aboriginal	Draft Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation (DEC 2005)
	The Burra Charter (The Australia ICOMOS charter for places of cultural significance)
Non- Aboriginal	NSW Heritage Manual (NSW Heritage Office & DUAP)
	The Burra Charter (The Australia ICOMOS charter for places of cultural significance)
Soil and Water	
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)
	National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ)
	Bunding and Spill Management (EPA)
	Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC)
	Using the ANZECC Guideline and Water Quality Objectives in NSW (DEC)

	The NSW State Rivers and Estuaries Policy (NSW Water Resources Council)
	Water Sharing Plan for the Metropolitan Region Unregulated River Water Sources (NOW) 2011
Groundwater	National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC)
	NSW State Groundwater Policy Framework Document (DLWC)
	NSW State Groundwater Quality Protection Policy (DLWC)
	The NSW State Groundwater Dependent Ecosystem Policy (DLWC)
	Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources (NOW) 2011
Acid Sulfate Soils	Acid Sulfate Soil Manual (ASSMAC)
Erosion and Sediment	Managing Urban Stormwater: Soils & Construction (Landcom)
	Design Manual for Soil Conservation Works - Technical Handbook No. 5 (Soil Conservation Service of NSW)
	Soil and Landscape Issues in Environmental Impact Assessment (DLWC)
	Wind Erosion – 2nd Edition
Stormwater	Managing Urban Stormwater: Strategic Framework. Draft (EPA)
	Managing Urban Stormwater: Council Handbook. Draft (EPA)
	Managing Urban Stormwater: Treatment Techniques (EPA)
	Managing Urban Stormwater: Source Control. Draft (EPA)
	Managing Urban Stormwater: Harvesting and Reuse (DEC)
Wastewater	National Water Quality Management Strategy: Guidelines for Sewerage Systems - Effluent Management (ARMCANZ/ANZECC)
	National Water Quality Management Strategy: Guidelines for Sewerage Systems - Use of Reclaimed Water (ARMCANZ/ANZECC)
	National Water Quality Management Strategy - Guidelines For Water Recycling: Managing Health And Environmental Risks (Phase1) (EPHC, NRMMC & AHMC)
	National Water Quality Management Strategy - Guidelines For Water Recycling: Managing Health And Environmental Risks (Phase1) (EPHC, NRMMC & AHMC)
Contamination	State Environmental Planning Policy No 55 - Remediation of Land
	Managing Land Contamination - Planning Guidelines SEPP 55 – Remediation of Land (DUAP and EPA)
	Contaminated Land Management Act 1997 and Amendment Act 2008
	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)
	Contaminated Sites: Sampling Design Guidelines (NSW EPA)
	Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (NSW EPA)
	Guidelines for the Assessment and Management of Groundwater Contamination (DECC) Draft
Waste	
	Waste Avoidance and Resource Recovery Strategy 2007 - Overview (DECC)
	Waste Avoidance and Resource Recovery Performance Report 2006 (DECC)

Appendix B – Letter to nearby Receivers

Dongwha Timbers

21 August 2014

Dear Sir/Madam

Re: Bombala Sawmill Modification Letter update to residents

Dongwha Timbers propose to modify the current project approval to install a new wood-fired boiler within its saw milling facility located south-west of Bombala in the Monaro Region of NSW.

The proposal involves the installation of an 18 megawatt (MW) boiler to replace the use of three gas fired boilers and an existing wood fired boiler currently approved at the site. The new boiler would be designed to comply with statutory emissions requirements and be supplied with clean timber residual products currently generated by the sawmill operations at the site.

The proposal represents an alteration to the development as described in the original project application and therefore requires approval from the NSW Minister for Planning in the form of a modification under Section 75W of the Environmental Planning and Assessment Act, 1979 (EP&A Act). An environmental assessment is currently being prepared to assess potential environmental impacts associated with the proposal and will be submitted to the Department of Planning and Environment for determination of the proposed modification.

The Bombala Sawmill currently produces up to 800 tonnes of wood residue per day as a by-product of milling activities. Wood residue products, including fresh sawdust, pine bark, dried wood shavings and fresh woodchips are temporarily stored in purpose built bunkers on site prior to being transported off-site for sale or disposal.

The installation of an 18MW wood fired boiler will allow use of timber residue products to provide steam for the kilns which are used in the drying process at the sawmill. The proposal will result in limited changes to the majority of site operational processes and is not considered likely to adversely affect any near neighbours.

Results of the air quality impact assessment show that the emissions from the proposed 18 MW wood fired boiler will meet the Clean Air Regulation Group 6 limits and also the EPA Impact Assessment Criteria for all surrounding properties.

The use of the timber residue products as a fuel source will result in a considerable reduction in heavy vehicle movements required for waste removal from the site. The proposal is anticipated to improve the amenity of local residents living on the main transport routes through Bombala, by reducing the number of heavy vehicle movements required for the transport of residual timber products.

The proposal will also replace the use of fossil fuels with a renewable timber resource resulting in a considerable reduction in greenhouse emissions from the sawmill operations.

If you have any queries in regards to the proposal please contact Russell Rowling on 02 64595 555

Yours sincerely

Hong Lee
Managing Director
Dongwha Timbers

Dongwha Timbers Pty Ltd
ABN 83 104 629 058

1 Sandy Lane (PO Box 146)
Bombala NSW 2632
T: 02 6459 5555
F: 02 6458 3756
Toll Free: 1800 805 840

Appendix C – Air Quality Assessment

Bombala Sawmill

Section 75W Modification

Air Quality Assessment

August 2014

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Table index

Figure index

Appendices

1. Introduction

1.1 Purpose of this report

Dongwha Timbers (Dongwha) propose to modify the existing project approval to install a new wood-fired boiler within its existing saw milling facility located south-west of Bombala in the Monaro Region of NSW. The new wood-fired boiler involves the installation of a 18 megawatt (MW) boiler to replace the use of three gas fired boilers and an existing wood fired boiler currently approved at the site (hereafter referred to as "the proposal").

This report has been prepared by GHD Pty Ltd (GHD) to provide an assessment of air quality impacts of the proposal. This report has been conducted with consideration to the NSW Office of Environment and Heritage (OEH) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, Department of Environment and Conservation* (August 2005) (*Approved Methods*).

1.2 Proposal overview

The Bombala sawmill comprises log sorting, greenmill operations, moulder operations, kiln or steam autoclave for drying of timber and timber preservation and operates under an Environmental Protection Licence (EPL) number 11205.

It is now proposed to replace four boilers approved in the project approval with a new 18 MW wood-fired boiler (i.e. the proposal). The new boiler would be designed to comply with statutory emissions requirements and be supplied with clean timber residual products currently generated by the sawmill operations at the site. The proposal will allow Dongwha to proactively manage their ongoing energy costs and residual timber management requirements.

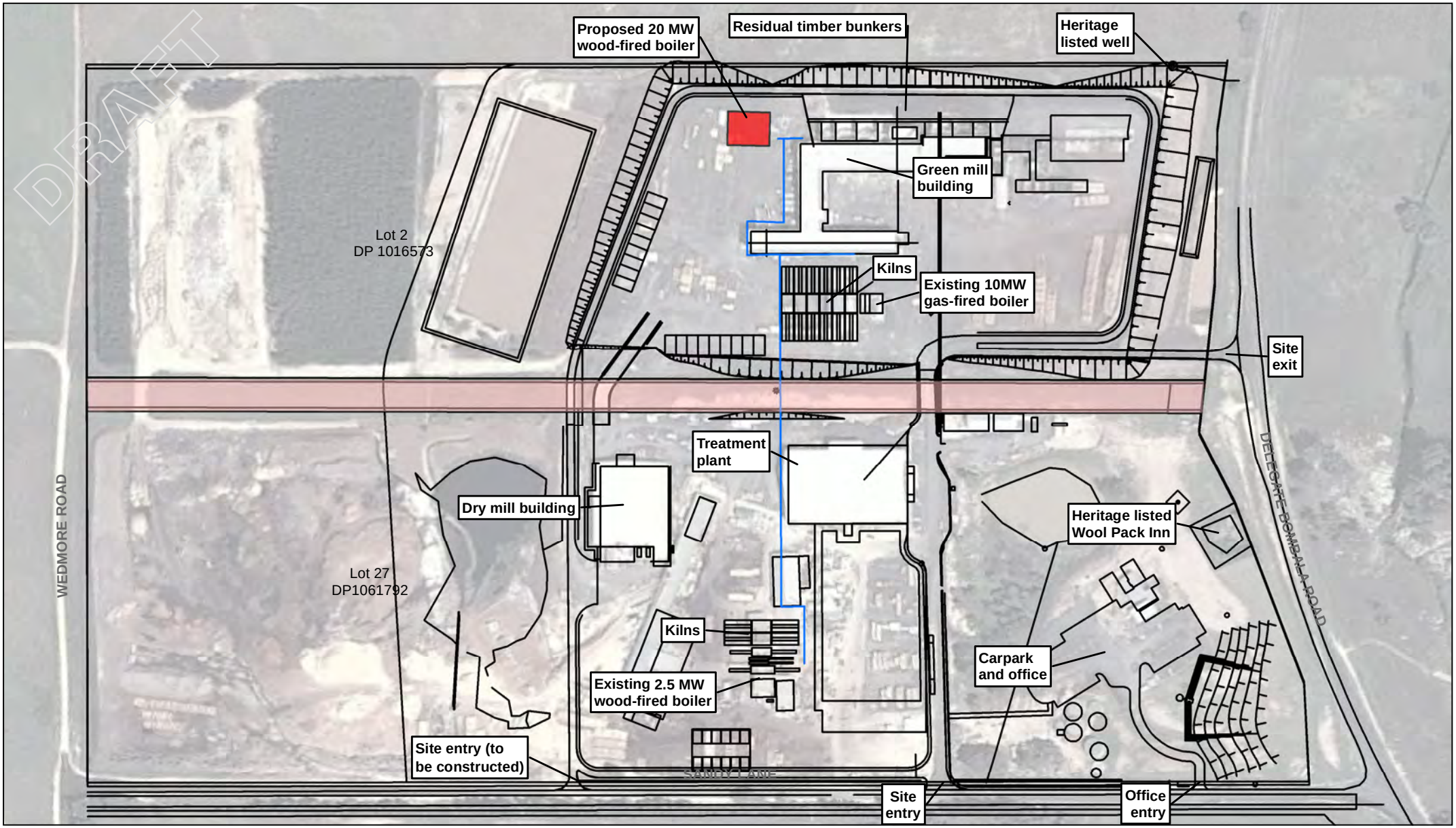
It is estimated that the proposed 18 MW wood-fired boiler would require approximately 43,000 tonnes of wood residue per annum.

The proposal would be located entirely within the previously approved sawmill site as shown in Figure 1.

1.3 Location of the proposal

The Bombala timber mill is located between Sandy Lane and Delegate Road approximately two kilometres south west of Bombala in the Monaro region of NSW as shown on Figure 2. The site is located within the following allotments:

- Lot 2 DP 1016573.
- Lot 27 DP 1061792.



Paper Size A4

0 12.5 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Boiler location
- Gas easement
- Steam pipeline indicative alignment
- Site Layout

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number	21-23466
Revision	A
Date	22 Aug 2014

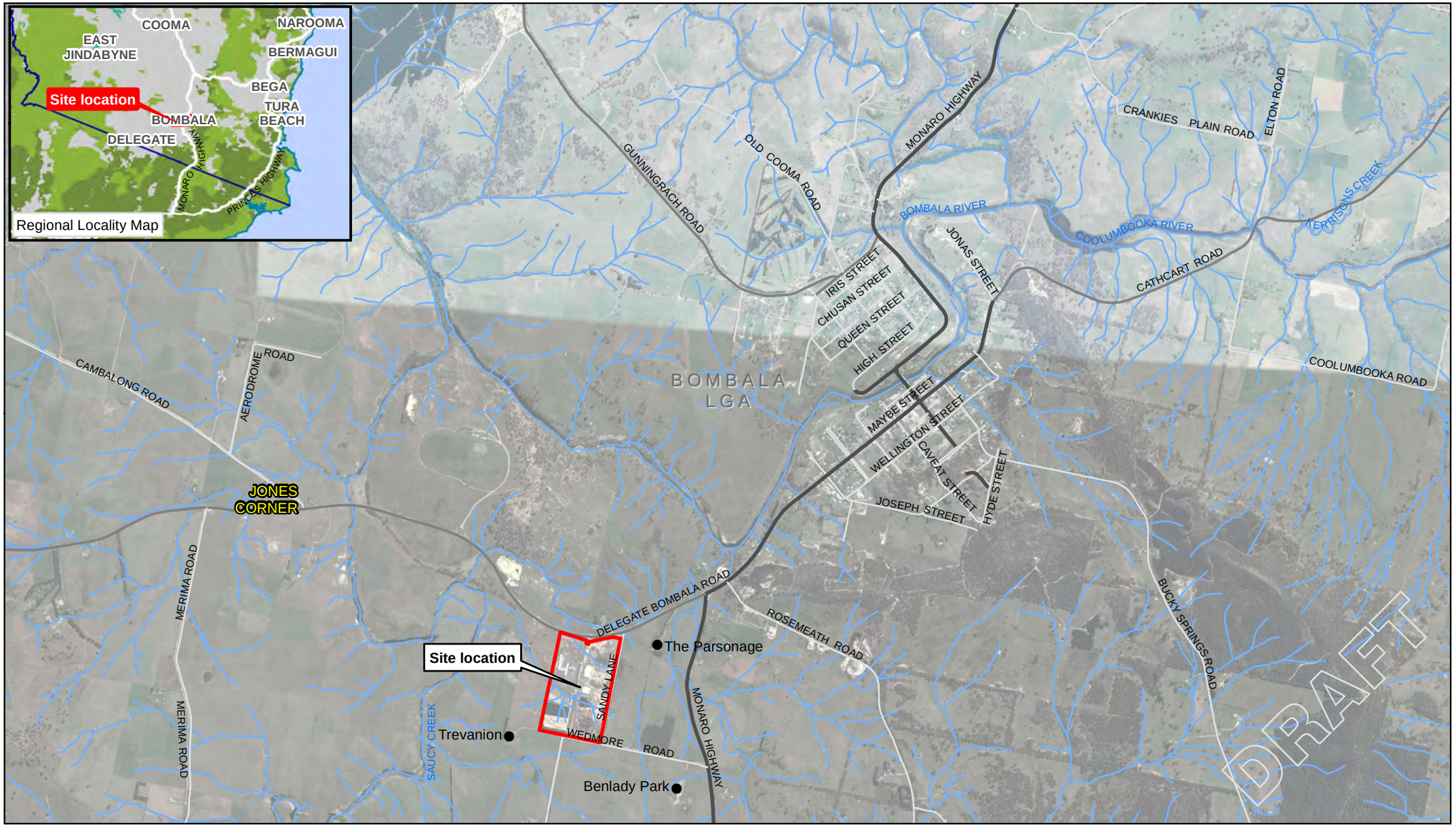
Site layout

Figure 1

N:\AU\Sydney\Projects\21\23466\GIS\Maps\Deliverables\21_23466_Z002_Site_location_LS_A4_RevB.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung



Paper Size A4

0 250 500 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Legend

- Site Location
- Highways
- Major Roads
- Other Roads
- Waterways

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number	21-23466
Revision	A
Date	25 Jun 2014

Regional context

Figure 2

N:\AU\Sydney\Projects\21\23466\GIS\Maps\Deliverables\21_23466_Z001_Regional_context.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com **W** www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung

1.4 Scope

The air quality assessment involved the following tasks:

- Initial review of project information provided by Dongwha covering the facility layout and plans, previous air quality assessments and the surrounding area.
- Review of site and local meteorological data.
- An inventory was developed of source emission rates (ERs) for the facility for current and proposed conditions.
- Synthesise meteorological data for the site using TAPM.
- Conduct a Level 2 modelling assessment to predict air quality impact (PM_{10}, $PM_{2.5}$, NO_2, SO_2, CO, VOC, dioxins and furans and PAH using NPI emission factors or data sourced from suppliers) at the nearest residences for existing and proposed scenarios.
- Determine if compliance to the OEH/EPA criterion is met.
- Reporting on the analyses conducted above.

2. Existing environment and meteorology

2.1 Sensitive receivers and land uses

Air quality sensitive receivers are defined based on the type of occupancy and the activities performed in the land use. Sensitive receivers are locations where people are likely to work or reside, which may include any of the following:

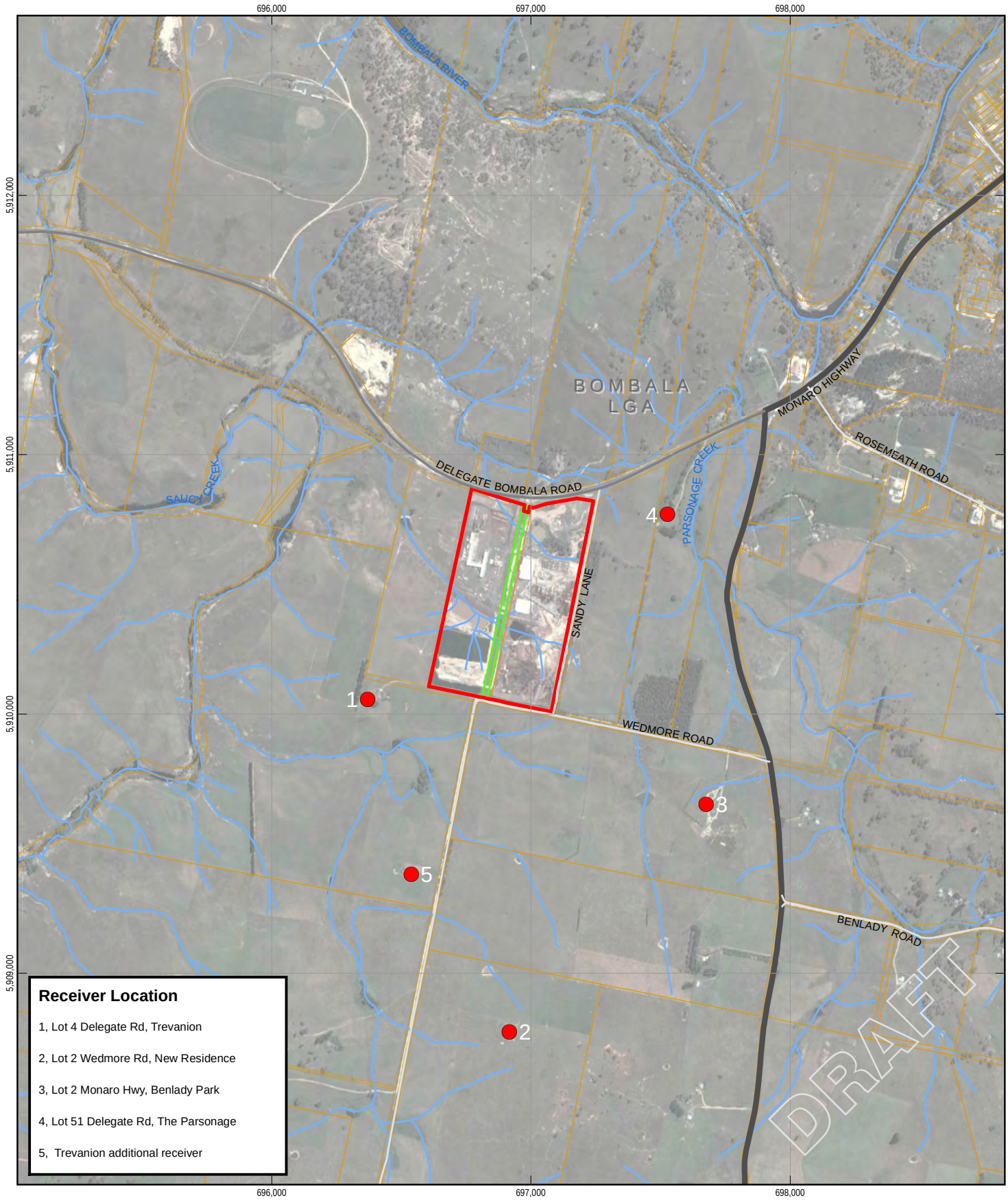
- Dwelling
- School
- Hospitals
- Office
- Public recreational area

Surrounding land uses are predominantly rural residential and land for grazing with little or no other industry in the immediate area other than quarry that is located off Delegate Road approximately 700m to the northwest of the site and an industrial area off Rosemeath Road located approximately 1500m to the east between the mill and the Bombala township.

Sensitive receivers surrounding the site are identified in Table 1 and shown in Figure 3.

Table 1 – Air quality sensitive receivers

Receiver	Receiver ID	Receiver ID	Easting/northing (m)
Residential	01	Trevanion	696369, 5910057
Residential	02	New Residence	696917, 5908773
Residential	03	Benlady Park	697676, 5909651
Residential	04	The Parsonage	697527, 5910769
Residential	05	Trevanion additional receiver	696543, 5909384



LEGEND

Receiver Location | Lot | Highways | Secondary Roads

Site Location | Gas Easement | Major Roads | Other Roads

Waterways

Paper Size A4

0 100 200 400 600 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Dongwha Timbers
Bombala Sawmill Section
75W Modification PEA

Job Number 21-23466
Revision A
Date 14 Jul 2014

Air quality sensitive receivers

Figure 3

N:\AU\Sydney\Projects\21\23466\GIS\Maps\Deliverables\21_23466_Z004_AirQuality_A4_RevA.mxd Level 15, 133 Castlereagh Street Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Data Source: NSW Department of Lands: Cadastre - Jan 2012; Geoscience Australia: 250k Data - Jan 2012; NSW Department od Primary Industry - Jan 2012; Google image Jan 2013. Created by: qjchung

2.2 Regional climate and prevailing meteorology

The local climate is similar to that of the broader Monaro Tableland region with cold winters with frequent frost and mild summers. The local climate at the Dongwha site is affected by broader regional patterns of synoptic pressure and wind with embedded weather systems.

Synoptic features vary in intensity and location according to the season. For instance, during summer a high-pressure belt is usually found over or just to the south of Australia, bringing warm weather while the subtropical easterlies cover most of the continent. In winter, the subtropical high-pressure belt is usually located further north over the continent, allowing westerly winds and occasional to frequent strong cold fronts to affect southern Australia.

The mean daily maximum temperatures range from 25.4 °C in summer to 10.6 °C in winter, and the mean daily minimum temperatures range from 10.7 °C in summer to -0.2 °C in winter. The area experiences significant diurnal and seasonal variations in meteorological conditions.

According to meteorological data, the average rainfall in the region is 596 mm (Bureau of Meteorology). Average monthly rainfall ranges from between 28 mm and 75 mm, and the driest months are in winter and early spring, with the higher rainfalls experienced between November and March.

2.3 Wind pattern

There is a meteorological station at the Dongwha site however the data obtained was of insufficient quality for dispersion modelling purposes. Modelling requires hourly data for an entire 12 month period. The Bureau of Meteorology (BoM) AWS at Bombala also lacks sufficient data in order to produce a modelling meteorological file and therefore a TAPM generated meteorological dataset has been used, as was done in the previous air quality assessment in 2012.

TAPM accesses databases of synoptic weather analyses from the BoM. The model then provides the link between the synoptic large-scale flows and local climatology, which includes characterising such factors as local land use and topography, and their influence on atmospheric stability and mixing height.

TAPM Version 4 was used to generate a meteorological dataset for 2009 at the Bombala site. TAPM was run using assimilated hourly wind speed and direction data from the Bombala AWS from January 2009 to December 2009.

The TAPM model parameters are summarised in Table 2.

Table 2 - TAPM model parameters

Parameter	Value
Modelled Year	2009
Domain centre	UTM: 55H 699385 m E, 5912523 m N
Number of vertical levels	25
Number of Easting Grid Points	25
Number of Northing Grid Points	25
Outer Grid Spacing	30,000 m x 30,000 m
Number of Grid Levels	4
Grid Level Spacing	Level 2 – 10000 x 10000 m Level 3 – 300 x 300 m Level 4 – 1000 x 1000 m

The average wind speed for the 2009 AWS data was 4.5 m/s and the average for the TAPM derived data was 4 m/s. The lighter wind speeds in the TAPM run are considered conservative and may assist worst-case dispersion of pollutants from the site.

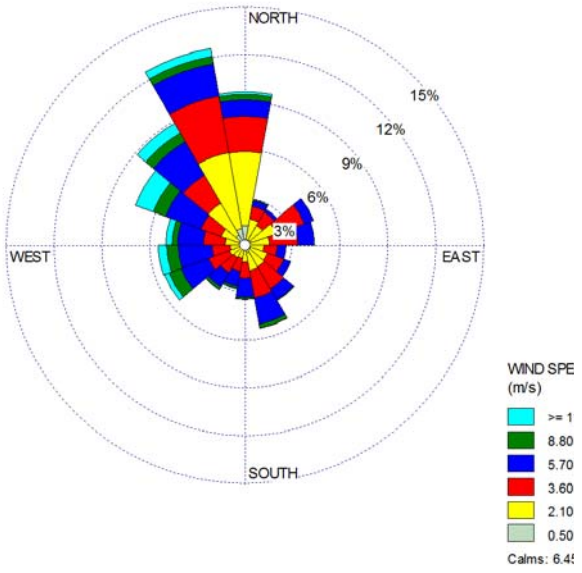
The effect of wind on pollutant dispersion patterns can be examined using the general wind climate and atmospheric stability class distributions. The general wind climate at a site is most readily displayed by means of wind rose plots, giving the incidence of winds from different directions for various wind speed ranges.

The features of particular interest in this assessment are: (i) the prevailing wind directions and (ii) the relative incidence of more stable light wind conditions (these define peak impacts from ground-based sources).

2.3.1 Validation of meteorological data

Wind field data from TAPM has been compared to the Bombala AWS meteorological station at the same site. Wind speed and direction from both wind-roses below dominates from the north east and is typically low from all other quadrants. The largest proportion of light winds (<2 m/s) are also from the north west.

Bombala AWS 2009



TAPM derived Bombala AWS 2009

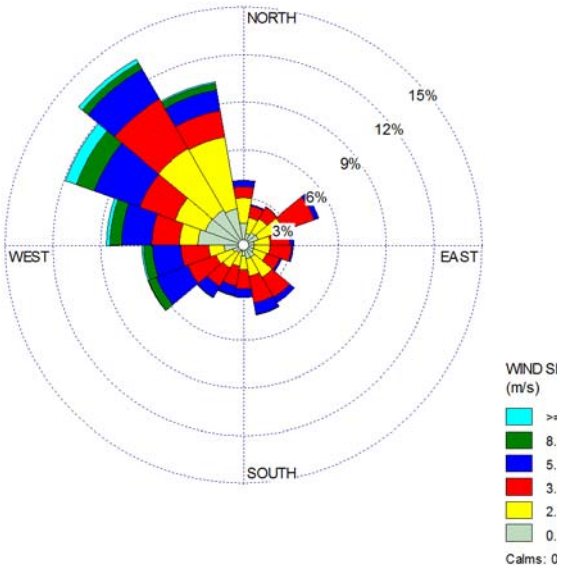


Figure 4 – Comparison of Bombala AWS and TAPM outputs for 2009

2.3.2 Dongwha site

The meteorology differs considerably in the town of Bombala which is located nearly 10 km north of the BOM AWS site. The meteorology here is influenced by the steep terrain to the east of Bombala. This observation reflects cool air drainage flows from the hills and mountains from the surrounding land in the east. The observed wind speed distribution indicates that the largest proportion of high wind speeds (> 6 m/s) are from the west and south, while the largest proportion of light winds (<2 m/s) are also from the east.

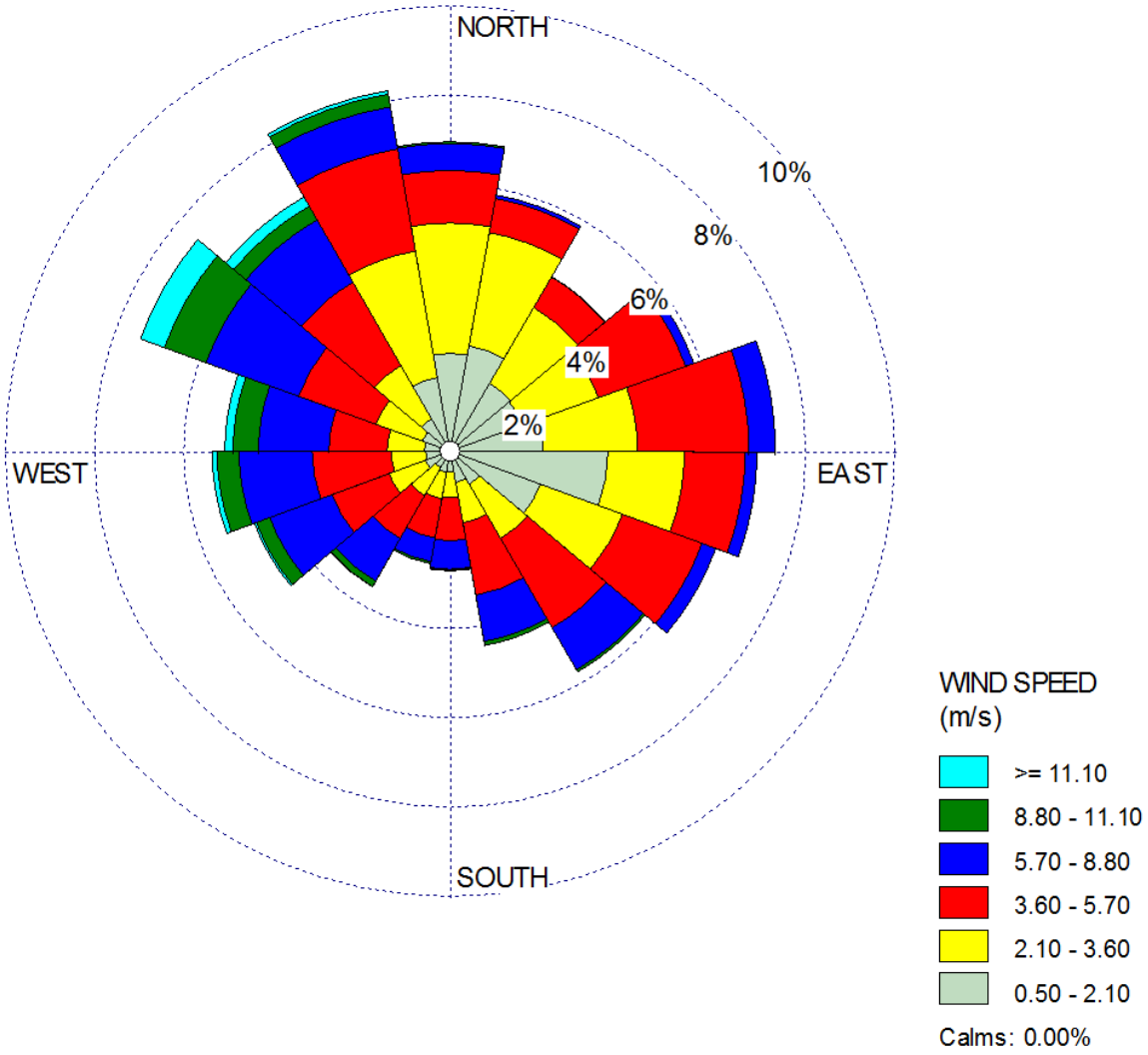


Figure 5 - TAPM derived Dongwha Timbers site 2009

2.3.3 Seasonal wind roses

The seasonal wind roses in Figure 6 indicate that:

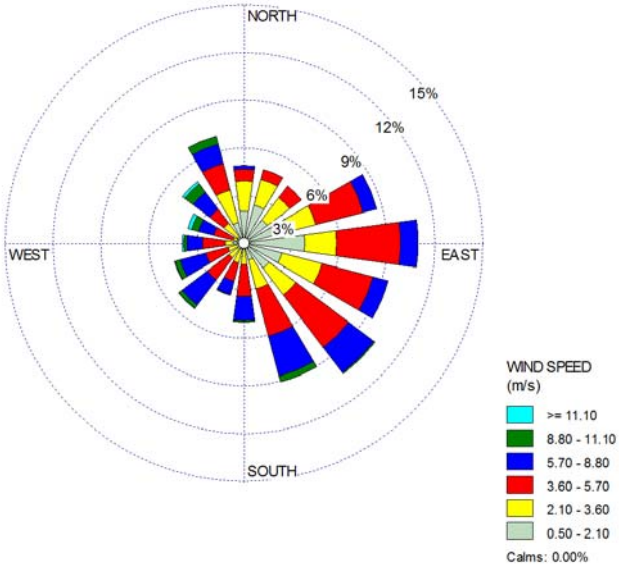
- In winter, the winds are predominantly from the northwest. This observation reflects cool air drainage flows from the hills and mountains from the surrounding land in the west, as well as with the synoptic winter westerlies associated with the pre-frontal (stronger) winds; while
- In summer, the majority of stronger winds are from the south east reflecting the synoptic sub-tropical ridge migrating to the south of this location during the warmer months of the year.

Autumn and spring are transitional seasons with a mixture of both winter and summer observations, with peak incidences from the west, west-northwest and south.

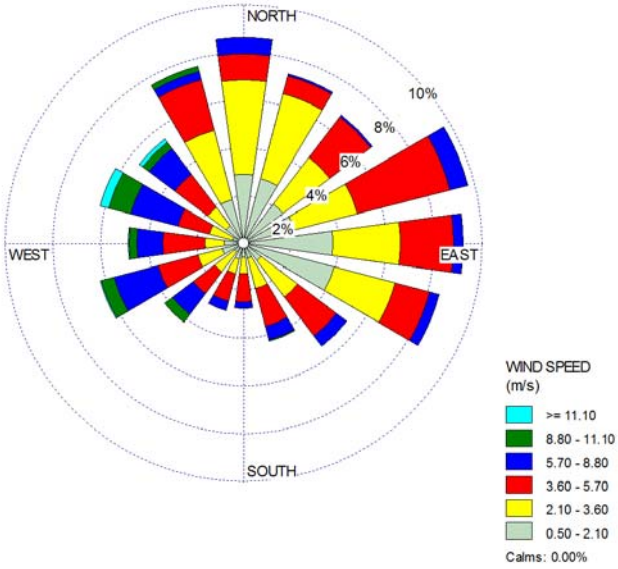
The direction and high proportion of light winds in autumn and spring are predominantly easterly and north-easterly. These air flows are likely to be associated with high stability, and can be expected to define the directions of poorest dispersion for low lying emission sources. As the

site is located inland with prominent stable winds from the east and northeast, the potential for impact is somewhat increased towards the west and south

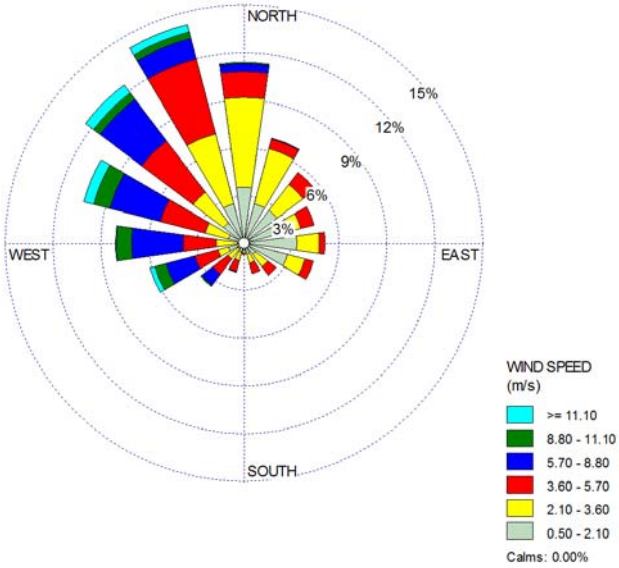
Summer (average speed = 4.0 m/s)



Autumn (average speed = 3.6 m/s)



Winter (average speed = 3.9 m/s)



Spring (average speed = 4.2 m/s)

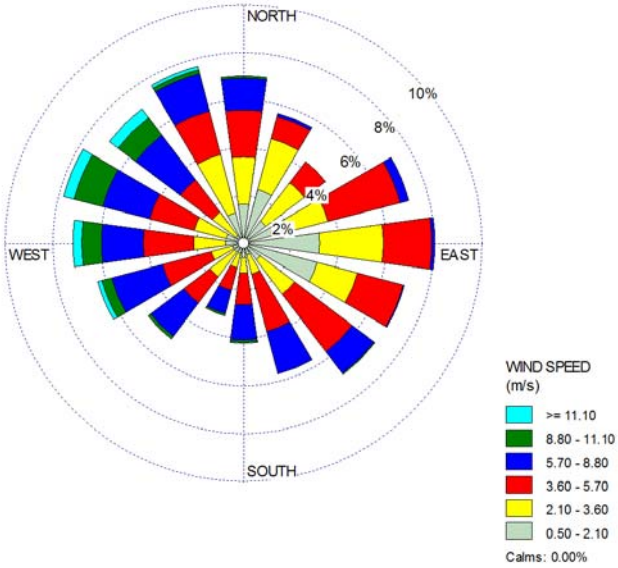


Figure 6 – TAPM derived seasonal wind roses 2009

2.4 Annual pattern and seasonal variation in atmospheric stability

In the Pasquill/Gifford atmospheric stability scheme, stability is classified into six classes A through F. The A, B and C stability classes represent strongly, moderately and slightly unstable atmospheres respectively. Under unstable conditions dispersion of emissions from near ground sources is good due to convectively vertical turbulent mixing. The stability category D denotes neutral atmospheric conditions (strong winds in moderate temperatures or lighter winds on overcast to partly cloudy days). Categories E and F denote slightly and moderately stable atmospheres when dispersion is poorest, as vertical mixing of air is suppressed Stable atmospheric conditions occur in the absence of strong gradient winds, and mostly on nights with clear skies. They are often associated with ground-based radiation force temperature inversions, sometimes with fog, mist or frost.

Neutral stability (D class) conditions generally occur most frequently and along with the prevailing wind direction can indicate the most common direction for potential impact. Under night-time E and F class conditions, emissions from ground based sources result in a downwind plume that is detectable to a greater distance than during the day with associated neutral or unstable atmospheric conditions.

Figure 7 shows the stability rose for the entire data period. Neutral atmosphere (D) comprises 41.8% of incident time while the A, B and C class contribute unstable atmospheres 27% of the time and the stable E and F conditions contribute 31.2%. Figure 7 shows that stable winds are represented in all quadrants.

2.5 Background air quality

The Office of Environment and Heritage (OEH) operates a comprehensive air quality monitoring network to provide the community with accurate and up-to-date information about air quality across NSW. The monitoring sites are generally in areas where there is potential for elevated air emissions such as in cities and heavy industrial areas. The original air quality assessment found no background air quality data available in the Bombala region and the EPA approved assessment compared the predicted incremental impact with the criteria discussed in Section 3.

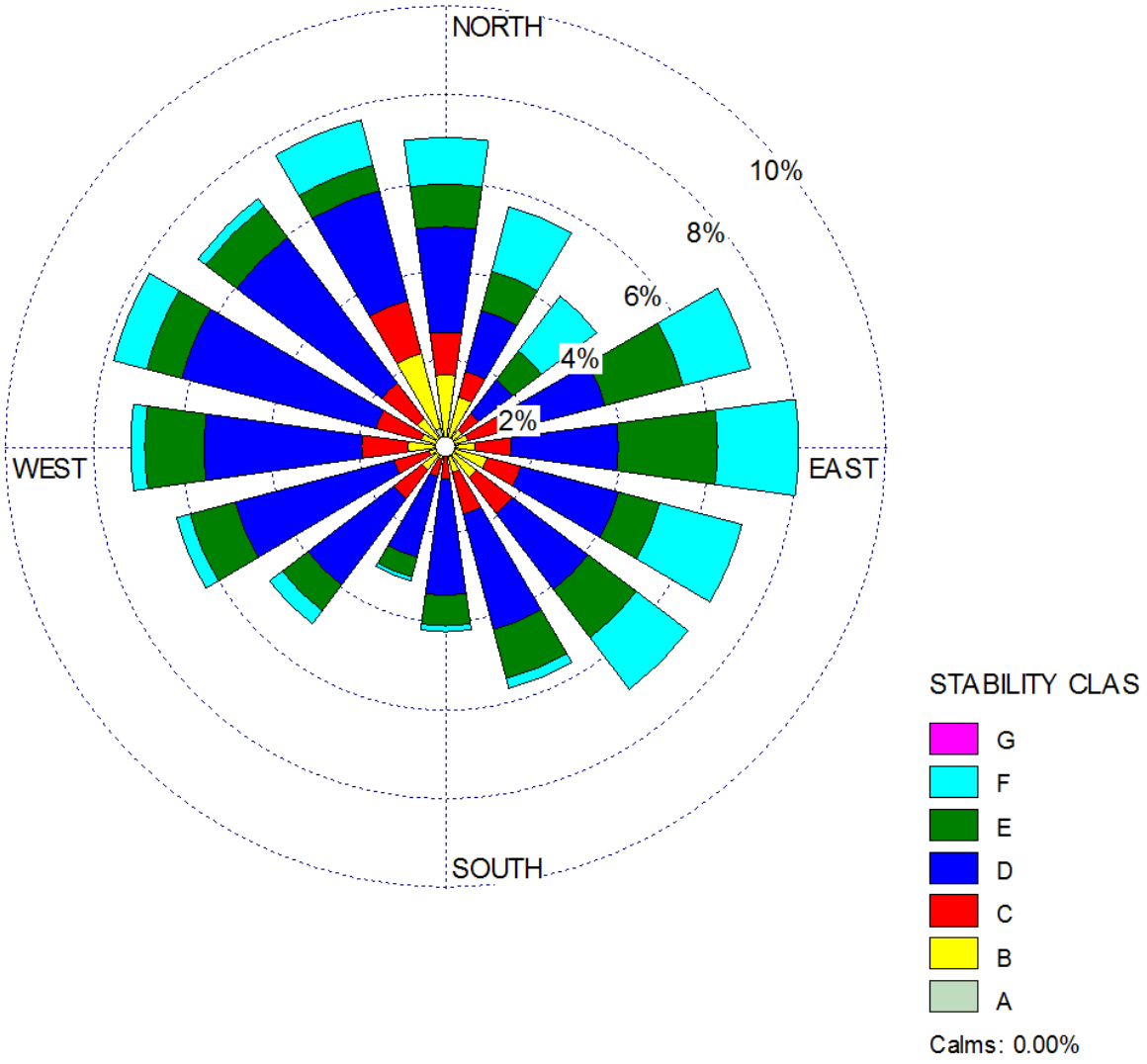


Figure 7 – TAPM derived annual stability rose 2009

3. Air quality criteria

3.1 Overview

This section considers the key guidelines/criteria which relate to and are relevant to the following potential impacts arising from emissions from the operation of the boiler which includes:

1. Particulate matter (PM_{10})
2. Particulate matter ($PM_{2.5}$)
3. Carbon monoxide (CO)
4. Nitrogen oxides (NO_2)
5. Sulphur dioxide (SO_2)
6. Volatile organic compounds (VOC)
7. Dioxins and furans
8. Polycyclic aromatic hydrocarbon (PAH)

3.2 Applicable Legislation

The *Protection of the Environment Operations Act 1997* (POEO Act) establishes, amongst other things, the procedures for issuing licences for environmental protection in relation to aspects such as waste, air, water and noise pollution control. The owner or occupier of premises engaged in scheduled activities is required to hold an environmental protection licence (EPL) and comply with the conditions of that licence.

The POEO Act requires that no occupier of any premises causes air pollution through a failure to maintain or operate equipment or deal with materials in a proper and efficient manner. The operator must also take all practicable means to minimise and prevent air pollution (sections 124, 125, 126 and 128 of the POEO Act).

The Protection of the Environment Operations (Clean Air) Regulation 2010 (Clean Air Regulation) provides regulatory measures to control emissions from wood heaters, open burning, motor vehicles and fuels and industry. The regulation outlines the grouping of activities and plant into 6 groups based on when the activities commenced operation. Group 6 applies to activities that commence operation after 1 September 2005 as a result of an environment protection licence granted under the POEO Act pursuant to an application made on or after 1 September 2005.

Schedule 4 of the Clean Air Regulation includes standards of concentration for scheduled premises: general activities and plant, which are relevant to the proposed wood fired boiler at Dongwha Bombala.

3.3 Standards of Concentration

The applicable Group 6 limits for the proposal are listed below in Table 3. In accordance with the regulations, demonstration of compliance with either the CO or VOC standard of concentration (but not both) is necessary.

As the previous air quality assessment found that metal emissions were extremely low and compliance with the impact assessment criteria is expected, these emissions have not been assessed and are not considered further in this report.

Table 3 – Standards of concentration

Pollutant	Standard of concentration (mg/m3)
Solid particles[1]	50
NO_2	500
SO_2	-
CO	125
TVOC[2]	40
Dioxins and furans	0.1
PAH	-

[1] Assumed PM_{10} and $PM_{2.5}$ in this assessment
[2] TVOC modelled as n-hexane

3.4 Impact assessment criteria

The Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales ('the Approved Methods') (DEC, 2005) lists the statutory methods for modelling and assessing emissions of air pollutants from stationary sources in NSW.

The impact assessment criteria must be applied at the nearest existing or likely future off-site sensitive receptor. For PAH, TVOC and dioxins and furans, the impact assessment criteria applies at and beyond the site boundary. Impact assessment criteria for the proposal are listed in Table 4.

Table 4 – Impact assessment criteria

Pollutant	Averaging period	Concentration (mg/m3)	Predicted impact
PM_{10}	24-hour	0.050	100th percentile
$PM_{2.5}$[3]	24-hour	0.050	100th percentile
NO_2	1-hour	0.246	100th percentile
SO_2	1-hour	0.570	100th percentile
CO	1-hour	30	100th percentile
TVOC[4]	1-hour	3.2	99.9th percentile
Dioxins and furans	1-hour	2.0E-9	99.9th percentile
PAH	1-hour	0.0004	99.9th percentile

[3] $PM_{2.5}$ criterion taken as PM_{10}
[4] TVOC modelled as n-hexane

4. Estimated emissions

4.1 Overview

Air emissions for the various processes onsite are discussed in the Air Emissions Management Plan (Dongwha Timbers, 2012). The plan details that the significant sources of emissions are the boilers, the treatment plant, the green off-sawn kilns and the redry kilns. Each of the four emission sources emit a different range of significant pollutants meaning only the boilers were considered in this assessment.

The mass emission rates (g/s) were calculated using several methods including the National Pollutant Inventory (NPI) Emission Estimation Technique (EET) and the Manual for Combustion in Boilers Version 3.6 2011. Where potential suppliers of the proposed boiler provided details, these were included in place of the NPI emission factors. Some of the mass emission rates were calculated based on the proposed stack configuration and the maximum allowable class 6 discharge limit listed in the Clean Air Regulation.

The methods used were to ensure that the emissions from the proposal will meet the class 6 discharge limits.

The EET Manual describes the recommended procedures for estimating emissions from the combustion of a fuel in boilers, with the use of emission factors appropriate when no measured data is available.

Emissions were estimated for both the approved boiler configuration which includes the operation of three gas fired boilers and the existing 2.5 MW wood fired boiler together and the proposed 18 MW wood fired boiler.

The following assumptions were made in relation to the existing natural gas boilers:

- The energy content of natural gas is 39.7 MJ/m^3
- The weight to volume of natural gas is 0.74 kg/m^3
- The rate of gas for boiler 1 and 4 (both 10 MW) is 25.2 GJ/hr
- The rate of gas for boiler 2 (3.5 MW) is 8.8 GJ/hr
- Boiler type for all gas boiler is tangential fired

The following assumptions were made in relation to the wood fired boilers:

- The rate of wood for the existing wood boiler is 0.93 t/hr
- The rate of wood for the proposal wood boiler is 4.9 t/hr (advised 42955 t/yr)
- The fuel used as per the EET Manual is wood/bark fired

4.2 Existing situation

The current approved boiler discharge points are as follows:

- DP1 – Boiler 1, 10 MW (gas). Located at the western site
- DP2 – Boiler 2, 3.5 MW (gas). Located at western site
- DP3 – Boiler 3, 2.5 MW (wood).
- DP4 – Boiler 4, 10 MW (gas). Located at eastern site.

A summary of the boiler discharge points is presented below in Table 5.

Table 5 – Summary of approved boiler discharge points

Parameter	DP1	DP2	DP3	DP4
Fuel	Natural gas	Natural gas	Wood	Natural gas
Size (MW)	10	3.5	2.5	10
Stack height (m)	13	10	12	13
Stack tip diameter (m)	0.87	0.55	0.58	0.87
Exhaust discharge temperature (ºC)	140	225	255	140
Discharge velocity (m/s)	10	10.3	7	10

A summary of the existing boiler discharge emissions is presented in Table 6 and has been calculated using the NPI emission factors.

Table 6 – Summary of approved boiler discharge point emissions

Parameter	DP1	DP2	DP3	DP4
PM_{10} (g/s)	0.021	0.0073	0.22	0.021
$PM_{2.5}$ (g/s)	0.021	0.0073	0.11	0.021
NO_x as NO_2 (g/s)	0.48	0.17	0.37	0.48
SO_2 (g/s)	0.0046	0.0016	0.044	0.0046
CO (g/s)	0.068	0.024	1.05	0.068
VOC (g/s)	0.016	0.0054	0.03	0.016
Dioxins and furans (ng/s)	0.014	0.0049	3.7	0.014
PAH	0.0000018	0.00000063	0.00046	0.0000018

4.3 Proposal

As discussed in Section 1.2, the proposal involves the following:

- Removal of Boilers DP1, DP2, DP3 and DP4.
- Installation of a new Boiler 5, 18 MW (wood). Located at the western side of the site.

The proposed boiler stack details are summarised in Table 7 below.

Table 7 – Summary of proposal boiler discharge points

Parameter	DP5
Fuel	Wood
Size (MW)	18
Stack height (m)	13
Stack tip diameter (m)	2.2
Exhaust discharge temperature (ºC)	160
Discharge velocity (m/s)	9

A summary of the proposed boiler discharge emissions is presented in Table 8. This has been based on burning 4.9 tonnes of wood per hour in the 18 MW boiler.

More detailed calculations are provided in Appendix A.

Table 8 – Summary of proposal boiler discharge point emissions

Parameter	DP5 (g/s)	DP5 (mg/m^3)	Reference
PM_{10}	1.079	50	Class 6 limit
$PM_{2.5}$	0.59	27.2	NPI
NO_x as NO_2	8.630	400	Boiler supplier
SO_2	0.232	10.7	NPI
CO	2.697	125	Class 6 limit
VOC	0.863	40	Class 6 limit
Dioxins and furans	2.157 ng/s	0.1 ng/m^3	Class 6 limit
PAH	0.002	0.112	NPI

5. Air quality modelling

5.1 Choice of dispersion model

Dispersion modelling was undertaken using Ausplume version 6.0. Ausplume is a Gaussian plume dispersion model developed by the Victorian EPA to assess the impact of airborne pollutants. AUSPLUME is the approved dispersion model for use in most simple, near field applications where coastal effects and complex terrain are of no concern.

Ausplume predicts downwind concentrations for the model inputs representative of pollutant emissions at a given physical site under a range of hourly varying meteorological conditions over a period of a year or more. Features of the model include: building downwash (the effect of buildings in causing a plume to be dragged down to ground level where it can impact an area); area, line and volume sources; plume rise as a function of downwind distance; and terrain adjustment.

AUSPLUME is specifically not approved for use in the flowing applications:

- complex terrain, non-steady-state conditions
- buoyant line plumes;
- coastal effects such as fumigation;
- high frequency of stable calm night-time conditions;
- high frequency of calm conditions; and
- inversion break-up fumigation conditions.

It is of GHD's opinion that the area immediately surrounding the site is relatively flat and that no receptor height significantly exceeds the lowest release height and that the terrain is not overly complex.

There are no buoyant line plumes, the site is not subject to coastal effects such as fumigation and the site is not subject to inversion break-up fumigation conditions.

The frequency of night-time (8 pm to 6 am) stable E and F class conditions indicate a incidence of ~60% compared to D (neutral conditions) occurring for ~38% of the time, while for all hours of the day the incidence of E and F classes is ~33% compared to D conditions occurring for 43% of the time. Neither case represents a high frequency of stable conditions, GHD considers these conditions to be average. Thus GHD concludes that the Ausplume model will be appropriate for the proposal site. Ausplume was also previously approved for use at the site by EPA (Dongwha, 2012).

5.2 Model configuration

AUSPLUME was configured to model the situation in accordance with the estimated emissions, relevant physical building characteristics and representative meteorological data.

Key components of the model configurations are summarised below:

- 12 month TAPM derived meteorological data for the period January 2009 – December 2009 for the Dongwha site
- A 5 km x 5 km square receptor grid, centred over the Dongwha site, using a grid resolution of 50 metres;
- An averaging period of one hour or 24 hours;
- Three site buildings were included in the model;

- Horizontal and vertical dispersion were parameterised according to equations for the Pasquill-Gifford curves; and
- A surface roughness height of 0.4 metres (rolling rural) was used.

Full details of the parameter settings are given in Appendix B.

5.3 Buildings

Three site buildings have been included in the Ausplume model ranging from 10m to 12m in height. The buildings in the model that may influence dispersion of pollutants are:

- Green mill building (11.6m)
- Dry mill building (11.6m)
- Treatment plant (10.2m)

The four existing discharge points and the proposed one range from 10 to 13m above ground level. Given the stack heights are at or just above the building heights, significant building wake effects are predicted to occur onsite that may enhance downwind spreading.

5.4 Scenarios

All Ausplume modelling has been undertaken in accordance with the NSW Approved Methods for Level 2 assessment. The predicted concentrations for TVOC and dioxins and furans have been assessed as the 99.9^{th} percentile predicted concentration. The criteria for TVOC and dioxins and furans have been applied at the site boundary. The predicted concentrations for PM10, PM2.5, NO2, SO2 and CO have been assessed as the 100% percentile predicted concentration. The criteria for these have been applied at the nearest sensitive receivers.

6. Assessment of potential impacts

6.1 Overview

The dispersion modelling was conducted to predict the pattern of maximum off-site ground level concentrations resulting from stack emissions from the site during operation of the proposal. Previous investigations undertaken at the site indicate the significant emission sources at the site emit a different range of potential pollutants, so only the boilers were considered in this assessment which represents the element of the proposed modification. All modelling was undertaken in accordance with the NSW Approved Methods for Level 2 assessment for the following parameters:

- Particulate matter (PM_{10})
- Particulate matter ($PM_{2.5}$)
- Carbon monoxide (CO)
- Nitrogen oxides (NO_2)
- Sulphur dioxide (SO_2)
- Volatile organic compounds (VOC)
- Dioxins and furans
- PAH

The predicted air quality impacts have been plotted for all modelled parameters. In most cases the predicted levels are orders of magnitude below the impact criteria meaning that it would not be visible if plotted on a map. The maps below show a concentration to display the general dispersion pattern however are all well below the criteria.

6.2 Potential Impacts

6.2.1 PM_{10}

Predicted PM_{10} levels from the proposal are well below the criteria of 50 µg/m^3 at all sensitive receivers. The predicted 100th percentile 24 hour PM_{10} level of 10 µg/m^3 has been plotted below in Figure 8. The figure indicates that the buildings onsite are strongly influencing the downwind plume from the stack. The predicted levels at nearby sensitive receivers are presented in

Table 9.

Table 9 - Predicted maximum PM_{10} levels at sensitive receivers

Receiver	Predicted PM_{10} 24 hour µg/m^3	Criterion
1	0.79	50 µg/m^3
2	0.97	50 µg/m^3
3	1.30	50 µg/m^3
4	2.39	50 µg/m^3
5	0.90	50 µg/m^3

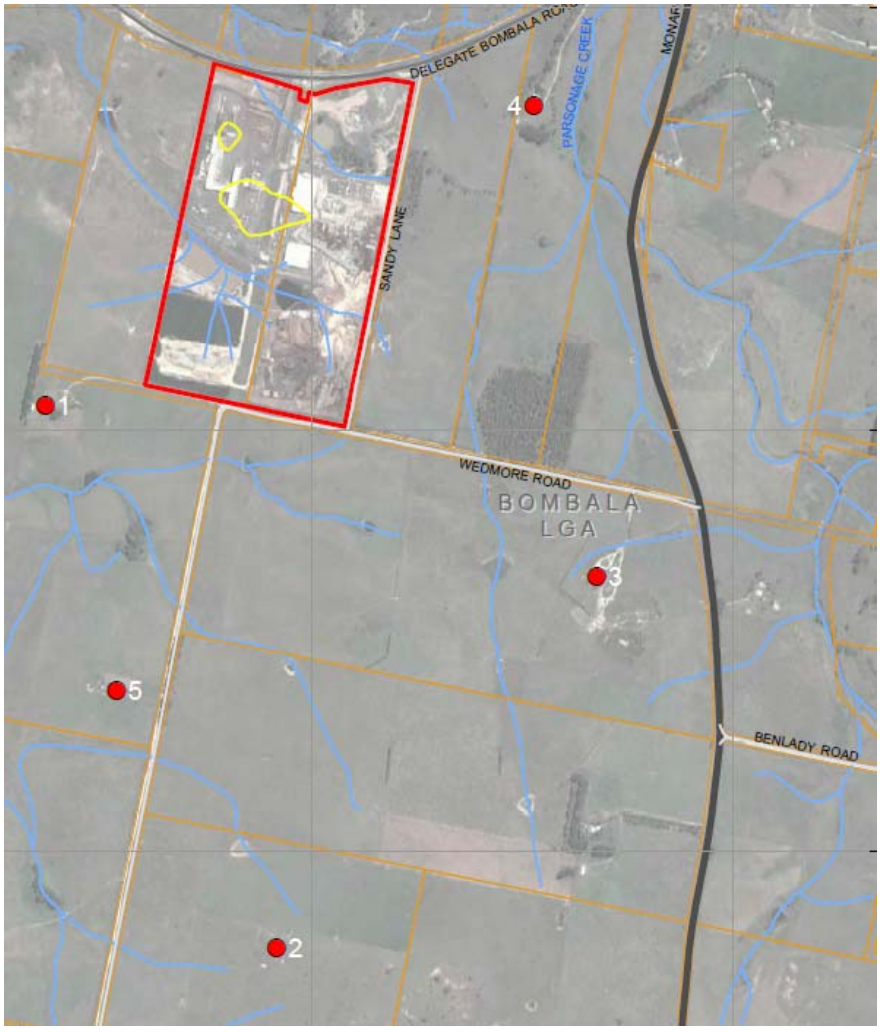


Figure 8 – Predicted 100th percentile 24 hour PM_{10} level of 10 µg/m^3

6.2.2 $PM_{2.5}$

Predicted $PM_{2.5}$ levels from the proposal are well below the criteria of 50 µg/m^3 at all sensitive receivers. The predicted 100th percentile 24 hour $PM_{2.5}$ level of 10 µg/m^3 has been plotted below in Figure 9. The predicted levels at nearby sensitive receivers are presented in Table 10.

Table 10 - Predicted maximum $PM_{2.5}$ levels at sensitive receivers

Receiver	Predicted $PM_{2.5}$ 24 hour µg/m^3	Criterion
1	0.57	50 µg/m^3
2	0.48	50 µg/m^3
3	0.66	50 µg/m^3
4	2.45	50 µg/m^3
5	0.47	50 µg/m^3

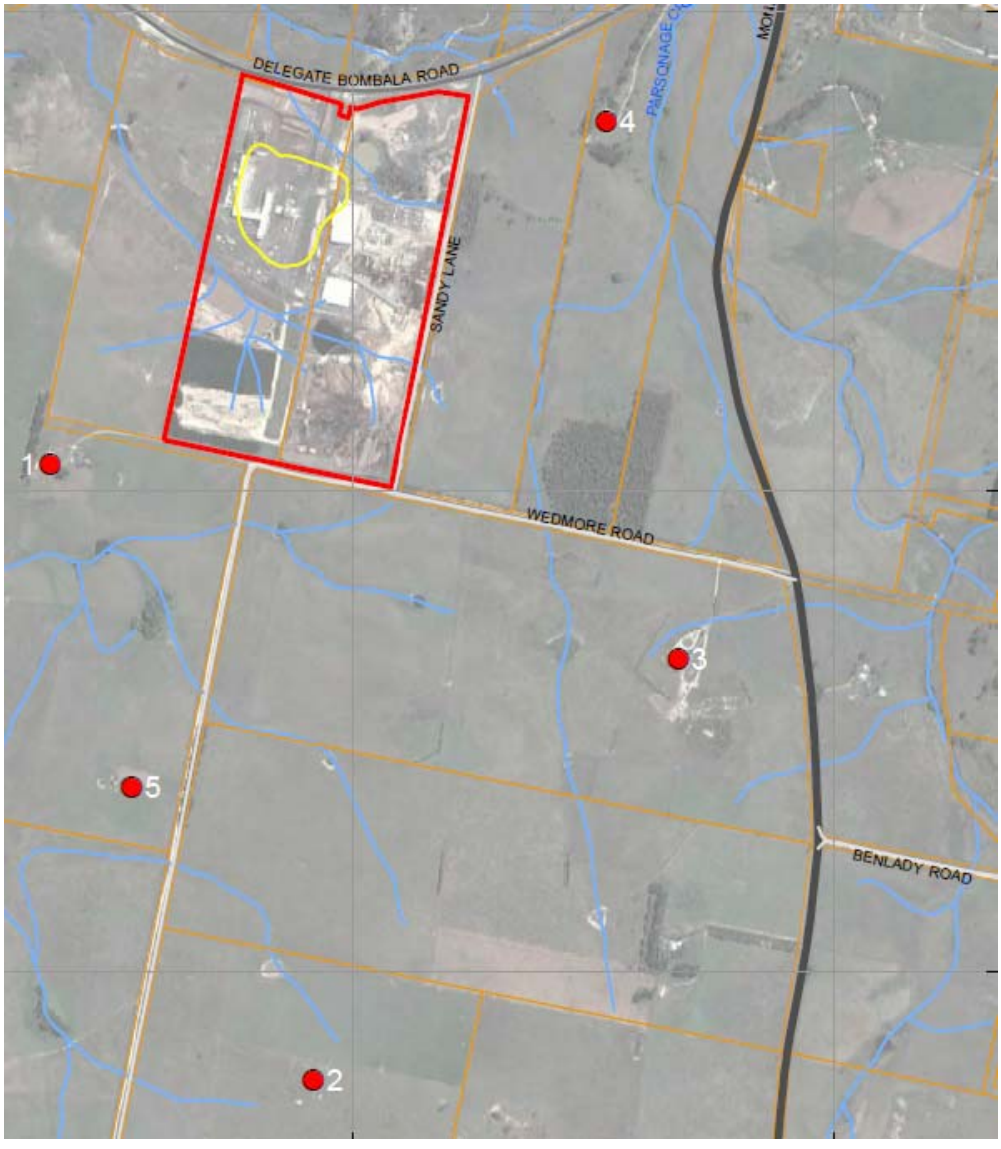


Figure 9 - Predicted 100th percentile 24 hour $PM_{2.5}$ level of 10 µg/m^3

6.2.3 CO

Predicted CO levels from the proposal are well below the criteria of 30 mg/m^3 at all sensitive receivers. The predicted 100th percentile 1 hour CO level of 0.1mg/m^3 has been plotted below in Figure 10. The predicted levels at nearby sensitive receivers are presented in Table 11.

Table 11 - Predicted maximum CO levels at sensitive receivers

Receiver	Predicted CO 1 hour mg/m^3	Criterion
1	0.0142	30 mg/m^3
2	0.0083	30 mg/m^3
3	0.0013	30 mg/m^3
4	0.0011	30 mg/m^3
5	0.0010	30 mg/m^3

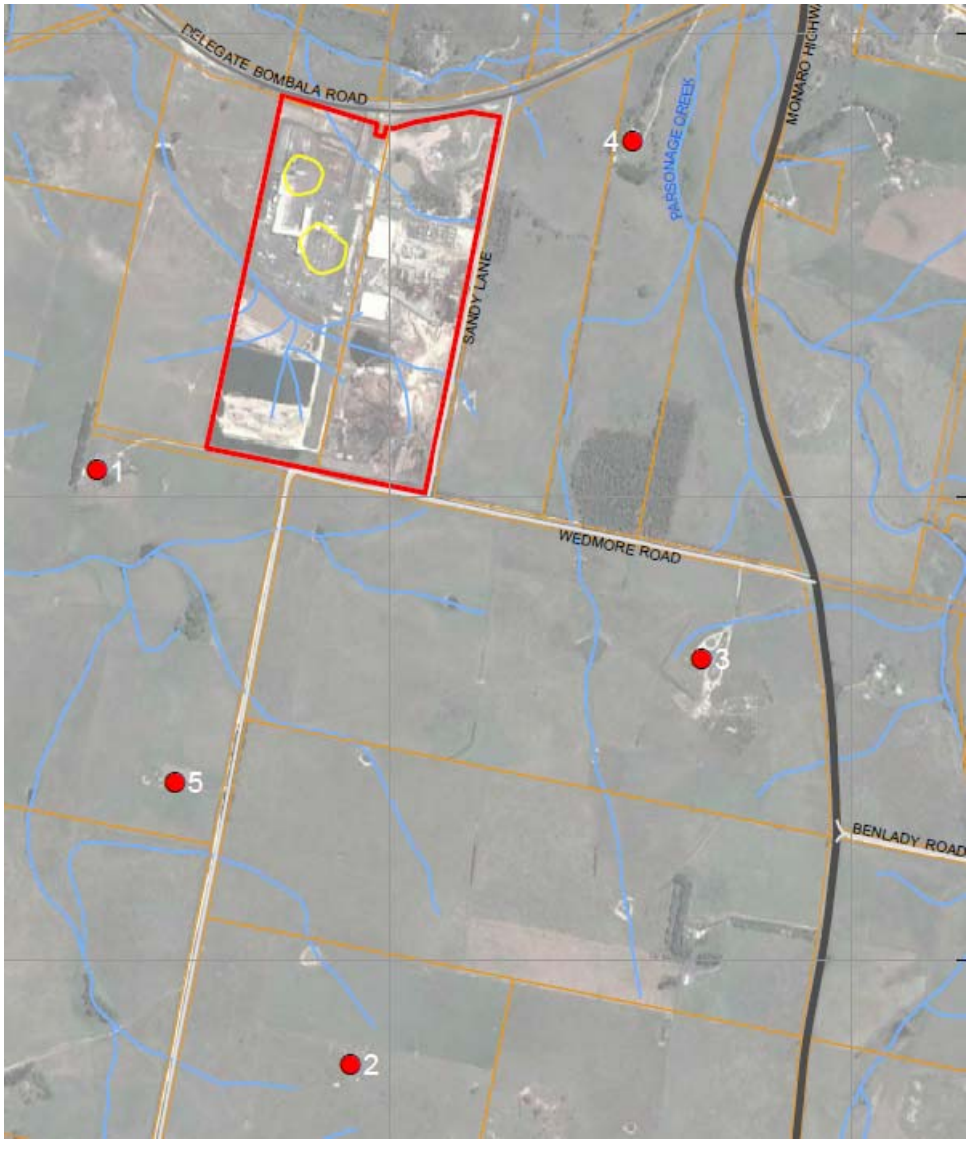


Figure 10 - Predicted 100th percentile 1 hour CO level of 0.1 mg/m^3

6.2.4 NO2

Predicted NO2 levels from the proposal are well below the criteria of 246 µg/m^3 at all sensitive receivers. The predicted 100th percentile 1 hour NO2 level of 246 µg/m^3 has been plotted below in Figure 11. The predicted levels at nearby sensitive receivers are presented in Table 12

Table 12 - Predicted maximum NO2 levels at sensitive receivers

Receiver	Predicted NO2 1 hour µg/m^3	Criterion
1	45.3	246 µg/m^3
2	26.5	246 µg/m^3
3	41.0	246 µg/m^3
4	36.4	246 µg/m^3
5	34.9	246 µg/m^3

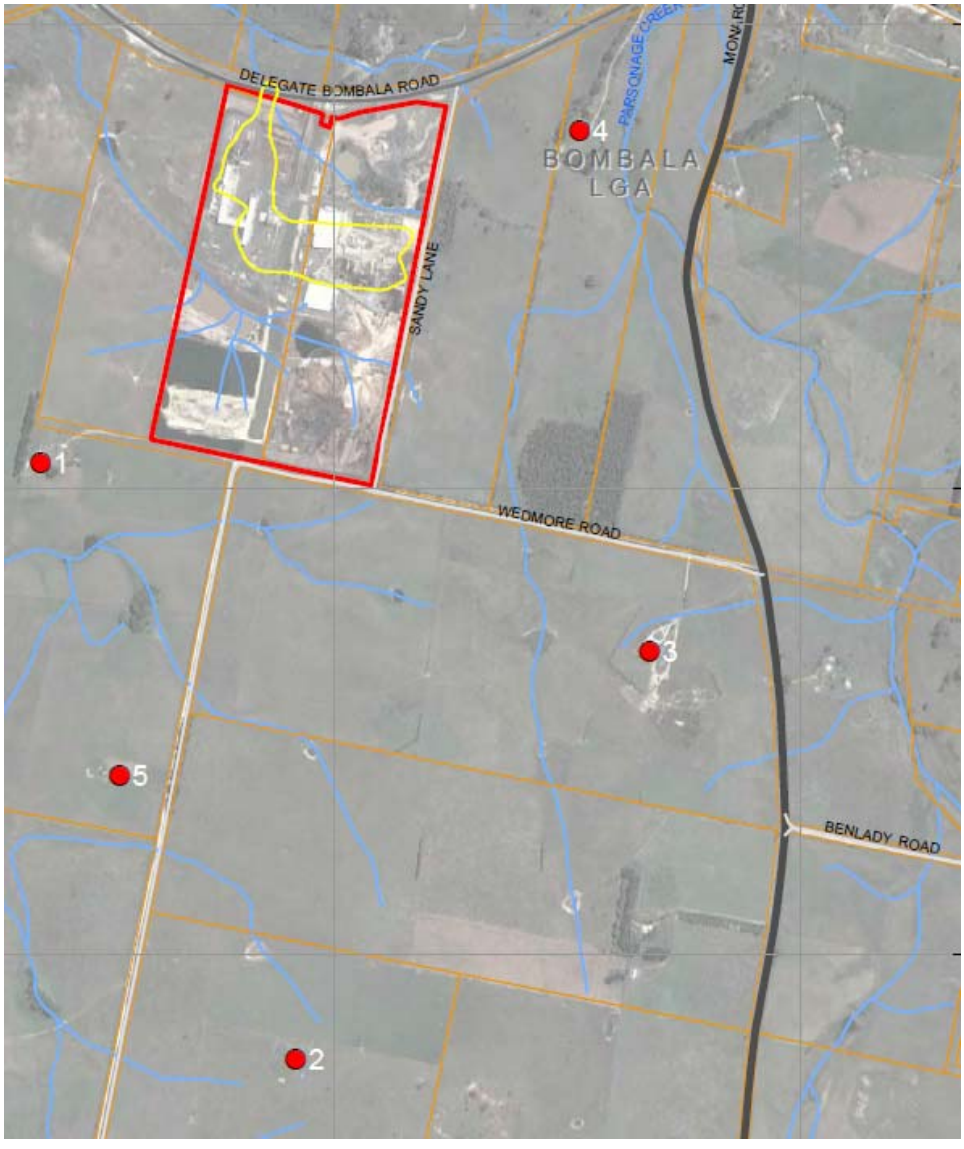


Figure 11 - Predicted 100th percentile 1 hour NO2 level of 246 µg/m^3

6.2.5 SO2

Predicted SO2 levels from the proposal are well below the criteria of 570 µg/m^3 at all sensitive receivers. The predicted 100th percentile 1 hour SO2 level of 10 µg/m^3 has been plotted below in Figure 12. The predicted levels at nearby sensitive receivers are presented in Table 13

Table 13 - Predicted maximum SO2 levels at sensitive receivers

Receiver	Predicted SO2 1 hour µg/m^3	Criterion
1	1.21	570 µg/m^3
2	0.71	570 µg/m^3
3	1.10	570 µg/m^3
4	0.97	570 µg/m^3
5	0.94	570 µg/m^3

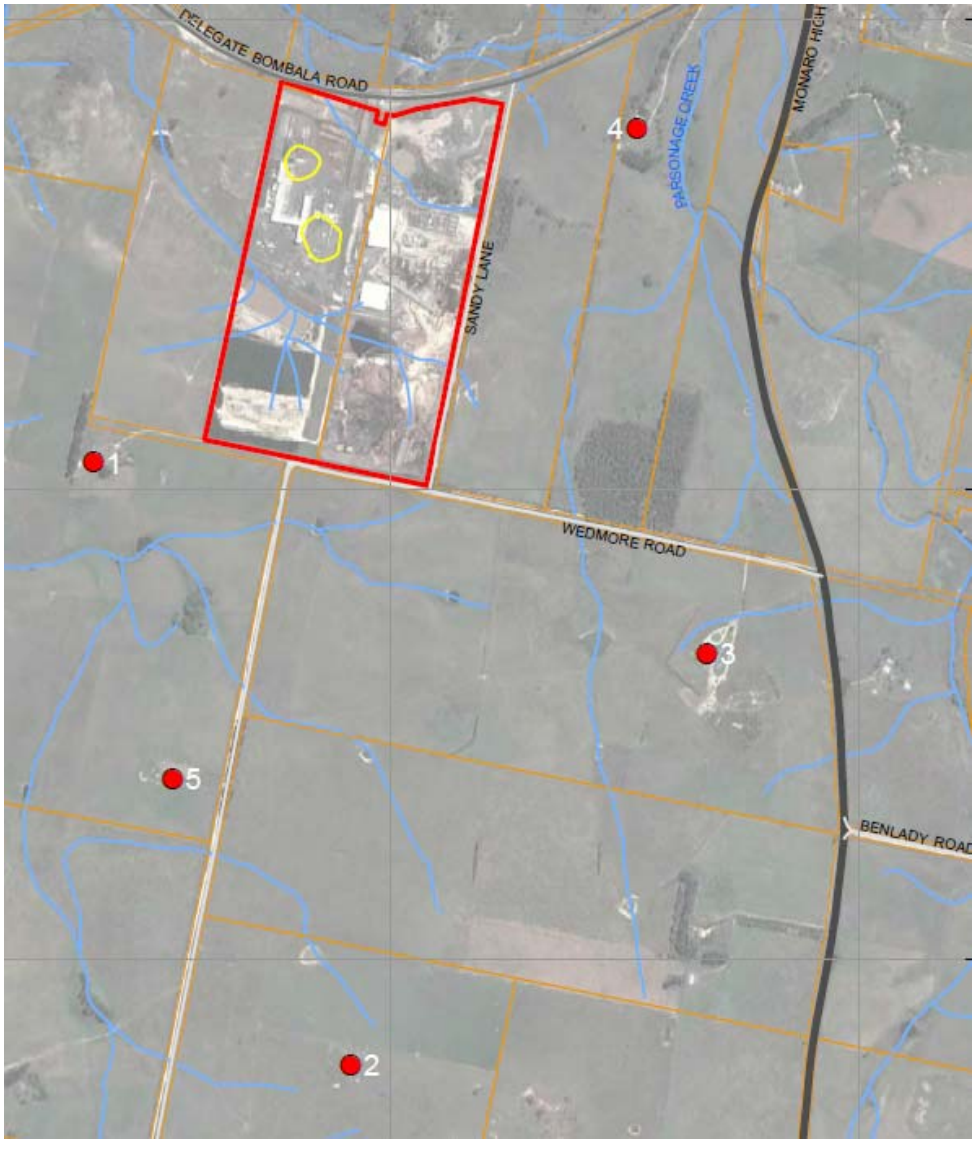


Figure 12 - Predicted 100th percentile 1 hour SO2 level of 10 µg/m^3

6.2.6 VOC

Predicted VOC levels from the proposal are well below the criteria of 3.2 mg/m^3 at all sensitive receivers. The predicted 99.9th percentile 1 hour VOC level of 0.04 µg/m^3 has been plotted below in Figure 13. The predicted levels at nearby sensitive receivers are presented in Table 14.

Table 14 - Predicted maximum VOC levels at sensitive receivers

Receiver	Predicted VOC 1 hour mg/m^3	Criterion
Property boundary	0.019	3.2 mg/m^3
1	0.0032	3.2 mg/m^3
2	0.0051	3.2 mg/m^3
3	0.0026	3.2 mg/m^3
4	0.0033	3.2 mg/m^3
5	0.0027	3.2 mg/m^3

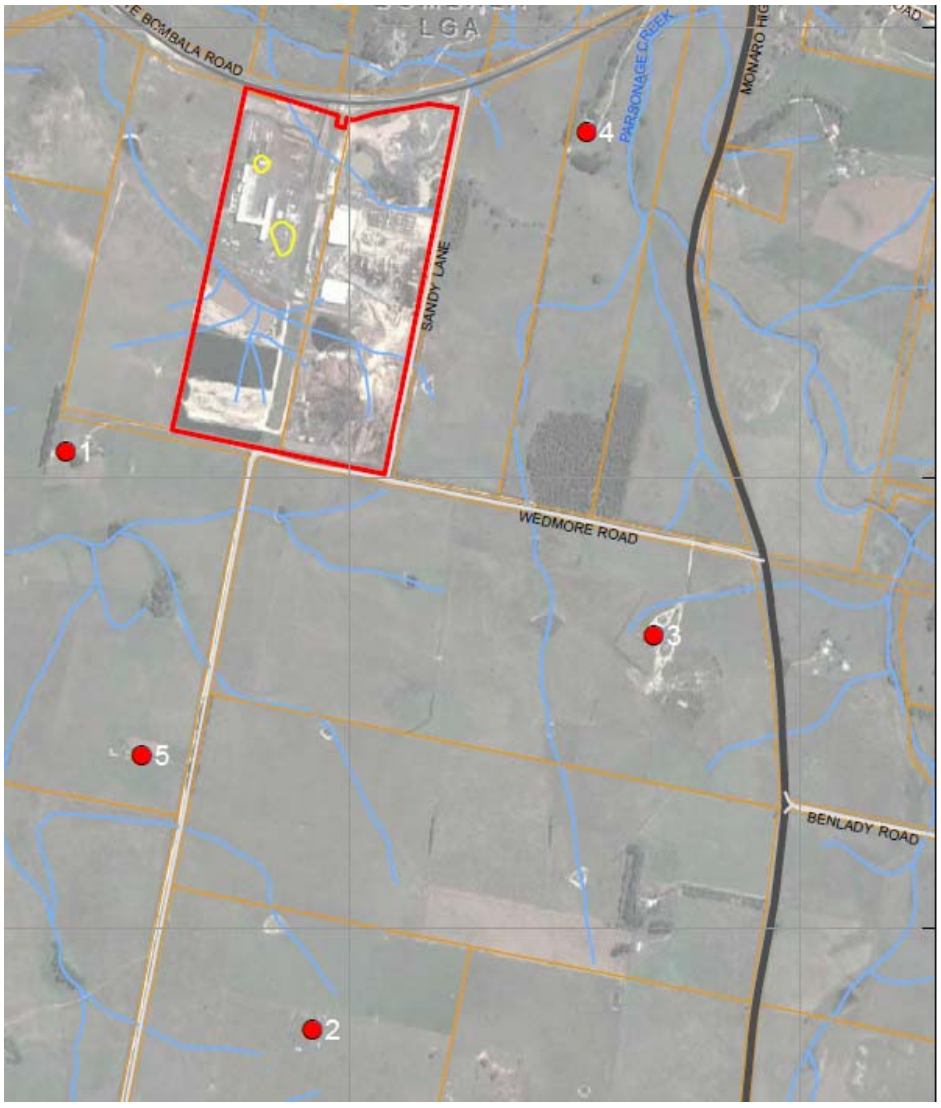


Figure 13 - Predicted 99.9th percentile 1 hour VOC level of 0.04 mg/m^3

6.2.7 Dioxins and furans

Predicted dioxin and furan levels from the proposal are well below the criteria of 2E-9 mg/m^3 at all sensitive receivers. The predicted 99.9th percentile 1 hour DFs level of 1E-10 µg/m^3 has been plotted below in Figure 14. The predicted levels at nearby sensitive receivers are presented in Table 15.

Table 15 - Predicted maximum DF levels at sensitive receivers

Receiver	Predicted DFs 1 hour mg/m^3	Criterion
Property boundary	8.4E-11	2E-9 mg/m^3
1	1.4E-11	2E-9 mg/m^3
2	9.0E-12	2E-9 mg/m^3
3	1.1E-11	2E-9 mg/m^3
4	1.4E-11	2E-9 mg/m^3
5	1.1E-11	2E-9 mg/m^3

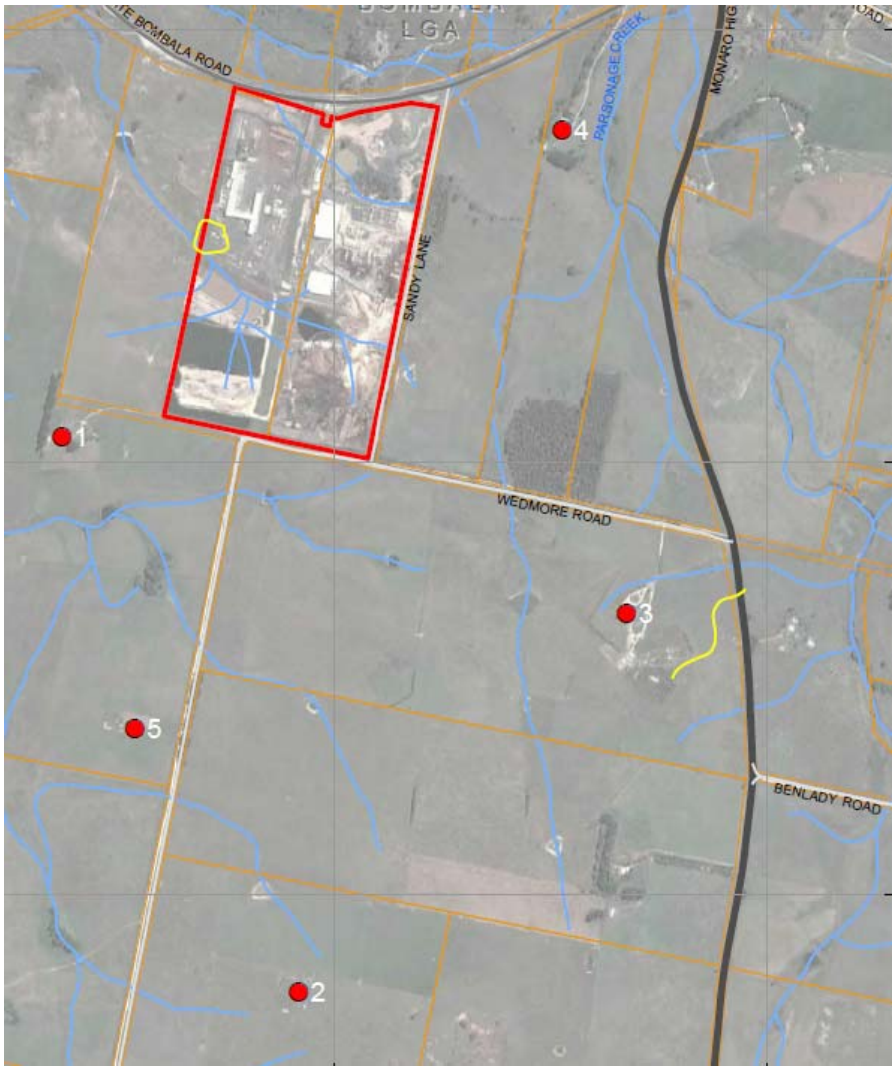


Figure 14 - Predicted 99.9th percentile 1 hour DFs level of 1E-10 mg/m^3

6.2.8 PAH

Predicted PAH levels from the proposal are well below the criteria of 0.004 mg/m^3 at all sensitive receivers. The predicted 99.9th percentile 1 hour PAH level of 0.0001 mg/m^3 has been plotted below in Figure 15. The predicted levels at nearby sensitive receivers are presented in Table 16.

Table 16 - Predicted maximum PAH levels at sensitive receivers

Receiver	Predicted PAH 1 hour mg/m^3	Criterion
Property boundary	0.00004	0.004 mg/m^3
1	0.000008	0.004 mg/m^3
2	0.000008	0.004 mg/m^3
3	0.000006	0.004 mg/m^3
4	0.000008	0.004 mg/m^3
5	0.000007	0.004 mg/m^3

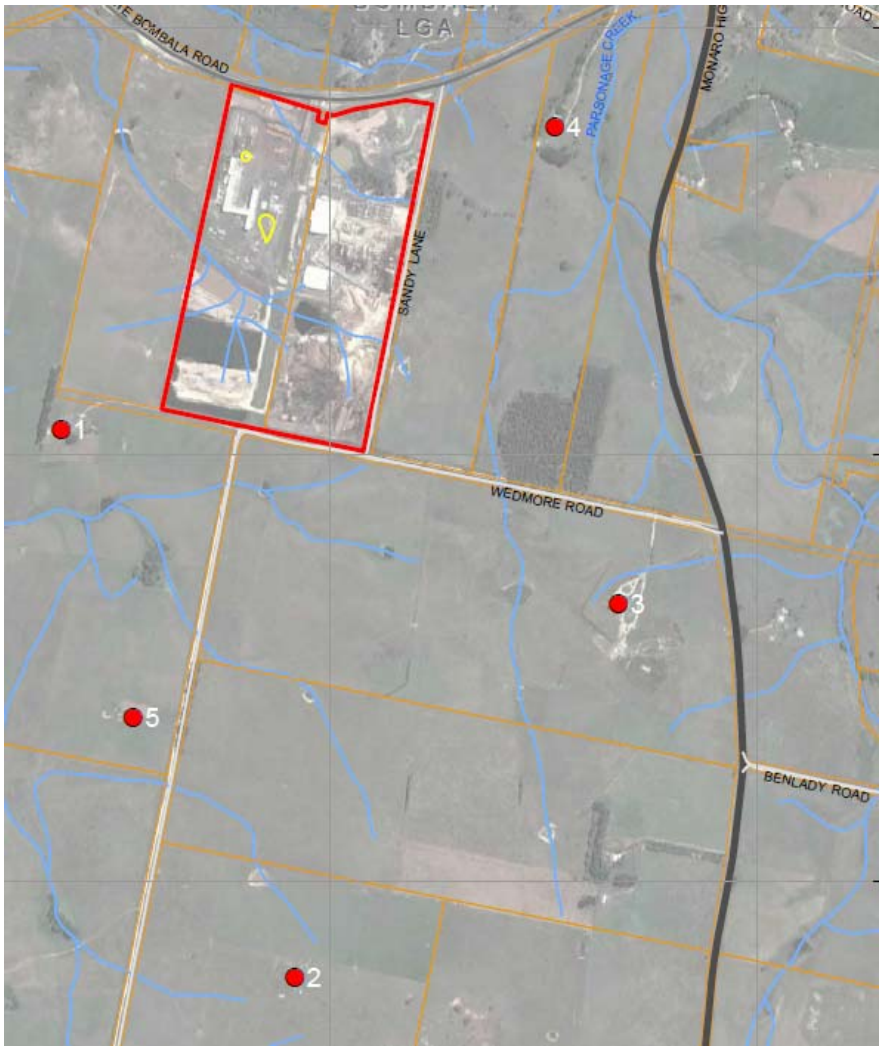


Figure 15 - Predicted 99.9th percentile 1 hour PAH level of 0.0001 mg/m3

7. Conclusions and implications

An operational air quality impact assessment has been undertaken with consideration given to the *Approved methods for the modelling and assessment of pollutants in NSW* (DEC, 2005).

The air quality impact assessment shows that the maximum predicted concentrations that may occur as the result of the operation of the 18 MW wood fired boiler are expected to comply with the impact assessment criteria at all surrounding receivers and the site boundary where relevant.

The predicted levels for most pollutants are one or more orders of magnitude below the respective impact assessment criterion.

The predicted maximum concentrations of PM_{10}, $PM_{2.5}$, NO_2, SO_2 and CO should be combined with the existing background levels for comparison with the impact assessment criteria in accordance with the Approved Methods however this information was not available in the Bombala region. There are no significant sources of any of these pollutants nearby to the site and therefore any cumulative impacts would not be significant, given that the predicted incremental impact has shown to be well below the criteria.

Results of the air quality impact assessment show that the emissions from the proposed 18 MW wood fired boiler will meet the Clean Air Regulation Group 6 limits and also the DEC Impact Assessment Criteria at all identified receivers

Appendices

Appendix A – Emission estimations

Bioler fuel: Wood

Wood existing	0.93	tonnes/hr
Wood proposed	42955	tonnes/annum

Existing diameter m	0.58	m	Existing area (circle)	0.264207942	m^2
Existing exit velocity m/s	7	m/s	Existing volume flow rate	1.849455595	m^3/s 6658.040143 m^3/h
Exit temperature (deg C)	255	C			
Proposed diameter m	2.2	m	Proposed area (circle)	3.801327111	m^2
Proposed exit velocity m/s	9	m/s	Proposed volume flow rate	34.211944	m^3/s
Proposed exit temp (deg C)	160	C			

ExistingFlow rate normalisation multiplier 1.933552993

(Q = QN × (Pref / Pa) × (T / Tref))

Proposed Flow rate normalisation multiplier 1.585758741

Energy and fuel usage

Existing 2.5MW	0.93	tonnes/hr
Proposed 20MW	4.9	tonnes/hr

Relevant emission factors for wood- from Table 33 of manual

Species	EF^{-1} (kg/tonne)	Species
PM10	8.60E-01	PM10
PM2.5	4.30E-01	PM2.5
NOX	1.49E+00	NOX
SO2	1.70E-01	SO2
PAH	1.78E-03	PAH
CO	4.08E+00	CO
TVOC	1.20E-01	TVOC
Polychlorinated dioxins and furans	5.29E-10	Dioxins and furans

Emission rates

Species	Existing kg/hr	Existing g/s	Existing mg/m^3	Proposed kg/hr	Proposed g/s	Proposed mg/m^3	Supplier mg/m3	Class 6 Limit	Proposed g/s to meet class 6 limit or supplier	Model g/s
PM10	0.80	0.22	232.269	4.22	1.17	54.296	50	50	1.078724749	1.079
PM2.5	0.40	0.11	116.134	2.11	0.59	27.148				0.586
NOX	1.39	0.38	402.419	7.31	2.03	94.070	400	500	8.629797994	8.630
SO2	0.16	0.04	45.914	0.83	0.23	10.733		1000		0.232
PAH	0.00	0.00	0.481	0.01	0.00	0.112				0.002
CO	3.79	1.05	1101.927	20.01	5.56	257.589	1000	125	2.696811873	2.697
TVOC	0.11	0.03	32.410	0.59	0.16	7.576	150	40	0.862979799	0.863
Polychlorinated dioxins and furans	0.00	0.000	0.000	0.00	0.00	0.000		0.1	2.157449499	2.157

Note: for paramater that don't comply with the class 6 emission limits we have modelled to assume that they will. The g/s have been back calculated based on the class 6 limits

Bioler fuel: Natural gas

10 MW

		GJ
Scenario 1	77263	GJ
Scenario 2	220752	GJ
Diameter m	0.87	m
Exit velocity m/s	10	m/s
Exit temperature (deg C)	140	C
Flow rate normalisation multiplier	1.512538898	

(Q = QN × (Pref / Pa) × (T / Tref))

Energy content of natural gas	39.7	MJ/m3	
Weight/volume nat gas	0.74	kg/m3	
Area (circle)	0.59446787	m^2	
Volume flow rate	5.944678699	m^3/s	21400.84332

Energy and fuel usage

Boiler 10 MW

Scenario 2		Scenario 3	
8.819977169	GJ/h	25.2	GJ/h
8819.977169	MJ/h	25200	MJ/h
222.1656718	m3/h	634.7607053	m3/h
0.164402597	**tonnes/h**	**0.469722922**	**tonnes/h**

Relevant emission factors for natural gas- from Table 20 of manual

Species	**EF^{-1} (kg/t)**	**Species**	**Scenario 1 kg/h**	**Scenario 1 g/s**	**Scenario 1 mg/m^3**	**Scenario 2 kg/h**	**Scenario 2 g/s**	**Scenario 2 mg/m^3**
PM10	1.60E-01	PM10	0.026	0.007	1.859	0.075	0.021	5.312
PM2.5	1.60E-01	PM2.5	0.026	0.007	1.859	0.075	0.021	5.312
NOX	3.68E+00	NOX	0.605	0.168	42.759	1.729	0.480	122.170
SO2	0.023856	SO2	0.004	0.001	0.277	0.011	0.003	0.792
PAH	1.38E-05	PAH	0.000	0.000	0.000	0.000	0.000	0.000
CO	5.20E-01	CO	0.085	0.024	6.042	0.244	0.068	17.263
TVOC	1.19E-01	TVOC	0.020	0.005	1.383	0.056	0.016	3.951
Polychlorinated dioxins and furans	1.07E-10	Dioxins and furans	0.000	0.000	0.000	0.000	0.0000000000140	0.000

Quantity emitted = rate of fuel used x EF x Control Efficiency

The rate of fuel used by the natural gas boilers was calculated from the capacity of the boiler, the energy content of natural gas (39.7 MJ/m^3) and the weight to volume of natural gas (0.74 kg/m^3). The rate has been estimated as 25.2 GJ/hr for boiler 1 and boiler 4, and 8.8 GJ/hr for boiler 2. Appropriate EFs were obtained from Table 20 of the EET Manual, based on the fuel used (natural gas), the type of boiler ("tangential fired") and the control technology employed ("uncontrolled"). The boilers were assumed to have 0% control efficiencies for all the species emitted.

Appendix B – Sample Ausplume file

1 _____

Run01

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Concentration or deposition Concentration
Emission rate units grams/second
Concentration units milligrams/m3
Units conversion factor 1.00E+03
Constant background concentration 0.00E+00
Terrain effects None
Smooth stability class changes? No
Other stability class adjustments ("urban modes") None
Ignore building wake effects? No
Decay coefficient (unless overridden by met. file) 0.000
Anemometer height 10 m
Roughness height at the wind vane site 0.300 m
Use the convective PDF algorithm? No
Averaging time for sigma-theta values 60 min.

DISPERSION CURVES
Horizontal dispersion curves for sources <100m high Sigma-theta
Vertical dispersion curves for sources <100m high Pasquill-Gifford
Horizontal dispersion curves for sources >100m high Briggs Rural
Vertical dispersion curves for sources >100m high Briggs Rural
Enhance horizontal plume spreads for buoyancy? Yes
Enhance vertical plume spreads for buoyancy? Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust vertical P-G formulae for roughness height? Yes
Roughness height 0.400m
Adjustment for wind directional shear None

PLUME RISE OPTIONS
Gradual plume rise? Yes
Stack-tip downwash included? Yes
Building downwash algorithm: PRIME method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions? No
Disregard temp. gradients in the hourly met. file? No

and in the absence of boundary-layer potential temperature gradients
given by the hourly met. file, a value from the following table
(in K/m) is used:

Wind Speed	Stability Class					
Category	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035

2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Urban" values (unless overridden by met. file)

AVERAGING TIMES

1 hour

1

Run01

SOURCE CHARACTERISTICS

STACK SOURCE: DP5-W

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
696731	5910530	0m	13m	2.20m	160C	9.0m/s

Effective building dimensions (in metres)

Flow direction	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°
Effective building width	0	99	0	0	0	0	0	0	170	160	0	0
Effective building height	0	11	0	0	0	0	0	0	11	11	0	0
Along-flow building length	0	149	0	0	0	0	0	0	88	78	0	0
Along-flow distance from stack	0	14	0	0	0	0	0	0	17	11	0	0
Across-flow distance from stack	0	-36	0	0	0	0	0	0	70	80	0	0

Flow direction	130°	140°	150°	160°	170°	180°	190°	200°	210°	220°	230°	240°
Effective building width	0	0	0	0	0	0	0	99	122	142	158	169
Effective building height	0	0	0	0	0	0	0	11	11	11	11	11
Along-flow building length	0	0	0	0	0	0	0	150	135	118	109	101
Along-flow distance from stack	0	0	0	0	0	0	0	-163	-161	-154	-142	-131
Across-flow distance from stack	0	0	0	0	0	0	0	36	20	4	-13	-29

Flow direction	250°	260°	270°	280°	290°	300°	310°	320°	330°	340°	350°	360°
Effective building width	175	175	170	160	0	0	0	0	0	0	0	0
Effective building height	11	11	11	11	0	0	0	0	0	0	0	0
Along-flow building length	100	95	88	78	0	0	0	0	0	0	0	0
Along-flow distance from stack	-127	-118	-105	-89	0	0	0	0	0	0	0	0
Across-flow distance from stack	-44	-58	-70	-80	0	0	0	0	0	0	0	0

(Constant) emission rate = 8.63E-01 grams/second
No gravitational settling or scavenging.

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1 _____

Run01

RECEPTOR LOCATIONS

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The Cartesian receptor grid has the following x-values (or eastings):
695500.m 695550.m 695600.m 695650.m 695700.m 695750.m 695800.m
695850.m 695900.m 695950.m 696000.m 696050.m 696100.m 696150.m
696200.m 696250.m 696300.m 696350.m 696400.m 696450.m 696500.m
696550.m 696600.m 696650.m 696700.m 696750.m 696800.m 696850.m
696900.m 696950.m 697000.m 697050.m 697100.m 697150.m 697200.m
697250.m 697300.m 697350.m 697400.m 697450.m 697500.m 697550.m
697600.m 697650.m 697700.m 697750.m 697800.m 697850.m 697900.m
697950.m

and these y-values (or northings):
5909500.m 5909550.m 5909600.m 5909650.m 5909700.m 5909750.m 5909800.m
5909850.m 5909900.m 5909950.m 5910000.m 5910050.m 5910100.m 5910150.m
5910200.m 5910250.m 5910300.m 5910350.m 5910400.m 5910450.m 5910500.m
5910550.m 5910600.m 5910650.m 5910700.m 5910750.m 5910800.m 5910850.m
5910900.m 5910950.m 5911000.m 5911050.m 5911100.m 5911150.m 5911200.m
5911250.m 5911300.m 5911350.m 5911400.m 5911450.m 5911500.m 5911550.m
5911600.m 5911650.m 5911700.m 5911750.m 5911800.m 5911850.m 5911900.m
5911950.m

DISCRETE RECEPTOR LOCATIONS (in metres)

No.	X	Y	ELEVN	HEIGHT	No.	X	Y	ELEVN	HEIGHT
1	696917	5908773	0.0	0.0					

METEOROLOGICAL DATA : AUSPLUME METFILE

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1 Peak values for the 100 worst cases (in milligrams/m3)
Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)

1	5.65E-02	21,23/10/09	(696800, 5910700,	0.0)
2	5.57E-02	20,05/06/09	(696850, 5910550,	0.0)
3	5.44E-02	03,29/09/09	(696850, 5910550,	0.0)
4	5.28E-02	18,11/06/09	(696850, 5910550,	0.0)
5	5.26E-02	01,30/11/09	(696850, 5910550,	0.0)
6	5.23E-02	20,28/08/09	(696850, 5910550,	0.0)
7	5.21E-02	18,10/02/09	(696800, 5910700,	0.0)
8	5.16E-02	06,08/05/09	(696850, 5910550,	0.0)
9	5.15E-02	17,20/07/09	(696850, 5910550,	0.0)
10	5.13E-02	18,10/06/09	(696850, 5910550,	0.0)
11	5.13E-02	12,29/05/09	(696800, 5910700,	0.0)
12	5.11E-02	19,10/12/09	(696800, 5910700,	0.0)
13	5.10E-02	01,04/07/09	(696850, 5910550,	0.0)
14	5.10E-02	06,04/07/09	(696850, 5910550,	0.0)
15	5.09E-02	18,30/08/09	(696850, 5910550,	0.0)
16	5.09E-02	10,23/09/09	(696850, 5910550,	0.0)
17	5.08E-02	06,08/09/09	(696850, 5910550,	0.0)
18	5.05E-02	19,17/10/09	(696800, 5910700,	0.0)
19	5.04E-02	17,27/07/09	(696850, 5910550,	0.0)
20	5.03E-02	05,04/07/09	(696850, 5910550,	0.0)
21	5.03E-02	04,08/05/09	(696850, 5910550,	0.0)
22	5.02E-02	10,10/06/09	(696850, 5910550,	0.0)
23	5.01E-02	04,26/02/09	(696850, 5910550,	0.0)
24	5.01E-02	15,25/06/09	(696850, 5910550,	0.0)
25	5.00E-02	13,14/10/09	(696850, 5910550,	0.0)
26	5.00E-02	16,25/06/09	(696850, 5910550,	0.0)
27	5.00E-02	06,25/08/09	(696850, 5910550,	0.0)
28	4.99E-02	08,09/09/09	(696850, 5910550,	0.0)
29	4.99E-02	21,20/11/09	(696800, 5910700,	0.0)
30	4.98E-02	05,16/10/09	(696850, 5910550,	0.0)
31	4.97E-02	17,07/10/09	(696800, 5910700,	0.0)
32	4.96E-02	18,04/07/09	(696850, 5910550,	0.0)
33	4.96E-02	10,16/07/09	(696850, 5910550,	0.0)
34	4.96E-02	18,05/08/09	(696850, 5910550,	0.0)
35	4.95E-02	02,24/09/09	(696850, 5910550,	0.0)
36	4.94E-02	16,28/07/09	(696850, 5910550,	0.0)
37	4.94E-02	01,24/09/09	(696850, 5910550,	0.0)
38	4.94E-02	05,08/05/09	(696850, 5910550,	0.0)
39	4.93E-02	23,26/09/09	(696850, 5910550,	0.0)
40	4.92E-02	24,06/10/09	(696850, 5910550,	0.0)
41	4.92E-02	18,19/07/09	(696850, 5910550,	0.0)
42	4.91E-02	07,17/07/09	(696850, 5910550,	0.0)
43	4.91E-02	17,31/08/09	(696850, 5910550,	0.0)
44	4.91E-02	19,04/04/09	(696800, 5910700,	0.0)
45	4.91E-02	14,25/06/09	(696850, 5910550,	0.0)
46	4.90E-02	23,23/09/09	(696850, 5910550,	0.0)
47	4.89E-02	24,11/06/09	(696850, 5910550,	0.0)
48	4.89E-02	09,27/04/09	(696850, 5910550,	0.0)
49	4.88E-02	10,11/06/09	(696850, 5910550,	0.0)
50	4.88E-02	13,07/10/09	(696800, 5910700,	0.0)
51	4.88E-02	15,22/07/09	(696850, 5910550,	0.0)
52	4.86E-02	17,14/10/09	(696850, 5910550,	0.0)

53	4.85E-02	04,04/07/09	(696850, 5910550,	0.0)
54	4.84E-02	09,13/08/09	(696850, 5910550,	0.0)
55	4.83E-02	23,05/07/09	(696850, 5910550,	0.0)
56	4.82E-02	17,28/08/09	(696850, 5910550,	0.0)
57	4.82E-02	18,20/07/09	(696850, 5910550,	0.0)
58	4.82E-02	11,09/09/09	(696850, 5910550,	0.0)
59	4.81E-02	15,28/07/09	(696850, 5910550,	0.0)
60	4.80E-02	17,01/12/09	(696800, 5910700,	0.0)
61	4.80E-02	13,28/07/09	(696850, 5910550,	0.0)
62	4.80E-02	09,03/08/09	(696850, 5910550,	0.0)
63	4.80E-02	20,31/12/09	(696850, 5910550,	0.0)
64	4.80E-02	22,27/09/09	(696850, 5910550,	0.0)
65	4.78E-02	14,22/07/09	(696850, 5910550,	0.0)
66	4.78E-02	04,13/10/09	(696850, 5910500,	0.0)
67	4.78E-02	10,06/03/09	(696850, 5910550,	0.0)
68	4.77E-02	01,24/10/09	(696850, 5910550,	0.0)
69	4.76E-02	02,17/07/09	(696850, 5910550,	0.0)
70	4.76E-02	03,28/09/09	(696850, 5910550,	0.0)
71	4.75E-02	11,14/08/09	(696850, 5910550,	0.0)
72	4.75E-02	12,08/10/09	(696800, 5910700,	0.0)
73	4.75E-02	05,28/06/09	(696800, 5910700,	0.0)
74	4.75E-02	18,19/09/09	(696850, 5910550,	0.0)
75	4.75E-02	10,17/10/09	(696850, 5910550,	0.0)
76	4.75E-02	10,27/04/09	(696850, 5910550,	0.0)
77	4.74E-02	12,13/08/09	(696850, 5910550,	0.0)
78	4.74E-02	20,21/08/09	(696850, 5910550,	0.0)
79	4.74E-02	14,27/07/09	(696850, 5910550,	0.0)
80	4.72E-02	12,12/04/09	(696850, 5910550,	0.0)
81	4.71E-02	10,23/07/09	(696850, 5910550,	0.0)
82	4.71E-02	13,29/07/09	(696850, 5910550,	0.0)
83	4.71E-02	19,24/07/09	(696850, 5910550,	0.0)
84	4.71E-02	12,29/07/09	(696850, 5910550,	0.0)
85	4.71E-02	17,02/08/09	(696850, 5910550,	0.0)
86	4.71E-02	09,30/08/09	(696850, 5910550,	0.0)
87	4.70E-02	12,28/07/09	(696850, 5910550,	0.0)
88	4.70E-02	15,07/10/09	(696800, 5910700,	0.0)
89	4.70E-02	11,27/04/09	(696850, 5910550,	0.0)
90	4.70E-02	14,28/07/09	(696850, 5910550,	0.0)
91	4.70E-02	17,11/06/09	(696850, 5910550,	0.0)
92	4.70E-02	02,05/03/09	(696850, 5910550,	0.0)
93	4.69E-02	16,20/07/09	(696850, 5910500,	0.0)
94	4.69E-02	13,27/07/09	(696850, 5910550,	0.0)
95	4.69E-02	11,17/03/09	(696850, 5910550,	0.0)
96	4.68E-02	22,07/08/09	(696850, 5910550,	0.0)
97	4.68E-02	15,08/08/09	(696850, 5910550,	0.0)
98	4.68E-02	18,24/07/09	(696850, 5910550,	0.0)
99	4.68E-02	02,30/11/09	(696850, 5910550,	0.0)
100	4.68E-02	19,16/07/09	(696800, 5910700,	0.0)

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133 Castlereagh St Sydney NSW 2000

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T: +61 2 9239 7100 F: +61 2 9239 7199 E: sydmail@ghd.com.au

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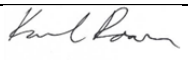
		Name	Signature	Name	Signature	Date
A	E Smith	M Asimakis/ Esmith		K Rosen		26/6/14
B	E Smith	M Asimakis/ Esmith		K Rosen		22/8/14

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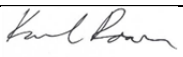
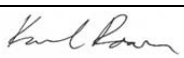
Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	R.Exikanas/ E.Smith/ K.Rosen	Kate .Day, Karl Rosen		K.Rosen		22/08/2014

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