global environmental solutions

# Boral Berrima Cement Works

# Modification 9 - Use of Solid Waste Derived Fuels

# Response to Submissions

Report Number 610.15875

22 January 2016

Boral Cement Limited

Greystanes House

Clunies Ross Street

Prospect NSW 2142

# Boral Berrima Cement Works

# Modification 9 - Use of Solid Waste Derived Fuels

# Response to Submissions

22 January 2016

PREPARED BY:

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
2 Lincoln Street
Lane Cove NSW 2066 Australia
(PO Box 176 Lane Cove NSW 1595 Australia)
T: +61 2 9427 8100 F: +61 2 9427 8200
sydney@slrconsulting.com www.slrconsulting.com

# TABLE OF CONTENTS

**1 INTRODUCTION ..... 1**

1.1 Background ..... 1

1.2 Summary of Submissions ..... 1

**2 GOVERNMENT AGENCY SUBMISSIONS ..... 3**

2.1 Department of Planning ..... 3

2.1.1 Compliance with *NSW Energy from Waste Policy Statement* and EU Best Practice ..... 3

2.1.2 Human Health Assessment ..... 3

2.1.3 General ..... 3

2.1.4 Noise ..... 8

2.2 Department of Planning and Environment & NSW Environmental Protection Authority (prepared by Arup) ..... 12

2.2.1 Feedstocks and Reference Facilities ..... 12

2.2.2 Air Quality Emissions Limits ..... 13

2.2.3 Emissions Reporting ..... 15

2.2.4 Emissions Control Equipment ..... 16

2.2.5 Solid Waste Derived Fuel Acceptance ..... 17

2.2.6 Co-incineration of SWDF ..... 17

2.2.7 Storage and Stockpiling of SWDF ..... 19

2.3 NSW Environmental Protection Authority (EPA) ..... 20

2.3.1 Submission 1 ..... 20

2.3.2 Submission 2 (Air Quality) ..... 23

2.4 NSW Environment Protection Authority – Review of Human Health Risk Assessment (prepared by Environmental Risk Sciences) ..... 25

2.5 Roads and Maritime Services ..... 26

2.6 Department of Primary Industries - Water & Geological Survey of NSW ..... 27

2.6.1 Surface water and Groundwater Impacts ..... 27

2.7 Wingecarribee Shire Council ..... 29

2.7.1 Traffic ..... 29

2.7.2 Environment and Sustainability ..... 29

**3 SPECIALIST INTEREST GROUP SUBMISSION ..... 30**

3.1 Cement Concrete & Aggregates Australia (CCAA) ..... 30

## TABLES

Table 1 Submissions Received ..... 2

Table 2 Predicted Operational Noise Levels – One Vehicle Access Door Open (NO FEL) ..... 10

Table 3 Predicted Operation Noise Levels – All Vehicle Access Doors Closed (NO FEL) ..... 11

## FIGURES

Figure 1 GHG Emissions from the Existing and Proposed Project ..... 4
Figure 2 Environmental and Socio-economic benefits from the Proposal ..... 6
Figure 3 VOC off-white clinker emissions ..... 15

## APPENDICES

Appendix A Ground and Surface Water Assessment
Appendix B Updated Human Health Risk Assessment
Appendix C ABL Environmental Licence
Appendix D Environment Protection (Air Quality) Policy 1994
Appendix E Supplementary Noise Report
Appendix F Chelsey Park Farm Title Search

# 1 INTRODUCTION

## 1.1 Background

An Environmental Assessment (EA) report was submitted to the Department of Planning & Environment (DPE) in July 2015 to support an application pursuant to Section 75W of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act), seeking modification of the current approval at the Boral Cement Works (the Cement Works) in New Berrima.

Boral Cement Limited (Boral) operates the Cement Works at New Berrima in the Wingecarribee Local Government Area and is a significant contributor to the local economy.

The Cement Works operate subject to two development consents issued by the Department of Planning and Environment (DA 401-11-2002 (Kiln 6), May 2003 and DA 85-4-2005 (Mill 7), Aug 2005). The development consent for Kiln 6 has since been modified eight times. An Environment Protection Licence (EPL 1698) issued by the Environment Protection Authority (EPA) is also held by Boral for the operation of the facility.

This modification, Modification 9, seeks approval for the following:

- use of Solid Waste Derived Fuel (SWDF) as an energy source;
- changes to the air emission limits of particulate matter (PM), nitrous oxides (NOx) and volatile organic compounds (VOC); and
- construction and operation of a fuel storage and kiln feeding system.

In addition, Boral wishes to surrender Modification No. 6 (June 2012) relating to the stockpiling of coal for sale and transport to Port Kembla.

The modification is needed to maintain the viability of Boral as a cement manufacturer in an industry that is facing increasing pressure from less expensive imported products and rising energy costs. Up until recently coal from the Berrima Colliery at Medway was used to fire the cement kiln. In October 2013 the colliery ceased operation, consequently Boral is pursuing other fuel sources to ensure its operation remains economically viable into the future. The modification would also have associated environmental benefits of reducing carbon emissions and diverting waste from landfill.

The proposed modification is considered to be minor in the context of the overall operations at New Berrima and would not significantly alter the operation of the Cement Works, other than to allow the use of different fuel sources in the manufacturing process. The project as modified would be substantially the same development as approved previously.

## 1.2 Summary of Submissions

The submissions received in relation to the proposal are summarised below, and can be viewed in full on the DPE's website at the following address:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=7158

A summary of the seven submissions received from government agencies and a special interest group is provided in **Table 1**. No submissions were received from members of the public.

**Table 1 Submissions Received**

| From | Supports / Objection / Comments |
|---|---|
| **Government Agencies** | |
| Department of Planning and Environment (DPE) | Comments |
| Department of Planning and Environment (DPE) & Environment Protection Authority (EPA) – Technology and Engineering Assessment (prepared by Arup) | Comments |
| Environmental Protection Authority (2 submissions) | Comments |
| Environment Protection Authority (EPA) - Human Health Risk Assessment (HHRA) Peer Review (prepared by Environmental Risk Sciences) | Comments |
| Roads and Maritime Services (RMS) | Comments |
| Department of Primary Industries - Water & Geological Survey of NSW | Comments |
| Wingecarribee Shire Council | Comments |
| **Special Interest Group** | |
| Cement Concrete and Aggregates Australia (CCAA) | Supports |

# 2 GOVERNMENT AGENCY SUBMISSIONS

Submissions were received from five government agencies (see **Table 1** above). Each of these submissions are addressed in the below sub-sections, with the issues raised presented in ***bold italics***, followed by the response in normal text.

## 2.1 Department of Planning

### 2.1.1 Compliance with *NSW Energy from Waste Policy Statement* and EU Best Practice

***Refer to the attached report by ARUP, prepared on behalf of the Department and the NSW Environment Protection Authority. Please respond to the review, in particular, the recommendations for changes to the proposed modification, conditions of consent and/or mitigation measures in Section 2 of the report.***

See **Section 2.2**

### 2.1.2 Human Health Assessment

***Refer to the attached report by EnRiskS, prepared on behalf of the Department and the NSW Environment Protection Authority. Please respond to the review, in particular, the matters needing additional assessment outlined in Section 3 of the report.***

See **Section 2.4**

### 2.1.3 General

***A diagram that sets out the environmental offsets and benefits of the proposal should be included, i.e. use of non-standard fuels, reduced transport of coal, reduced use of coal, less waste to landfill, etc.***

The main environmental benefits resulting from the proposal are a significant reduction in greenhouse gas emissions both from the operation of the cement works and the avoided decomposition of waste in landfill, a reduced demand for scarce landfill space, and continued support to the regional economy through direct employment and flow on economic effects. The main environmental risks are associated with potential human health impacts resulting from combustion emissions; however, these have been assessed through the air quality assessment and human health risk assessment to be within acceptable limits when appropriate mitigation measures and operational controls are considered.

The impact on greenhouse gas (GHG) emissions is presented in Section 7.2 of the EA report. On an annual operating basis the net reduction in GHG emissions is **118,814 T/$CO_2$-e pa**. This is broken down as follows:

- Scope 1:
  - Sub-bituminous Coal: reduction of **71,770 T/$CO_2$-e pa**
  - Coking Coal: reduction of **52,728 T/$CO_2$-e pa**
  - Waste Derived Fuel: increase of **2,196 T/$CO_2$-e pa**.
- Scope 2:
  - Electricity: increase of **2,354 T/CO2-e pa**
- Scope 3:
  - Transport Diesel: increase of **1,134 T/CO2-e pa**

The largest reduction in emissions results from the lower quantities of coal as a fuel source in the kiln with minor increases in emissions as a result of the introduction of waste derived fuel, electricity associated with new infrastructure and the increased truck movements resulting from the transport of solid waste derived fuel (due to their lower bulk density compared to coal).

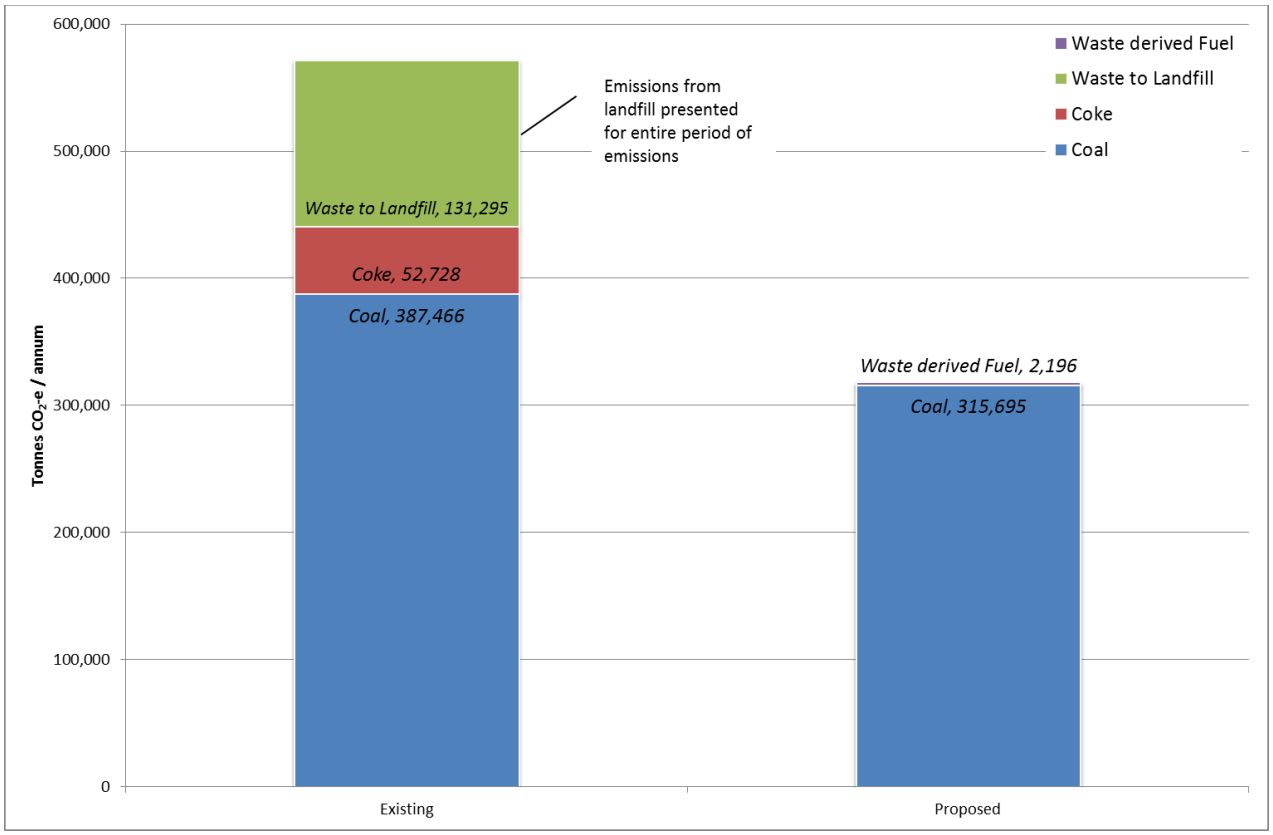
This net reduction does not take into account the avoided emissions associated with landfill decomposition.

Should waste derived fuel not be used in the cement works, the ultimate fate of this waste (assuming it is not diverted to another recycling or recovery process) would be landfill, where emissions of GHG would result from decomposition processes. Compared with combustion, emissions of GHG resulting from decomposition of waste in landfill would be larger given that methane emissions would be significantly higher. Emissions would also be experienced over a longer period of time (decades) compared with instantaneous emissions if combusted.

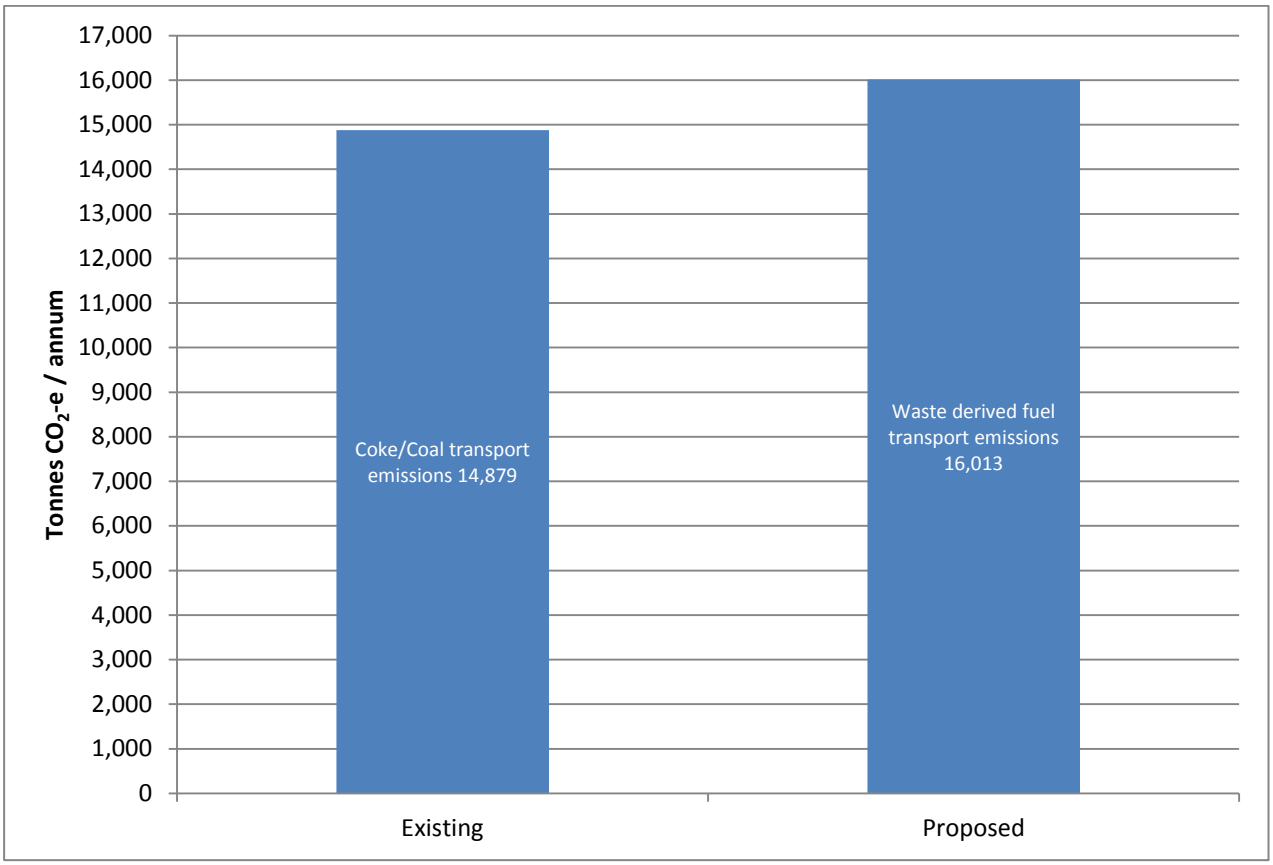
Emissions of $CO_2$-e associated with either the placement of 100'000 tonnes of waste in landfill or use as a waste derived fuel are calculated to be **131,295 tonnes** and **2,196 tonnes**, respectively. Emissions resulting from waste placement in landfill have been calculated over the entire period in which emissions from that waste continue to be emitted (rather than on a per year basis).

The overall change in GHG emissions as a result of the proposal are summarised in Figure 1.

**Figure 1 GHG Emissions from the Existing and Proposed Project**



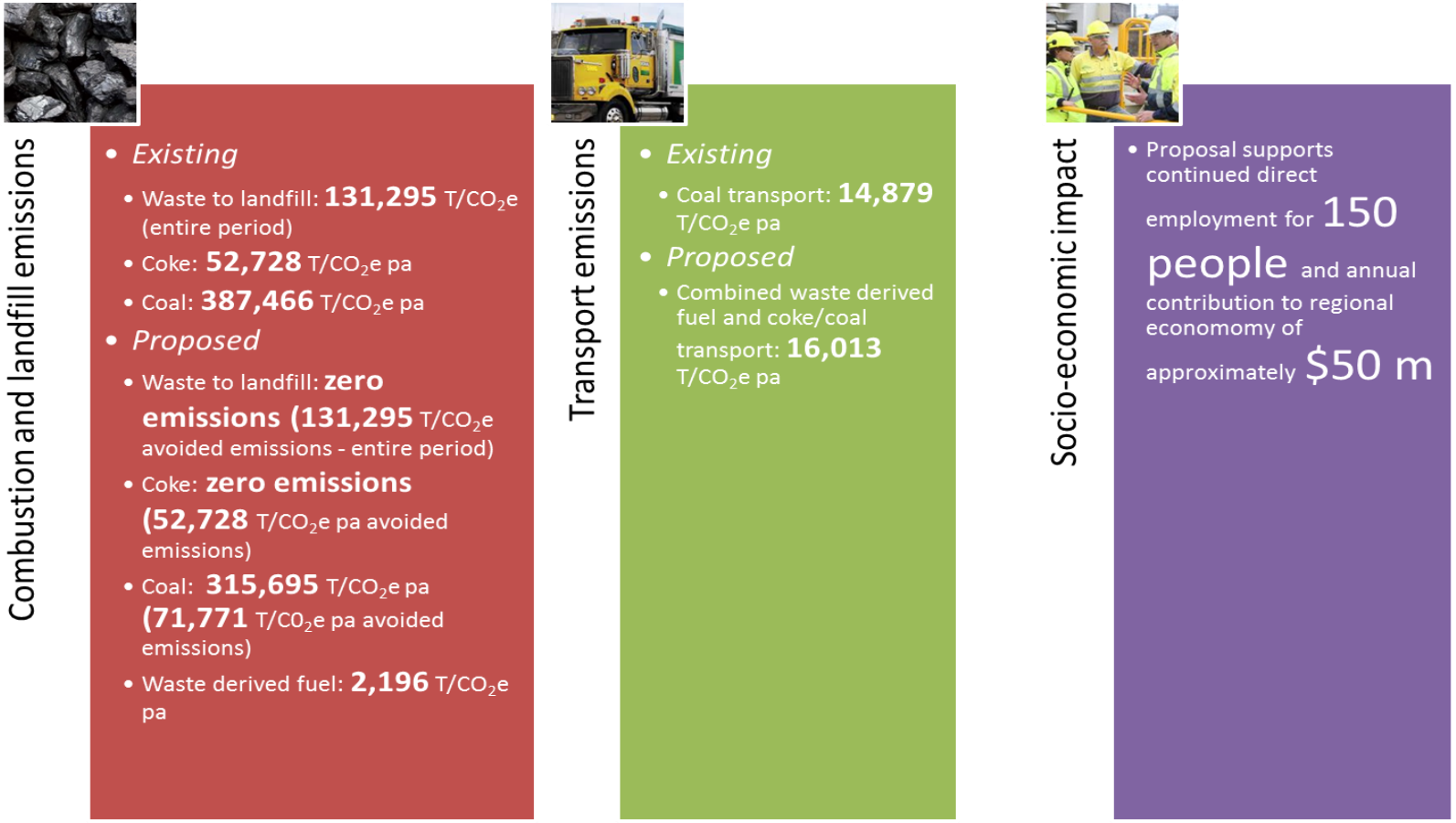

Note: Calculations for waste to landfill performed using the Clean Energy Regulator Solid Waste Emissions Calculator with an assumed 50,000 tpa of RDF (15% organics, 35% paper and paperboard, 10% wood and wood waste, 40% inert material) and 50,000 tpa of Wood Waste (15% paper and paperboard, 70% wood and wood waste, 10% textiles and 5% inert material).




In addition to the reduction in GHG emissions, the reduced demand on landfill space and the measures to manage air quality emissions, the proposal supports the continued direct employment of 150 people at the Berrima facility and an estimated $50 million benefit to the regional economy each year.

The environmental and socio-economic benefits are summarised in **Figure 2.**

**Figure 2 Environmental and Socio-economic benefits from the Proposal**



***Section 4.7 states that "all other cement kilns in Australia have been using these fuels for a number of years". Please provide a list of these kilns, the specific types of non-standard fuels being used and the emission limits for these facilities. Examples provided in Table 12 are from the UK only. Emission limits / licence conditions for these facilities should be provided to support the modification request, where possible.***

In Australia, the most relevant reference facility treating similar type waste streams with similar technology and in a similar jurisdiction is Adelaide Brighton Limited's (ABL) Birkenhead cement facility in Adelaide. The Birkenhead facility operates a 1.3 million tpa dry process kiln with pre-calciner and four stages preheater, which is a similar technology to that used on Kiln 6 at Berrima. Process gas filtration occurs through two Electrostatic Precipitators while Berrima uses one electrostatic precipitator and one bag filter, which is a more modern filtration technology.

ABL has successfully utilised a waste derived fuel known as Processed Engineered Fuel (PEF) over a number of years to partially replace natural gas as fuel at Birkenhead. PEF is a waste derived fuel from commercial and industrial (C&I) and construction and demolition (C&D) wastes that would have traditionally gone to landfill. The RDF proposed for use at Berrima would be similar to the PEF used by ABL. The ABL waste derived fuel plant was commissioned in 2006 with an annual average use of 75,000 tpa of PEF. The PEF manufacturing plant was upgraded in 2014 supplying PEF to ABL in excess of 90,000 tpa. The volume of waste derived fuel used at Birkenhead is therefore similar to that proposed by Boral in Kiln 6.

In terms of emission limits Boral has proposed significantly more stringent limits on emissions than those set for ABL by the South Australian EPA.

The ABL environmental licence has a kiln exhaust stack particulate limit of 250 mg/m$^3$ while Boral is proposing a 50 mg/m$^3$ limit for the Berrima plant when using waste derived fuels. The proposed Kiln 6 particulate limit is therefore five times more stringent than the comparison facility. Condition 3 of the ABL environmental licence (**Appendix C**) states:

> *The Licensee must not allow particle emissions from the Dry Process Kiln 4, the Precalciner Plant and associated Electrostatic Precipitators to exceed the prescribed standard in Item 1 of Schedule 1 of the Environment Protection (Air Quality) Policy 1994, other than for the exempted periods and situations described in EPA Exemption Authorisation No. 12368.*

Please refer to page 4, Schedule 1, Part 1 of **Appendix D,** for the Environment Protection (Air Quality) Policy 1994 which established the particulate limit of 250 mg/m$^3$. The Policy does not distinguish between standard fuel and PEF.

Birkenhead does not currently have a stack emission limit for NOx measured on a continuous basis, as is the case for Kiln 6. Instead, Birkenhead reports a ground level concentration for NOx reported on an annual basis as part of the National Pollution Inventory (NPI). For 2013 to 2014, this load was 3,000,000 kg of NOx which equates to 2.3 kg/t clinker. By comparison, Kiln 6 NOx reported in NPI for the same period was 2,200,000 which equates to 1.55kg/t clinker. Berrima's Kiln 6 NOx emissions are therefore significantly lower than Birkenhead.

There is no limit for VOC at Birkenhead.

***Insufficient information has been provided regarding the impacts to groundwater and surface water as a result of the construction and operation of the facility. Please provide further information regarding any dewatering, interception of groundwater and surface water management during operation and construction.***

Refer to **Section 2.6** and **Appendix A** - Ground and Surface Water Assessment

***Table 22 of the EA refers to dangerous goods vehicle movements. It is noted that the maximum number of vehicles per week is < 1. Please provide the total number of movements expected over one year as < 1 movement does not provide a representative total.***

The total number of movements per week will be one, making the total number of movements per year a maximum of 52 movements. However, Boral Berrima generally closes down for a few weeks per year for maintenance and repairs, therefore the estimated total number of movements would be around 50 per year.

***Provide an assessment of how the proposed storage and kiln feeding system meet the design requirements of Conditions 1.4B and 1.4C of the consent (as modified). Confirm that the proposed storage of tyre chips is in accordance with the NSW Fire Brigades' (Fire Safety Division) Guidelines for Bulk Storage of Rubber Tyres (as per Condition 1.4B of the modified consent).***

NSW Fire Brigades' (Fire Safety Division) *Guidelines for Bulk Storage of Rubber Tyres* primarily provides guidance for the storage of whole tyres, however, does define shredded tyres (as would be used in Kiln 6) as a related subsidiary product.

When using tyre chips in Kiln 6, they would be delivered to, and stored in, the fuel storage shed. The shed would have a maximum floor area of 1,500 $m^2$. The guideline requires buildings with floor areas of greater than 2,000 $m^2$ to have a sprinkler system installed in accordance with AS 2118.1 *Automatic Fire Sprinkler Systems: General.* Despite the smaller floor size of the SWDF storage shed, for fire risk mitigation purposes, Boral will be installing a sprinkler system in accordance with AS 2118.1

The need for smoke and heat vents specified in Section 7 of the guideline will be balanced during detailed design with the risk of propagation of odour (primarily for RDF) and Boral's insurer requirements in relation to fire suppression.

The storage shed design can comply with the tyre stockpile clearances and setbacks in Section 7 of the guideline. However, it would be un-economic for Boral to comply with the stockpile height limit of 3.7 metres and stockpile area of 30 $m^2$. It should be noted that these stockpile limits are primarily designed for stockpiling of whole tyres, which due to air gaps between the tyres, are at a greater risk of catching fire and burning than stockpiled tyre chips. It is therefore submitted that the stockpile height and area limits should not apply to stockpiled tyre chips.

***The current approval limits the use of coal to a minimum of 60% of total fuel by mass. The EA seeks approval to modify this such that there is no limit on the percentage of total fuel by mass (refer Table 4). Please provide some justification for this modification to fuel limits.***

Coal will make up the balance of the fuel mix once the use of other fuels is taken into account. As there are limits on the individual non-standard fuels there is no relevance in placing a limit on the proportion of coal in the kiln fuel mix.

### 2.1.4 Noise

***Section 6.4 states that truck movements were excluded from the calculation as total truck movements from the existing operation are the same as the proposed operation. However, the numbers provided in brackets indicate a change from 243 to 223. Notwithstanding, the TRAFFIX Report submitted with the modification indicates an increase. Please confirm truck movement impacts and ensure the noise assessment considers the correct predictions.***

In **Section 6.4** of the supplementary noise report (**Appendix E**) an error was made in regards to the reporting of figures for existing and predicted day-time and evening total truck movements. The number of existing total truck movements (223) and the predicted future total truck movements (243) were reversed in the report. This does not alter the conclusion of no overall change in the number of truck movements for the purposes of the noise assessment. For clarity, this was calculated as follows:

- Day-time (7am-6pm) + Evening (7pm-10pm) = 15 hours
- Number of 15 minute segments = 60 (noise modelling is reported based on 15 minute segments)
- Existing total truck movements = 223 or 3.71 per 15 minutes
- Predicted total truck movements = 243 or 4.07 per 15 minutes
- For the purposes of noise modelling existing and predicted truck movements are rounded to four.

Truck movements were excluded from the calculation as the total truck movements from the existing operation (223 during the day, 74 during the night or 4 movements per 15 minute period during the day and 2 movements during the night-time) are the same as the proposed operation (243 during the day, 74 during the night or 4 movements per 15 minute period during the day and 2 movements during the night-time).

***In Section 5.3 construction noise goals have assumed the background noise level is 30dB(A), as background noise data in the absence of the existing operations was not available. Ambient monitoring should be carried out to obtain a background level that includes the operations.***

EPL 1698 includes a Pollution Reduction Program (PRP 7) regarding Project Specific Noise Limits. PRP 7 states:

"*The licensee must engage a suitably qualified and experienced acoustic consultant to undertake background noise monitoring and establish Project Specific Noise Levels in respect of operational noise from the premises for all time periods (eg day, evening and night) that activities are carried on at the premises. The noise assessment must be undertaken in accordance with the EPA's Industrial Noise Policy (2000). A report detailing the background noise monitoring undertaken and determination of Project Specific Noise Levels at defined residential locations must be provided in writing to the EPA's Regional Manager Metro/Illawarra."*

PRP 7 indicates that this work should be completed by January 2012.

A background noise monitoring assessment was undertaken in 2011. This was used as the basis for recommending Project Specific Noise Levels (PSNLs) which was reported to the EPA in January 2012. Following a request for clarification, further information will be provided to the EPA which will form the basis for determining Project Specific Noise Levels.

SLR do not believe additional background monitoring is warranted for the purpose of establishing construction noise goals as the lowest possible background applicable has been adopted and compliance is still predicted to be achieved.

***Noise modelling for the operational noise assessment (Section 6) was undertaken for calm conditions only. The worst case scenario should be considered***

Noise modelling has been updated to address predicted operational noise levels under adverse conditions. The model has also been updated to reflect the replacement of the Front End Loader (FEL) with an automated roof mounted gantry crane/picking system in the receival hall, with a significant reduction in sound power level. In addition, the model was updated to include solid buildings not previously included, which have the effect of further containing predicted noise.

The updated results show compliance with noise targets at 4 Melbourne Street and Candowie Park Farm.

A 3dB exceedance is predicted at Chesley Park Farm. However, it is understood that Chesley Park Farm has been acquired by Austral Bricks which was confirmed in their recently approved modification to the New Berrima Clay/Shale Quarry, with the intention of providing additional landscape and visual screening on the southern side of the quarry operations. The Title Search for Chelsey Park Farm confirming ownership by Austral Bricks is attached as **Appendix F**. The Farm was previously the subject of an industrial sub-division application to Wingecarribee Shire Council, and is currently zoned IN1.

While the updated noise modelling shows an exceedance at Chesley Park Farm, it is no longer considered to be a sensitive receiver for the purposes of noise, given its recent acquisition by Austral Bricks, its ancillary use for a mining development, and its current IN1 Industrial zoning. The updated predicted operational noise levels are provided in **Table 2** and

Table 3.

**Table 2 Predicted Operational Noise Levels – One Vehicle Access Door Open (NO FEL)**

| Location | Period | Predicted Noise Level ($L_{Aeq(15minute)}$) | | | Noise Target | | | Exceedance |
|---|---|---|---|---|---|---|---|---|
| | | Calm | Adverse (3m/s) | Inversion | Day | Evening | Night | |
| 4 Melbourne Street | Day | 31 dBA | 31 dBA | n/a | 31 dBA | 31 dBA | 31 dBA | 0 dB |
| | Evening | 31 dBA | 31 dBA | n/a | | | | |
| | Night | 31 dBA | 31 dBA | 31 dBA | | | | |
| Chesley Park Farm | Day | 23 dBA | 27 dBA | n/a | 24 dBA | 24 dBA | 24 dBA | 3 dB |
| | Evening | 23 dBA | 27 dBA | n/a | | | | |
| | Night | 23 dBA | 27 dBA | 27 dBA | | | | |
| Candowrie Farm House | Day | 21 dBA | 25 dBA | n/a | 31 dBA | 31 dBA | 31 dBA | 0 dB |
| | Evening | 21 dBA | 25 dBA | n/a | | | | |
| | Night | 21 dBA | 25 dBA | 25 dBA | | | | |

**Table 3 Predicted Operation Noise Levels – All Vehicle Access Doors Closed (NO FEL)**

| Location | Period | Predicted Noise Level ($L_{Aeq(15minute)}$) | | | Noise Target | | | Exceedance |
|---|---|---|---|---|---|---|---|---|
| | | Calm | Adverse (3m/s) | Inversion | Day | Evening | Night | |
| 4 Melbourne Street | Day | 30 dBA | 31 dBA | n/a | 31 dBA | 31 dBA | 31 dBA | 0 dB |
| | Evening | 30 dBA | 31 dBA | n/a | | | | |
| | Night | 30 dBA | 31 dBA | 31 dBA | | | | |
| Chesley Park Farm | Day | 22 dBA | 26 dBA | n/a | 24 dBA | 24 dBA | 24 dBA | 2 dB |
| | Evening | 22 dBA | 26 dBA | n/a | | | | |
| | Night | 22 dBA | 26 dBA | 26 dBA | | | | |
| Candowrie Farm House | Day | 20 dBA | 24 dBA | n/a | 31 dBA | 31 dBA | 31 dBA | 0 dB |
| | Evening | 20 dBA | 24 dBA | n/a | | | | |
| | Night | 20 dBA | 24 dBA | 24 dBA | | | | |

It should also be noted (refer to previous comment) in response to a PRP, a background noise monitoring assessment was undertaken in 2011. This was used as the basis for recommending Project Specific Noise Levels (PSNLs) which was reported to the EPA in January 2012. Following a request for clarification, further information will be provided to the EPA which will form the basis for determining Project Specific Noise Levels. The PSNLs, once agreed, may require a modification to the development consent to align the noise criteria in the consent with the PSNLs adopted in the EPL.

## 2.2 Department of Planning and Environment & NSW Environmental Protection Authority (prepared by Arup)

Arup was appointed in August 2015 by the NSW Department of Planning & Environment and EPA to undertake a review of the technical components of the Berrima Cement Works Modification No. 9 EA.

The scope of this commission included:

- A merit review of the proposed modification including the use of solid waste derived fuel as an energy source and the proposed changes to emissions limits and emissions reporting;
- A critical review of the existing and proposed technology/infrastructure and its ability to meet the criterial of the NSW Energy from Waste Policy Statement (2014);
- An assessment of the eligibility of the proposed waste derived fuels and whether the facility meets the requirements to be an energy recovery facility;
- Recommendations for changes to the proposed modification and/or any necessary mitigation measures; and
- Recommended conditions of approval (should the modification be approved).

### 2.2.1 Feedstocks and Reference Facilities

***It is recommended that the proponent provides an estimated volume range breakdown of the SWDF waste streams proposed.***

The potential range of Solid Waste Derived Fuel (including wood waste and RDF) use is shown in **Table 4** of the Environmental Assessment (EA). It is estimated however that, subject to final commercial arrangements with suppliers, the breakdown of SWDF use would be:

- Wood waste - 0 to 50,000 tonnes/annum; and
- RDF - 0 to 80,000 tonnes/annum.

The total SWDF use would be up to 100,000 tonnes/annum.

Initially it is anticipated that the wood waste and RDF would be sourced from commercial and industrial waste or commercial and demolition waste sources, primarily in western Sydney.

The actual breakdown and source of waste materials would be subject to final commercial arrangements with suppliers.

***Before the acceptance of SWDF commences, it is recommended that the proponent provides information of reference facilities treating similar type waste streams, of a similar range, and within a similar jurisdiction to that that is proposed.***

In Australia, the most relevant reference facility treating similar type waste streams with similar technology and in a similar jurisdiction is Adelaide Brighton Limited's (ABL) Birkenhead cement facility in Adelaide. The Birkenhead facility operates a 1.3 million tpa dry process kiln with pre-calciner and four stages preheater, which is a similar technology to that used on Kiln 6 at Berrima. Process gas filtration occurs through two Electrostatic Precipitators while Berrima uses 1 electrostatic precipitator and one bag filter, which is a more modern filtration technology.

ABL has successfully utilised a waste derived fuel known as Processed Engineered Fuel (PEF) over a number of years to partially replace natural gas as fuel at Birkenhead. PEF is a waste derived fuel from commercial and industrial (C&I) and construction and demolition (C&D) wastes that would have traditionally gone to landfill. The RDF proposed for use at Berrima would be similar to the PEF used by ABL. The ABL waste derived fuel plant was commissioned in 2006 with an annual average use of 75,000 tpa of PEF. The PEF manufacturing plant was upgraded in 2014 supplying PEF to ABL in excess of 90,000 tpa. The volume of waste derived fuel used at Birkenhead is therefore similar to that proposed by Boral in Kiln 6.

In terms of emission limits Boral has proposed significantly more stringent limits on emissions than those set for ABL by the South Australian EPA.

The ABL environmental licence has a kiln exhaust stack particulate limit of 250 mg/$m^3$ while Boral is proposing a 50 mg/$m^3$ limit for the Berrima plant when using waste derived fuels. The proposed Kiln 6 particulate limit is therefore five times more stringent than the comparison facility.

Birkenhead does not currently have a stack emission limit for NOx measured on a continuous basis, as is the case for Kiln 6. Instead, Birkenhead reports a ground level concentration for NOx reported on an annual basis as part of the National Pollution Inventory (NPI). For 2013 to 2014, this load was 3,000,000 kg of NOx which equates to 2.3 kg/t clinker. By comparison, Kiln 6 NOx reported in NPI for the same period was 2,200,000 which equates to 1.55kg/t clinker. Berrima's Kiln 6 NOx emissions are therefore significantly lower than Birkenhead.

There is no limit for VOC at Birkenhead.

### 2.2.2 Air Quality Emissions Limits

***It is recommended that the proponent investigates the feasibility for the installation of NOx reducing emission control equipment (SNCR or SCR) and if financially and technically viable propose a timeframe for its installation.***

***Justification should also be provided if emission control equipment is not considered feasible, and consideration should be given to other NOx abatement control measures.***

***There are a number of emission control measures for particulates defined by the EU. It is recommended that the proponent consider and determine what measures could be feasibly implemented in order to reduce particulate emissions in line with international best practice.***

***The emission limit value for VOCs (20 ppm) should remain unless the applicant demonstrates that it is physically impossible due to the nature of the raw materials, to achieve this limit, in which case the higher limit sought (40 ppm) could be granted.***

Oxides of Nitrogen (NOx)

Boral has reviewed the financial and technical feasibility of using SNCR or SCR (Ammonia injection) for the purposes of NOx reduction in Kiln 6. The review concluded that while technically feasible, the costs of these control methods is prohibitive and would make the use of waste derived fuels at Berrima financially unviable. The use of SNCR for example, which is the most common form of post combustion NOx reduction equipment used in Europe, would require a high level of capital investment (circa $1.4 million) for storage, pumping and control systems. The ongoing cost of Ammonia reagent and additional power consumption for operation of the system is also very high. These costs have been estimated to be $4 million to $5 million per year at Berrima. The Ammonia reagent price is high as a result of international commodity pricing (Ammonia is processed mainly from natural gas) and is of relatively small scale in the supply network in Australia.

In addition to financial considerations it is also noted that the need to transport and handle relatively large volumes of Ammonia reagent (typically 25% $NH_3$ solution) would increase the safety risk on site.

Although SNCR and SCR are not considered viable for use at Berrima, the site has employed a number of other best practice techniques. These techniques are recognised as best practice in the EU Best Available Techniques document 2013/163/EU and include:

- Low NOx burner - A modern low NOx kiln burner is installed to fire the Kiln 6;
- Process optimisation - High level process control (Fuzzy logic) is used to provide maximum optimisation of combustion conditions; and
- Staged combustion - The modern precalciner design installed for Kiln 6 uses a controlled tertiary air supply to provide staged combustion in a fuel in the precalciner vessel. This creates a localised reducing zone (high CO concentration) in the calciner which reduces NOx generated in the kiln. It is also proposed to combust the solid waste derived fuels in the precalciner vessel and experience of this approach, backed by computational fluid dynamics studies, suggests that burning fuel in this way could also help reduce NOx emissions.

The adoption of the above NOx reduction techniques has resulted in the ground level NOx levels surrounding the Berrima plant remaining well below the relevant health limits. This was demonstrated in the dispersion modelling study presented in the EA. The imposition of further high levels of capital and operating costs associated with the installation of SNCR or SCR NOx control measures would negate any savings made by using SWDF's and is therefore not justified.

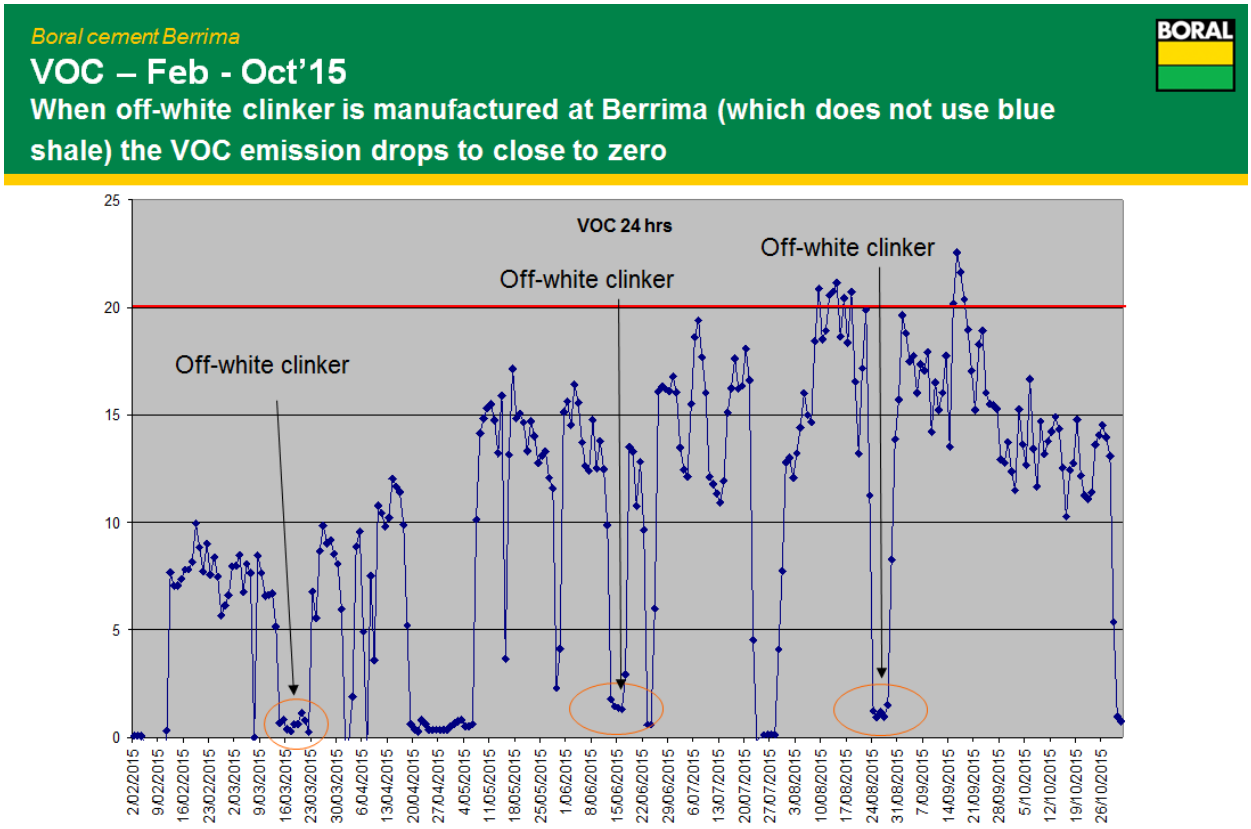
Particulates

In the Official Journal of the European Union published on 9 April 2013, the Commission Implementing Decision establishing the best available techniques (BAT), made conclusions for the production of cement, lime and magnesium oxide. Chapter 1.5.1 titled *"Description of techniques for the cement industry dust emission*" includes electrostatic precipitators and fabric filters as BAT for the control of particulate emissions from cement kilns. Kiln 6 already uses both techniques to control dust emissions from the stack.

VOCs

In respect of VOCs, Boral provided information in the EA (**Section 4.5.2 and Figure 7**) to demonstrate that VOC emissions at Berrima are derived from the use of blue shale (one of the raw materials required for manufacturing grey clinker) and are therefore not related to combustion. Further evidence is shown in **Figure 3** which demonstrates that when off-white clinker is manufactured in Kiln 6 (where blue shale is not used) the VOC emission drops down close to zero. The graph also demonstrates that VOC emissions vary over time due to natural variation of blue shale within on-site shale pit resource. At times a 20ppm VOC limit will therefore be exceeded even when not using alternative SWDF. It is therefore physically impossible for Berrima to comply with a continuous VOC limit of 20ppm. It is noted that the *NSW Energy from Waste Policy* states (in footnote 2 pg. 6) that "an existing facility may apply to the EPA for an alternative NOx and VOCs emission standard in accordance with clause 36 of the *Protection of the Environment Operation (Clean Air) Regulation 2010*. In view of the above, Boral is proposing to set a practical VOC emission limit of 40ppm, on a 24 hour basis, expressed as non-methane hydrocarbon.

**Figure 3 VOC off-white clinker emissions**




*Areas highlighted show VOC reduced to almost 0 when Off-white clinker is produced as no blue shale is used. This shows that the VOC are derived from the use of blue shale (one of its raw materials required for manufacturing grey clinker) and are therefore not related to combustion*

### 2.2.3 Emissions Reporting

***It is recommended that the definition of VOCs remains until such time as the composition and concentration of organic compounds within the waste feed has been provided.***

***It is recommended that the change of reporting of NOx from 1-hour averaging to 24 hour averaging is granted.***

VOC Definition

In relation to the definition of VOCs, Boral has proposed that VOCs be defined as non-methane hydrocarbons (n-propane). This is in accordance with the current NSW Group 6 definition and has previously been confirmed in correspondence with the EPA.

NOx Reporting

Boral reiterates the importance of reporting NOx on a 24 hourly basis. This is because the NOx in a cement kiln are generated mainly from fuel combustion in the main kiln burner. The nature of the clinker manufacturing process is such that the NOx will be variable in time due to process temperature variations and NOx emissions may therefore vary significantly from hour to hour. This is recognised in Europe where a 24 hour averaging was established for NOx calculation across all European cement kilns. Arup's report also acknowledges the 24 hour average for NOx as standard practice in Europe.

*Protection of the Environment Operations (Clean Air) Regulations 2010* Group 6 states an averaging period of 1-hour. However, it is noted in Section 40 (2) (b) (ii) of the regulation allowance is made for other relevant averaging periods to be incorporated in a sites licence. The *NSW Energy from Waste Policy* also states that "an existing facility may apply to the EPA for an alternative NOx and VOCs emission standard in accordance with clause 36 of the *Protection of the Environment Operations (Clean Air) Regulations 2010*".

A one hour average for NOx is not considered to be a feasible averaging period for cement kilns with Continuous Emissions Monitoring Systems (CEMS), particularly when the limit is low. In reference to other cement kilns in similar Australian jurisdictions, the Cement Australia kiln in Gladstone has a limit of 1200 mg/$m^3$ based on a 24-hour averaging period.

Boral strongly supports a limit of 1000 mg/$m^3$ NOx based on a 24-hour averaging period when using waste derived fuels. If however a 1-hour averaging period is required for NOx when using waste derived fuels, it is proposed to make some allowance for the short term variability of NOx emissions from the cement kiln as follows:

- Base NOx emissions limit of 1000mg/$m^3$ at 10% $O_2$, dry basis on a 24-hour average; or
- 1250mg/$m^3$ on a 1 hour basis.

The above provides a practical approach to limiting peak hourly NOx emission levels as required by the EPA while also taking into account international best practice in relation to the application of a 24 hour averaging period.

### 2.2.4 Emissions Control Equipment

***It is recommended that Boral investigate the installation of NOx reducing emission control equipment (SNCR or SCR) and if financially and technically viable propose a timeframe for its installation. Justification needs to be provided if not considered feasible and consideration to other NOx abatement control needs to be provided.***

See **Section 2.2.2** and **Section 2.2.3** above

***There are a number of emission control measures for particulates defined by the EU.***

***Boral needs to consider and determine what measures could be feasibly implemented in order to reduce particulate emissions in line with international best practice.***

In the Official journal of the European Union published on 9 April 2013, the Commission Implementing Decision establishes the best available techniques (BAT) conclusions for the production of cement, lime and magnesium oxide. Chapter 1.5.1 titled "*Description of techniques for the cement industry dust emission"* includes electrostatic precipitators and fabric filters as BAT for the control of particulate emissions from cement kilns. The Berrima cement kiln already uses both systems to control dust emissions from the kiln stack.

As the level of particulate emissions is expected to be similar for both kiln operation using standard fuels and waste derived fuels it is proposed that the same emission limit of 50mg/$m^3$ at 10% $O_2$, dry basis reported on a 24 hour average basis is adopted for all Kiln 6 operations (with or without waste derived fuels). This represents a significant reduction in the current plant emission limit for non-standard fuels of 95mg/$m^3$.

It is noted however that current emission limits for standard fuels for pollutants other than particulates should remain unchanged.

### 2.2.5 Solid Waste Derived Fuel Acceptance

***Arup recommend that the capacity of the sampling container and the maximum particle size should be reviewed and a means developed for obtaining a representative sample.***

It has been proposed in the EA to sample waste derived fuels in accordance with the European standard EN15442:2011 "Solid Recovered Fuels - Methods of sampling". This standard describes the methodology for calculating the minimum sample size and minimum increment size for SRF (RDF). The calculation for the minimum increment size is based on the top nominal size and bulk density of the given material. These parameters have to be determined through characterisation of SRF products from different suppliers as material becomes available. The capacity of the sampling container to be used at Berrima will therefore be set at the appropriate size dictated by the standard.

***Arup recommend that a robust methodology is developed by Boral for pre-qualifying suppliers of SWDF to ensure that contracts for the supply of alternative fuels are placed only with suppliers that have appropriate technical expertise, are operating in accordance with the NSW EPA Energy from Waste Policy and have appropriate quality assurance systems.***

***Boral should also provide prior to the receipt of any waste at the facility, a comprehensive suite of operational procedures for the weighing, checking and handling of incoming waste fuels. This should form part of their QA/QC system and standard operating procedures for site operation.***

***A quarantine area should be provided onsite for waste received onsite that does not meet visual inspection criteria and to allow for its storage while being chemically assessed.***

Suppliers of SWDF will be contractually required to have in place appropriate and auditable quality control/quality assurance procedures to ensure that limits on contaminants stipulated in the SWDF specifications are met.

Prior to the receipt of any SWDF Boral will prepare operational procedures including weighing, checking and handling of incoming waste fuels. This will be part of the QA/QC system. A quarantine area will be designated in the storage shed. Daily visual inspection of the unloading area will be undertaken and any material not meeting the visual inspection criteria will be quarantined in the designated area for further assessment. Upon assessment, any waste that cannot be used as fuel will be returned to the supplier, or disposed of at a licensed waste facility.

***Boral should consider the impact the plastic wrapping will have on its fuel specification if it is intended to prepare the RDF inclusive of the plastic wrapping. If the RDF is prepared inclusive of the plastic wrapping any RDF sample should include a portion of plastic wrapping.***

***Conditions should be provided in any amended Consent that details the requirements for waste acceptance including sampling, testing, prequalification of suppliers and material handling of suspect or nonconforming waste.***

If SWDF was supplied in bale form, the bale wrapping material would form part of the total fuel mix, i.e. the average fuel analysis would include the relevant portion of wrapping material.

### 2.2.6 Co-incineration of SWDF

***A test program for the staged commissioning of non-standard fuel use should be prepared by Boral for the co-incineration of each alternative fuel.***

Boral Cement Berrima will prepare a test program for the staged commissioning of non-standard fuel. A report will be prepared after the commissioning including the total quantity of waste derived fuels used, dates and times when commissioning commenced, results of stack emission testing during commissioning and results for testing of the fuel used.

Following commissioning of the SWDF storage and feeding system, Boral proposes to carry out a testing program that:

- Will be completed within 3 months;
- Includes 720 hours of continuous monitoring data in accordance with the NSW Energy from Waste Policy 2014, under stable conditions using SWDF;
- Includes a round of independent testing of all relevant emission species;
- Documents process conditions and data collected in accordance with the NSW Energy from Waste Policy 2014;
- Samples and characterises fuels used in accordance with the relevant EU standards and NSW Energy from Waste Policy 2014; and
- Provides a written report to the EPA and DP&E on the results of the testing program within 3 months of the end of the testing period.

Boral proposes to continue to use waste derived fuels following the completion of the test period while a the report is being compiled and assessed by the EPA provided stack emission levels remain below permit levels. If emission levels are exceeded during the report development and assessment period Boral would stop the use of waste derived fuels until written permission to continue is received from the EPA.

***With regard to operational procedures Boral should provide details of their operational procedures when co-firing using SWDF.***

***The operational procedures shall ensure that the requirements of the NSW EPA Energy from Waste Policy are met with regard to raising of gas from the process to a minimum temperature of 850°C for a minimum of two seconds.***

Boral will develop operational procedures for co-firing SWDF to ensure that requirements of the *NSW EPA Energy from Waste Policy* are met in regard to raising gas from the process to a minimum temperature of 850°C for a minimum of two seconds. Operational procedures will include interlocks in the Berrima process control system. This is outlined below.

***It is therefore recommended that Boral should maintain and operate an automatic system to prevent waste feed:***

***a. at start-up, until the temperature of >850°C has been reached;***

***b. whenever the temperature falls below 850°C;***

***c. whenever the continuous measurements show that any emission limit value is exceeded;***

***d. whenever stoppages, disturbances or failure of the purification devices or the measurement devices may result in the exceedance of the emission limit values; or***

***e. in the case of a breakdown or incident.***

SWDF will be fed into the process through a system with screw conveyors which will be interlocked in the Berrima process control system. Interlocks will ensure that the system cannot start feeding SWDF into the calciner if:

- The kiln is in start-up conditions as defined in the EPL;
- Temperature in the vicinity of SWDF injection hasn't reached 850°C; and
- Continuous emission measurements exceed the emission limits.

The interlocks will also be used to initiate a ramp down to a rate of zero for waste derived fuels over a maximum of four hours. Ramping down the fuel in this way provides for a safe change over to standard fuels.

### 2.2.7 Storage and Stockpiling of SWDF

***In order to inform the local community of the possible magnitude of external stockpiles, Boral should consider what is the maximum operational stockpile of RDF required for normal operations and what proportion of RDF will be received in 1m$^3$ bales for external storage.***

***Boral should then consider the visual impact of external stockpiling on the local community.***

Under normal operation, SWDF will be delivered in loose form in covered trucks. This material will be transferred directly into an enclosed storage shed with a nominal capacity of 3600m$^3$ which should provide for 2 to 3 days of storage of SWDF for the plant. No loose SWDF will be stored outside the storage shed.

Delivery of RDF in baled form would normally only take place when there are periods of extended kiln downtime for maintenance or repair. In these situations wrapped baled material would be stored on a hardstand area adjacent to the SWDF storage shed. The area assigned to the storage of bales on site is approximately 30mx25m in area which can accommodate around 2000 bales or approximately 1600 tonnes of baled RDF. The height of the stored bales would be less than 5 metres. At this height and location, the stored bales would not be visible at any residential receiver.

## 2.3 NSW Environmental Protection Authority (EPA)

### 2.3.1 Submission 1 (17/09/2015)

#### 2.3.1.1 Section 4.5.1 - Use of Waste Derived Fuels

***Ambiguity over fuel composition and sources***

***Although the EPA appreciates that securing contracts and therefore specific facilities for waste material is unlikely to occur prior to consent being obtained for a proposal, a more detailed, expected typical composition of the RDF should be outlined given its flow-on implications for modelling of emissions and the composition of the clinker.***

A typical RDF composition has been described above in **Section 2.2.1.**

#### 2.3.1.2 Section 5.5 - Energy from Waste Policy Statement - Criteria for Energy Recovery Facilities

***Management of residues from the energy recovery process***

***Table 12 states that there will be no residues from the energy recovery process. The proponent should expand their response and explain why and how this is the case.***

Cement kilns are very good systems for use of waste derived fuels. When fuel is introduced into the calciner or kiln it will burn and create ash. The ash will combine with the raw material mix and become embedded in the clinker matrix. There is no residue generated by cement kilns regardless if the kiln uses coal or waste derived fuels.

***Requirement that where waste has a content of more than 1% of halogenated organic substances, expressed as chlorine, the temperature should be raised to 1100°C for at least 2 seconds after the last injection of air***

***The proponent proposes to meet this requirement by ensuring adherence to a fuel specification that will ensure no waste will have more than 1% halogenated organic substances. However, there are no details of how this is going to be achieved. Alternatively, the proponent should provide an explanation of how the waste will be raised above 1,100°C for at least 2 seconds.***

***Appendix B provides an indicative quality assurance method for testing and sampling the fuel but it provides no details about the test methods or information on what procedures there will be in place to ensure wastes containing more than 1% of these substances are identified and isolated so they do not reach the kiln. This is particularly important if the temperature cannot be raised to 1,100°C as required by the Policy. As a result, the proponent must develop a comprehensive quality assurance/quality control framework for this purpose as part of the EA.***

The fuel specifications for both waste wood and RDF includes a limit on total Chlorine of 1.0%, therefore there is no requirement to raise the gas temperature to 1100°C for 2 seconds. It is noted that it is likely that only a proportion of the total Chlorine input would be in the form of halogenated organic substances and so by specifying a total Chlorine limit the fuel specification will result in a level of halogenated organic substances much less than 1%.

As described in **Section 2.2.5**, prior to the receipt of any SWDF Boral will prepare operational procedures including weighing, checking and handling of incoming waste fuels. This will be part of the QA/QC system.

***There must be continuous measurements of NOx, CO, particles (total), total organic compounds, HCl, HF and $SO_2$***

***Table 12 acknowledges this requirement will be met but there are no details on how this will be achieved (e.g. methods and equipment). The proponent should clearly explain how this requirement will be met***.

The following Continuous Emission Monitors (CEMS) will be installed on the kiln stack for measuring stack emissions from waste derived fuels:

- NO, $NO_2$ – OPSIS AR600 – Differential Optical Absorption Spectroscopy (DOAS)
- CO – OPSIS AR650 – Differential Optical Absorption Spectroscopy (DOAS)
- Particles – PCME 181 – Light Scatter Dust Monitor
- VOC/Non-Methane– Baseline 9000 Total Hydrocarbon Analyser – Flame Ionisation Detection (FID)
- HCl - OPSIS AR650 – Differential Optical Absorption Spectroscopy (DOAS)
- SO2 – OPSIS AR600 – Differential Optical Absorption Spectroscopy (DOAS)

The above installation will meet the requirements of the *NSW Energy from Waste Policy* except for the requirement for continuous HF monitoring. It is not considered necessary to provide both HCl and HF monitoring as the cement kiln process is very effective at scrubbing HF and demonstrating compliance with HCl emissions should therefore also be sufficient to demonstrate compliance with HF limits.

***Emissions monitoring data must be made available to the EPA in real time***

***Table 12 states that this data will be made available to the EPA on request. This does not comply with the requirements of the Policy. Data must be provided in real time (e.g. on proponent's website or access to emissions control system)***

Data from CEMS will be made available to the EPA in real-time.

***Requirement to outline a plan for the required proof of performance (POP) trials to demonstrate compliance with air emissions standards***

***Table 12 simply states that this requirement has been "noted". This provides no confidence to the EPA that this requirement will be met and how. The proponent should address this requirement and outline how the required POP trials will be put in place.***

Refer to **Section 2.2.6.**

***Waste streams proposed for energy recovery should not contain contaminants such as batteries, light bulbs, or other electrical or hazardous wastes.***

***There is no mention of this requirement in this section. The proponent should outline how they will ensure the proposed fuel will not contain these contaminants and include these requirements as part of any quality control/quality assurance framework and fuel specification.***

Subject to final commercial supply agreements, it is anticipated that the SWDF to be initially used at Berrima will be derived from Commercial and Industrial or Commercial and Demolition waste sources.

Suppliers of SWDF will be contractually required to have in place appropriate and auditable quality control/quality assurance procedures to ensure that limits on contaminants stipulated in the SWDF specifications are met. The SWDF specification was provided in the EA (**Appendix B**) and incorporates tight limitations on contaminants such as heavy metals as well as placing restrictions on the inclusion of hazardous materials such as PCBs in the fuel feed stream..

These controls will effectively set limitations on the SWDFs containing contaminants such as batteries, light bulbs or other hazardous materials.

As described in **Section 2.2.5**, prior to the receipt of any SWDF Boral will prepare operational procedures including weighing, checking and handling of incoming waste fuels. This will be part of the QA/QC system.

#### 2.3.1.3 Section 6 - Consultation

***While there is mention of how issues raised by the Berrima Cement Works Community Liaison Group during consultation activities have been addressed, there is no evidence in the EA of what other methods are being used by the proponent to engage in genuine and ongoing dialogue with the broader community (e.g. mail-outs).***

***The EPA notes that the composition of this group, provided in Appendix C, includes three or four representatives from the local community. However, there are no details on how information is being distributed from and to the broader community through these representatives.***

***The proponent must provide specific details of any additional past, current and future community consultation strategies***

Boral has initiated two main phases of engagement with the local and broader Southern Highlands community to date. Phase 1 centred on awareness raising and education in September-October 2014 during the early preparation of the Environmental Assessment. Phase 2 commenced just before the modification went on public exhibition in August 2015.

**Phase 1**

- Community meeting at New Berrima on 11 September 2014;
- Issuing of an initial media release and six, weekly advertorials in the Southern Highland News during September and October 2014;
- A letter was sent to New Berrima and Berrima villages and surrounds on 19 September 2014 raising awareness and pointing people to the website. This included a Fact Sheet; and
- Website updates.

**Phase 2**

- Media release 6 August 2015 to Southern Highlands media;
- Exhibition period Newsletter and updated Fact Sheet sent to New Berrima and Berrima village and surrounds August 2015;
- Advertorial in the Southern Highland News on 31 July and 14 August 2015; and
- Website updates.

Phase 3 of the engagement strategy will commence upon determination of the Project. A newsletter will be issued to New Berrima and Berrima villages advising them of the outcome and the next steps and timing for the Project. This will also be communicated during the first Community Liaison Group in early 2016.

Table 13 of the Environmental Assessment document describes the issues that were raised during consultation and how these issues have been addressed.

### 2.3.2 Submission 2 (Air Quality) (20/10/2015)

***Insufficient demonstration Kiln 6 will achieve emissions limits under Modification 9***

***The EPA recommends the proponent be requested to demonstrate Kiln 6 will achieve the emission limits under Modification 9, including presenting emissions data from a comparable plant burning comparable fuels.***

Refer to **Section 2.2.1**.

***Insufficient demonstration VOC's are associated with the blue shale raw material***

***The EPA agrees with Boral's position that non-methane VOC's as propane in the appropriate VOC to measure compliance as this is consistent with the Clean Air Regulation definition, Clause 31.***

***The EPA considers further information needs to be presented to support the position that VOC emissions from Kiln 6 are associated with the natural composition of on-site blue shale used as a raw material. It needs to be demonstrated that Kiln 6 continually achieves a sustained reduction in VOC levels when shale is substituted with other raw materials.***

Refer to **Section 2.2.2 (VOC's)**.

***Insufficient justification for a 24 hour averaging period of $NO_x$***

***The EPA recommends the proponent is advised that it is considered appropriate that a 1 hour average $NO_x$ limit for Kiln 6 is retained in the consent and the EPL. Consideration could be given to an appropriately assessed and justified increase in the $NO_x$ emission limit.***

Refer to **Section 2.2.3**.

***No evidence $NO_x$ emissions have been minimised as far as practicable***

***The proponent should be requested to present a feasibility assessment of $NO_x$ post combustion control technology for Kiln 6 and demonstrate that Kiln 6 $NO_x$ emissions have been minimised as far as practicable through the implementation of all available primary $NO_x$ control techniques.***

Refer to **Section 2.2.2** (NOx).

***Solid particle emissions unlikely to comply with 24 hour average limit of 50 mg/Nm$^3$***

***The EPA considers further information is required to demonstrate that No 6 Kiln can comply with the proposed limit. The proponent must provide further information regarding the variation in solid particle emissions from the No 6 Kiln (2011 to 2014); the cause of any increase in emissions; and an analysis demonstrating Modification 9 can achieve the proposed 24 hour average solid particles emission limit of 50 mg/Nm$^3$. If appropriate, the proponent must identify any modifications to operational procedures to prevent periods of elevated emissions and ensure plant and equipment are operated in a proper and efficient manner at all times.***

Boral is confident that it can meet a particulate matter emission limit of 50 mg/Nm$^3$. In June 2013, Boral undertook a major refurbishment of the Kiln 6 precipitator and bag filter, and also increased its program of scheduled maintenance and inspections. An improved condition monitoring system was also installed which has given more certainty about when filters need to be changed. These measures have seen a significant and sustained improvement in particulate emission levels that gives Boral confidence that the 50 mg/Nm$^3$ proposed limit can be achieved.

***NSW Legislation does not provide for upset conditions***

***The EPA recommends the proponent is advised of the requirements to comply with the Clean Air Regulation and EPL limits at all times and there is no allowances in NSW legislation or policy documentation regarding an allowable number of hours emission limits can be exceeded.***

Refer to **Section 2.2.3** (NOx Reporting).

## 2.4 NSW Environment Protection Authority – Review of Human Health Risk Assessment (prepared by Environmental Risk Sciences)

Prior to the Environmental Assessment being placed on Public Exhibition in August 2015, discussions with the EPA and DP&E concluded that Boral should prepare a Human Health Risk Assessment (HHRA) having regard to the types of wastes proposed to be combusted in the kiln. A HHRA was prepared in accordance with the *Environmental Health Risk Assessment: Guidelines for Assessment Human Health Risks from Environmental Hazards (enHealth 2012*).

As part of the EPA's review of the proposal, Environmental Risk Sciences were engaged to undertake a peer review of the HHRA. The review comments have been addressed by way of an updated HHRA, which is provided as **Appendix B**.

The main findings of the updated HHRA are as follows:

The majority of Contaminants of Potential Concern (COPC) identified in the Issue Identification stage of the risk assessment were assessed as unlikely to be present at concentrations likely to impact on the health risks to receptors in the surrounding communities. This was based on comparisons of predicted COPC concentrations at or near receptor sites in communities with relevant air quality assessment criteria, such as NSW EPA criteria or health based benchmarks. This group of COPCs included fine particulates (TSP, $PM_{10}$, $PM_{2.5}$), $SO_2$, $NO_X$, CO, VOCs, PAHs, heavy metals, hydrogen chloride, hydrogen fluoride, chlorine, and dioxins. The exception to this was sulphuric acid mist/sulphur trioxide which required further assessment.

The predicted peak Ground Level Concentrations (GLC) of sulphuric acid mist / sulphur trioxide were 24.2µg/$m^3$ which exceed the EPA Criteria of 18µg/$m^3$. Therefore the potential for health risks, if any, to the local communities was assessed further.

The principal benchmark used in this assessment was the lowest concentration of airborne sulphuric acid reported to illicit a physiological response, being transient changes in pulmonary function, in the population group reported as most sensitive to sulphuric acid inhalation, adolescent asthmatic children with that concentration being 70µg/$m^3$.

In the current study, the maximum exposure concentration for sulphuric acid was predicted to occur at receptors near the site boundary and was 24.2µg/$m^3$. The exposure is less than half the lowest concentration of airborne sulphuric acid reported to illicit a response, that is 70µg/$m^3$.

Furthermore the actual exposure concentration of the surrounding communities is likely to be less than 24.2µg/$m^3$. This is based on two considerations, firstly the dilution of emissions as they travel away from the facility boundary to a receptor. Secondly, the conservative nature of the air modelling which allowed predicted concentrations to be possibly as much as ninety times higher the probable concentrations.

Based on this, the Primary Exposure pathway was considered unlikely to lead to receptor exposure at concentrations likely to increase the health risk to receptors. Therefore the predicted sulphuric acid emissions during the operation of Kiln 6 were not expected to lead to an increase health risk to the surrounding communities.

Therefore, predicted concentrations of identified COPC at or near receptor sites were unlikely to be present at concentrations likely to impact on the health risks to receptors in the surrounding communities. Therefore the use of SWDF as fuels in Kiln 6 under the conditions proposed by Boral are considered unlikely to increase the human health risk to surrounding communities.

## 2.5 Roads and Maritime Services

The RMS submission notes the proposed change in fuel source is likely to result in only a minor increase in traffic generation, which is unlikely to warrant any upgrades to the existing intersection of Berrima Road and the site access. Therefore, RMS does not object to the development application in principle.

No further information is required.

## 2.6 Department of Primary Industries - Water & Geological Survey of NSW

The Department of Primary Industries - Geological Surveys of NSW states they have no resource issues to raise in regards to the proposal, however DPI Water raise some concerns which are listed below.

### 2.6.1 Surface water and Groundwater Impacts

***The SEARs for the proposed modification require the Environmental Assessment (EA) to consider potential surface water and groundwater impacts that could result during construction (see Table 1 of EA, page 11). Table 1 indicated these potential impacts are addressed in the EA but the EA provides no details on surface water and groundwater impacts. Based on the information provided it is unclear if the proposal is likely to intercept groundwater and require dewatering: use surface water or groundwater as a water supply source; or pollute/degrade groundwater and surface water during construction etc.***

***Section 8 of the EA notes a Construction Environmental Management Plan would be prepared prior to commencement of construction and it would address "protocol to deal with identification of groundwater" but the EA provides no other details and it is unclear what is meant by this statement.***

***It is recommended the proponent provides an assessment of potential surface water and groundwater impacts in accordance with the SEARs.***

An updated water assessment is provided in **Appendix A**. The main points are summarised here:

Surface water impacts

The location of the proposed fuel storage shed and kiln feeding system is within the existing disturbed catchment of the cement works site water management plan. A link to the plan is provided below. The proposed site is located within the Kiln 6 construction area for the purposes of Figure 2 within the plan. Sections 9 and 10 of the water management plan deal with stormwater management and monitoring. The attached figure shows Kiln 6, the proposed fuel shed and some of the water management structures.

http://www.boral.com.au/Images/common/stakeholder-relations/cement-nsw/Berrima-Cement-Water-Management-Plan-0914.pdf

Ground disturbance activities will be required to dig the foundations of the fuel storage shed and kiln feeding system which have the potential to increase sediment in stormwater during the construction period. However, the existing water management system is more than capable of dealing with the small area of disturbance proposed during the construction activities. To minimise the potential impacts on the existing system, silt stop fences will be constructed downslope of ground disturbance activities to trap sediment at the source before entering the broader water management system.

More detailed measures will be outlined in the construction environmental management plan.

Groundwater impacts

The concrete foundations of the fuel storage shed will be dug to a depth up to 7 metres below the current ground surface. Geotechnical investigations were carried out early in 2015 within the proposed site footprint to inform design. A number of diamond drill holes were drilled to a depth up to 9 metres. No holes intercepted groundwater.

Additionally, the on-site shale pit, which is used to extract blue shale for the manufacture of clinker in Kiln 6 is located 450 metres to the south-west of where the fuel shed is proposed to be constructed. The shale pit has been extracted to a depth of 40 metres below ground surface, and has never intercepted groundwater since it was established in the late 1970's.

Given that groundwater was not intercepted to a depth of 9 metres within the area of the proposed fuel storage shed, and the nearby shale pit has not intercepted groundwater to a depth of 40 metres, it is submitted that the construction of the fuel shed and it foundations will not impact on or contaminate local groundwater.

## 2.7 Wingecarribee Shire Council

### 2.7.1 Traffic

***Council's supplementary submission regarding traffic (13/11/2015) advises that the traffic related concerns raised in the submission have been discussed with Boral. Boral have provided additional gatehouse data to support the information contain in Appendix H (to the EA) – traffic report prepared by 'Traffix'.***

***Council does not have any further matters of concern with regards to traffic relating to this proposal.***

No further information is required in relation to traffic.

### 2.7.2 Environment and Sustainability

***Council requests the Department of Planning and Environment to consider in its assessment of the modification application:***

- ***maintaining air quality with increased emission limits,***

Refer to **Section 2.2**.

- ***minimising noise impacts during construction and operation***

Refer to noise assessment and mitigation measures identified in EA document and additional information provided in **Section 2.1.4**.

- ***and increases in rail transport and road traffic for transport of fuel to site, and the cumulative impact when considered with other proposals in the area (including the draft mine plan outlined by Hume Coal).***

Refer to **Section 2.5** where the RMS submission notes the proposed change in fuel source is likely to result in only a minor increase in traffic generation, which is unlikely to warrant any upgrades to the existing intersection of Berrima Road and the site access. Therefore, RMS does not object to the development application in principle.

# 3 SPECIALIST INTEREST GROUP SUBMISSION

## 3.1 Cement Concrete & Aggregates Australia (CCAA)

The Cement Concrete & Aggregates Australia (CCAA) supports the proposed modification for the use of Solid Waste Derived Fuels (SWDF) at the Boral Berrima site stating that the modification will benefit the environment and the economy, both locally and on a state-wide basis.

CCAA states that the Berrima Cement works is a vital contributor to the supply chain of concrete production, historically accounting for 60% of cement volume in NSW. Allowing Boral Berrima to fuel its kiln with SWDF is economically and environmentally significant to the advancement of energy from waste energy production.

# Appendix A - Ground and Surface Water Assessment

## Appendix B – Updated Human Health Risk Assessment

## Appendix C - ABL Environmental Licence

## Appendix D - Environment Protection (Air Quality) Policy 1994

## Appendix E – Supplementary Noise Report

# Appendix F - Chelsey Park Farm Title Search