

**SMITHFIELD PACKAGE BOILER
REINSTATEMENT PROJECT
ENVIRONMENTAL ASSESSMENT
13 NOVEMBER 2014**

DA13/94

**ATTACHMENT 1 PROJECT APPROVAL
13/94**

New South Wales Government



Department of Planning

SYDNEY REGION WEST

Macquarie Tower,
Level 4, 10 Valentine Avenue
Parramatta, 2150
P.O.Box 404
Parramatta, 2124

Telephone : (02) 895 7633

Fax No. : (02) 891 3965

Contact :

Our Reference :

Your Reference :

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979
NOTICE TO APPLICANT OF DETERMINATION OF A DEVELOPMENT
APPLICATION

To: Pratt Industries

of: 42/525 Collins Street
MELBOURNE VIC

being the applicant in respect of DA No. 13/94.

Pursuant to section 92 of the Act, notice is hereby given of the determination by the Minister for Planning, as the consent authority pursuant to clause 8 of State Environmental Planning Policy No. 34 - Major Employment Generating Industrial Development, on 15 November 1994, of the development application No. 13/94.

The determination relates to the expansion of the Pratt Industries waste paper recycling and corrugating plant, Smithfield.

The determination relates to the land as follows:

160 Warren Road - Part Lot 19 DP 599957, Part Lot 1 DP 224162 and Part Lot 1 DP 528682.

The development application has been determined by the granting of consent subject to the conditions specified in this notice.

File to E.I.S.
Orig to Ned -
C. Rainer 2/3/95.

Noted

The reasons for the imposition of the conditions are:

- to clarify and enhance the design of the proposal so that issues of noise, traffic generation, pollution control, water management and safety are addressed;
- to ensure the preparation of any additional environmental studies required to reduce the impact of the proposal on the surrounding area;
- to ensure monitoring of air quality is undertaken to the satisfaction of the Environment Protection Authority.
- identify the authorities that will undertake further consultation and approval roles during the construction of the development; and
- to address the concerns of local residents.

The conditions of consent are as set out in the attached schedule

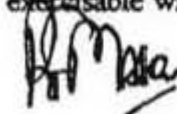
Note:

(a) to ascertain the date upon which the consent becomes effective, refer to S. 93 of the Act;

(b) to ascertain the date upon which the consent is liable to lapse, refer to S. 99 of the Act;

(c) S. 97 of the Act confers on the applicant who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within 12 months after receipt of this notice; and

(d) S. 98 of the Act confers on an objector who is dissatisfied with the determination of a consent authority a right of appeal to the Land and Environment Court exercisable within 28 days after receipt of this notice.



Ron Mason
Regional Manager
on behalf of Minister for Planning

16 NOV 1995

CONDITIONS OF CONSENT PRATT RECYCLING PLANT

GENERAL

1. The development shall be carried out generally in accordance with the details contained in the Environmental Impact Statement for the expanded liner board, box making and recycling plant and proposed newsprint plant, dated May 1994 as amended by additional information provided to the Commission of Inquiry into the SPP Cogeneration plant, as prepared by Dames and Moore, August 1994, except where amended by these conditions.

SAFETY

2. At least one month prior to the commencement of construction of the proposed development, except for preliminary works that will not be affected by study results, or within such further period as the Director of Planning or her nominee (the Director) may agree, the Applicant shall prepare and submit for the approval of the Director the following studies:

(a) Fire Safety Study

A fire safety study for the proposed development and all existing operations on the site. The study shall cover all aspects detailed in the Department's **Hazardous Industry Planning Advisory Paper No. 2 Fire Safety Study Guidelines**. The study shall also be submitted for the approval of the New South Wales Fire Brigade. The study shall include all interfaces with the proposed adjacent Cogeneration facility.

(b) Hazards and Operability Study

A Hazard and Operability Study (HAZOP) for the process operations and fuel supply for the proposed development. The study shall be chaired by an independent qualified person approved by the Director.

(c) Final Hazard Analysis

A final hazard analysis of the proposed development including consideration of risks from the existing operations. The analysis should be prepared in accordance with the Department of Planning's **Hazardous Industry Planning Advisory Paper No. 6 Guidelines for Hazard Analysis**.

(d) **Construction Safety Study**

A construction safety study prepared in accordance with Hazardous Industry Planning Advisory Paper No. 7 Construction Safety Guidelines.

3. At least two months prior to the commencement of operation of the proposed development, or within such further period as the Director may agree, the Applicant shall prepare and submit for the approval of the Director:

(a) **Emergency Plan**

A comprehensive emergency plan and detailed emergency procedures for the proposed development. The plan should include detailed procedures for the safety of people in areas outside the development and be integrated into the emergency procedures for the existing site and proposed Cogeneration plant. A total site emergency plan should be formulated to ensure both facilities operate using the same emergency procedures. The plan should be in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 1 Emergency Planning Guidelines.

(b) **Safety Management System**

A comprehensive safety management system, covering all operations on-site and associated transport facilities involving hazardous materials. The system should clearly specify all Safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to procedures. This should include work order and permit system to control and regulate maintenance and construction activities on - site, so as to prevent hazardous incidents that might arise from such activities. This system should allow for communication between the Cogeneration plant and the recycling facilities. Records must be kept on - site and should be available for inspection by the Director upon request. Further details of the requirements for the safety management system are available from the Department of Planning.

4. **Incident Reporting**

Within 24 hours of any accident or incident with actual or potential significant off - site impacts on people or the biophysical environment, a report shall be supplied to the Department outlining the basic facts. A further detailed report shall be prepared and submitted following investigations of the causes and identification necessary additional preventative measures.

5. Hazard Audit

Twelve months after the commencement of operations of the proposed development or within such further period as the Director may agree, the Applicant shall carry out a comprehensive hazard audit of the proposed development and submit a report on the audit to the Director. This audit is to be carried out at the Applicant's expense by a duly qualified independent person or team to be approved by the Director. Further audits will be required every three years or as may be requested by the Director. Hazard audits should be carried out in accordance with the Department's **Hazardous Industry Planning Advisory Paper No. 5, Hazard Audit Guidelines**.

6. The Applicant shall comply with all reasonable requirements of the Director in respect of the implementation of any measures arising from the approvals given in respect of the conditions 2 - 5, within such time as the Director may agree. Such compliance shall be prior to the commencement of operations of the proposed development and shall bring to the Director's or nominee's notice, those matters which the Applicant considers may require further investigation. Further, upon the receipt of the Director's or nominee's reasonable instructions, the Applicant shall proceed to implement those instructions to the satisfaction of the Director or nominee within such time as the Director or nominee may approve.

POLLUTION CONTROL

7. The applicant shall obtain from the Environment Protection Authority all necessary statutory approvals and licensing under the Pollution Control Act, 1970, Clean Air Act 1970, Clean Waters Act, 1970, Noise Control Act 1975 and Waste Disposal Act 1970, prior to the commencement of construction.

Water and Drainage

8. A Water Management Plan shall be prepared to meet the requirements of the EPA, the Water Board and Holroyd City Council. The Plan shall provide details of measures to be taken during both the construction and operation of the plant.

This Management Plan shall include, but not be limited to, details of the collection and disposal of stormwater; including appropriate bunding; the capacity of the proposed on - site detention systems to contain all discharge waters; sedimentation and control measures to prevent erosion of the site and the pollution of Prospect Creek; measures of dealing with overland flow and proposed measures for the use of reclaimed or recycled process waters.

9. Further specific measures to minimise water pollution shall include:

(a) **Construction.**

- (i) Sediment Control facilities shall be installed to the satisfaction of the EPA in each drainage catchment and sub-catchment as construction progresses;
- (ii) Surface water from all uncontaminated areas shall be diverted away from wastewater collection systems and around disturbed areas of the site;
- (iii) Diversion drains shall be constructed around the stockpile sites, where necessary to divert surface run - off water away from the stockpiles.
- (iv) Impervious bunds shall be constructed around all fuels or oil storage areas to ensure retention of not less than 110% of the capacity of the tank in each bund. Such bunds shall not be fitted with valves or drains. Each bund must be graded and must be provided with a sump so that any uncontaminated stormwater may be pumped from the bund. Bunded areas must be kept clean.

(b) **Operation**

- (i) Provision shall be made for retention and treatment of fire-water on the site, so that it is not directly discharged to stormwater drains.
- (ii) Sediment control / retention basins shall be as required by the EPA.

10. The measures included in this Plan and required by this consent may be varied from time to time in order to meet the licensing requirements and the pollution control approval requirements of the EPA.

Air Quality

11. An Air Management Plan shall be prepared to meet the requirements of the EPA. The Management Plan shall include measures to be taken during the construction and operation of the plant and at its commissioning. This plan may be varied to accommodate the greater detail in subsequent building applications submitted for this site.

The Management Plan shall include, but not be limited to, details of measures to prevent pollution, the monitoring of stack emissions at commissioning and operational stages, continuous monitoring of air quality and establishment of ambient air quality levels. The use of best available control technology to achieve EPA licensing requirements should also be considered.

Before Earthworks

12. Further specific measures to minimise air pollution shall include:

(a) **Construction**

- (i) exposed surfaces should be kept to a minimum and regenerated or stabilised as soon as practicable;
- (ii) any unsealed trafficked areas shall be kept sufficiently damp to prevent wind blown, or traffic generated dust;
- (iii) no cleared vegetation or construction material shall be burnt on site;
- (iv) trucks transporting excavated material to/from the site shall be covered immediately after loading to avoid wind blown dust or spillage.

(b) **Operation**

- (i) Monitoring of stack emissions shall be required during both the commissioning and operation of the plant for pollutants such as NO_x, CO, O₂, opacity and temperature to the requirements of the EPA.
- (ii) During the commissioning stage stack emission tests for dioxins and furans shall be carried out. Dioxin and furan testing for operational stage shall be, if required, to the satisfaction of the EPA.
- (iii) Monitoring of stack emissions shall be as required by the EPA for component deterioration.
- (iv) Dioxins and furans to be emitted to the atmosphere shall not exceed 0.1 ng/m³ I - TEF & 11% O₂.

(c) **Monitoring**

- (i) Dust deposit gauges shall be provided to the satisfaction of the EPA during the construction stage. Total suspended particulates shall be monitored during construction at the locations satisfactory to the EPA;
- (ii) All monitoring including the provision of monitoring facilities shall be to the requirements of the EPA.

13. The measures included in this Plan and required by this consent may be varied from time to time in order to meet the licensing requirements and the pollution control approval requirements of the EPA.

Noise

14. The Applicant shall prepare a Noise Management Plan to meet the requirements of the EPA. The Noise Management Plan shall be submitted in two stages to the EPA.

The first stage of the noise management plan shall deal with measures to be taken during the construction of the Pratt Industries Plant and shall be lodged with the EPA at the time of seeking a pollution control approval. The second stage of the noise management plan shall be lodged with the EPA at the time of seeking a pollution control licence for the operational stage and shall deal with measures to be taken during the operation of the plant. Both stages of the noise management plan shall include but not be limited to, information on the measures to be undertaken to achieve noise levels, complaints handling systems, noise monitoring, reporting of complaints and response actions. Measures for dealing with noise exceedances should also be addressed.

Plan to do early

15. Further specific measures to minimise noise shall include:

(a) **Construction Noise**

(i) During construction of the plant which includes the entry/ departure of heavy vehicles work shall be restricted to the hours between 0700 to 1800 hours (Monday - Friday); 0700 to 1300 hours (Saturday) and at no time on Sundays and public holidays. Hydraulic rock breakers, pile drivers and similar equipment producing impulsive noise peaks, shall only be used between the hours of 0900 to 1500 hours, unless they cannot be heard at the nearest affected residences.

(ii) Works outside these hours which may be permitted include:

- (A) any works which do not cause noise emission to be audible at any nearby residential premises;
- (B) the delivery of materials which is required outside these hours by police or other authorities for safety reasons; or,
- (C) any other work as approved by the EPA.

(b) **Operation Noise**

(i) L_{A10} sound pressure level from the Pratt plant must not exceed:

- (A) 41dB(A) between 2200 hours and 0700 hours when measured at any residential premises at Kiola Street;
- 43dB(A) between 2200 and 0700 hours when measured at any residential premises at Cooper Crescent, Solo Crescent and Alt Street;

- at any time interval between 10 and 15 minutes.
- (B) 70dB(A) between 0700 and 2200 hours when measured at the western plant boundary;
65dB(A) between 2200 and 0700 hours when measured at the western plant boundary;

- (ii) Noise levels at the southern, northern and eastern property boundaries shall be to the requirements of the EPA.
The property boundary shall be defined as Part Lot 1 D.P. 528682, Lot 1 D.P. 224162 and Part Lot 19 D.P. 599957, (all to be contained in Lot 3 of the new subdivision layout), and Lot 2, 158 - 160 McCredie Road, Smithfield.

16. The measures included in this Plan and required by this consent may be varied from time to time in order to meet the licensing requirements and pollution control approval requirements of the EPA.

17. An annual report detailing the summary of complaint handling, monitoring results, comparison of such data with EPA limits and any other relevant information shall be submitted to the EPA, a copy of which must be available to Holroyd City Council for public access.

} Annual.

Solid Waste

18. Waste material used in the multifuel boiler shall be limited to that generated from the existing plant and that proposed by this consent.

LANDSCAPING AND VISUAL

19. A Landscape Management Plan shall be prepared in consultation with and to the satisfaction of Holroyd City Council and be submitted with the initial Building Application. The plan shall provide details of the proposed plantings, their staging and maintenance. Details shall include on-site plantings, particularly those that will shield the proposal from the south-west. Planting shall be consistent with landscaping works being carried out within the Prospect Creek Reserve.

} Plan early to do

20. External illumination including security lighting, shall be designed and installed so as not to spill beyond the boundary of the site.

CAR PARKING AND TRAFFIC

21. A Traffic Management Plan shall be prepared to the satisfaction of Holroyd City Council and submitted with the initial Building Application. The plan shall include but not be limited to details of access to the site, traffic circulation, vehicle loading and unloading, and emergency exits and on-site parking.

} Plan early.

22. Parking, driveways, internal roads and manoeuvring areas are to be constructed from all weather material and appropriately signposted in accordance with Holroyd Council and Roads and Traffic Authority guidelines.

23. All construction traffic to the Pratt plant shall access the site via the new subdivision road.

24. All truck queuing shall occur on - site and within the property boundary.

OTHER

25. The Applicant shall participate in and co-operate with any Community Consultative Committee established by Holroyd City Council in discussion with Fairfield City Council to set up consultative mechanisms between the Applicant and the adjoining industrial and residential uses representing the community interest. The Applicant shall provide the Committee with details of any monitoring which is required by the EPA and shall investigate and respond to legitimate complaints which are raised. The Committee shall meet on a regular basis, be chaired by Holroyd City Council and include representatives of the EPA, two local residents and one representative from Fairfield City Council. This committee shall meet at least on one occasion prior to the commencement of the new operations, once following commencement and thereafter at yearly intervals or as determined by Holroyd City Council.

26. As part of the ongoing monitoring of the plant, Holroyd Council shall be supplied with updated 24 hour telephone numbers and names of contact personnel that can be used by local residents to investigate any complaints after normal business hours.

M Action

27. Separate approval shall be obtained from Holroyd Council for advertising signs.

28. Management Plans prepared for this plant shall be undertaken in consultation with Smithfield Power Partnership and in conjunction with any Management plans prepared for the adjoining Smithfield Power Partnership Cogeneration Plant.

NOTE: The above conditions do not relieve the Applicant of the obligation to obtain other approvals required by any other Act, including a Building application under the Local Government Act 1994 as amended.

**SMITHFIELD PACKAGE BOILER
REINSTATEMENT PROJECT**

ENVIRONMENTAL ASSESSMENT

13 NOVEMBER 2014

DA13/94

**ATTACHMENT 2 VISY SMITHFIELD
ENVIRONMENTAL PROTECTION
LICENCE**

Environment Protection Licence



Licence - 4100

Licence Details	
Number:	4100
Anniversary Date:	18-September

Licensee
VISY PAPER PTY LTD
PO BOX 2465
SMITHFIELD NSW 2164

Premises
VISY PAPER PTY LTD
6 HERBERT PLACE
SMITHFIELD NSW 2164

Scheduled Activity
Paper or Pulp Production

Fee Based Activity	Scale
Paper or pulp production	> 150000 T produced
Paper or pulp waste generation	> 100 T generated or stored

Region
Metropolitan - Sydney Industry
Level 13, 10 Valentine Ave
PARRAMATTA NSW 2150
Phone: (02) 9995 5000
Fax: (02) 9995 6900
PO Box 668 PARRAMATTA
NSW 2124

Environment Protection Licence

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

VISY PAPER PTY LTD
PO BOX 2465
SMITHFIELD NSW 2164

subject to the conditions which follow.

Environment Protection Licence

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1 Administrative Conditions

A1 What the licence authorises and regulates

- A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Paper or Pulp Production	Paper or pulp production	> 150000 T produced
Paper or Pulp Production	Paper or pulp waste generation	> 100 T generated or stored

A2 Premises or plant to which this licence applies

- A2.1 The licence applies to the following premises:

Premises Details
VISY PAPER PTY LTD
6 HERBERT PLACE
SMITHFIELD
NSW 2164
PART LOT 12 DP 808195, LOT 34 DP 850596

A3 Information supplied to the EPA

- A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Limit Conditions

L1 Pollution of waters

- L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with

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section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

- L2.1 The actual load of an assessable pollutant discharged from the premises during the reporting period must not exceed the load limit specified for the assessable pollutant in the table below.
- L2.2 The actual load of an assessable pollutant must be calculated in accordance with the relevant load calculation protocol.

Assessable Pollutant	Load limit (kg)
Coarse Particulates (Air)	
Fine Particulates (Air)	
Nitrogen Oxides - Summer (Air)	
Nitrogen Oxides (Air)	

Note: An assessable pollutant is a pollutant which affects the licence fee payable for the licence.

L3 Waste

- L3.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.
- Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.
- Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.
- This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Paper, plastics, glass, metal and timber	As defined in Schedule 1 of the POEO Act, in force from time to time.	Paper or Pulp Production	The amount of waste, including any recyclable or processed material, stored at the premises at any time must not exceed 19,000 tonnes.
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the	As specified in each particular resource recovery exemption	NA

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		Environment Operations (Waste) Regulation 2005		
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA

L3.2 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

Condition L5.1 does not limit any other conditions in this licence.

L4 Noise limits

L4.1 Noise from the premises must not exceed:

a) an LA10 (15 minute) noise emission criteria of 53 dB(A) 7.00am to 10pm seven days a week; and

b) at all other times an LA10 (15 minute) noise emission criteria of 43 dB(A);

when measured or computed at any point within one metre of any residential boundary at Cooper Crescent, Solo Crescent, Granville Street and Alt Street, Fairfield.

L4.2 Noise from the premises must not exceed:

a) an LA10 (15 minute) noise emission criteria of 51 dB(A) 7.00am to 10pm seven days a week; and

b) at all other times an LA10 (15 minute) noise emission criteria of 41 dB(A);

when measured or computed at any point within one metre of any residential boundary at Kiola Street, Fairfield.

L4.3 Noise from the premises must not exceed:

a) an LA10 (15 minute) noise emission criteria of 70 dB(A) 7.00am to 10pm seven days a week; and

b) at all other times an LA10 (15 minute) noise emission criteria of 65 dB(A);

when measured or computed at any point within one metre of the western plant boundary.

L4.4 5dB(A) must be added to the measured noise levels if the noise is substantially tonal or impulsive in character.

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L5 Potentially offensive odour

- L5.1 The licensee must ensure that the Plant complies with Section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

3 Operating Conditions

O1 Activities must be carried out in a competent manner

- O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

- O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

- O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O4 Emergency response

- O4.1 The licensee must maintain, and implement as necessary, a current emergency response plan for the premises. The licensee must keep the emergency response plan on the premises at all times. The emergency response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment. If a current emergency response plan does not exist at the date on which this condition is attached to the licence, the licensee must develop an emergency response plan within three months of that date.

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4 Monitoring and Recording Conditions

M1 Monitoring records

- M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.
- M1.2 All records required to be kept by this licence must be:
- a) in a legible form, or in a form that can readily be reduced to a legible form;
 - b) kept for at least 4 years after the monitoring or event to which they relate took place; and
 - c) produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- a) the date(s) on which the sample was taken;
 - b) the time(s) at which the sample was collected;
 - c) the point at which the sample was taken; and
 - d) the name of the person who collected the sample.

M2 Testing methods - concentration limits

- M2.1 *Clause 18 (1), (1A) and (2) of the Protection of the Environment Operations (General) Regulation 2009* requires that monitoring of actual loads of assessable pollutants listed in L2.2 must be carried out in accordance with the testing method set out in the relevant load calculation protocol for the fee-based activity classification listed in condition A1.1.

M3 Recording of pollution complaints

- M3.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.
- M3.2 The record must include details of the following:
- a) the date and time of the complaint;
 - b) the method by which the complaint was made;
 - c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - d) the nature of the complaint;
 - e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - f) if no action was taken by the licensee, the reasons why no action was taken.
- M3.3 The record of a complaint must be kept for at least 4 years after the complaint was made.
- M3.4 The record must be produced to any authorised officer of the EPA who asks to see them.

Environment Protection Licence

Licence - 4100



M4 Telephone complaints line

- M4.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.
- M4.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.
- M4.3 The preceding two conditions do not apply until 3 months after:
- the date of the issue of this licence or
 - if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

5 Reporting Conditions

R1 Annual return documents

- R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
- a Statement of Compliance; and
 - a Monitoring and Complaints Summary.
- At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.
- R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.
- R1.3 Where this licence is transferred from the licensee to a new licensee:
- the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
 - the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.
- R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
- in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
 - in relation to the revocation of the licence - the date from which notice revoking the licence operates.
- R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').
- R1.6 Where the licensee is unable to complete a part of the Annual Return by the due date because the licensee was unable to calculate the actual load of a pollutant due to circumstances beyond the licensee's control, the licensee must notify the EPA in writing as soon as practicable, and in any event not later than the due date. The notification must specify:

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- a) the assessable pollutants for which the actual load could not be calculated; and
- b) the relevant circumstances that were beyond the control of the licensee.

- R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.
- R1.8 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
- a) the licence holder; or
 - b) by a person approved in writing by the EPA to sign on behalf of the licence holder.
- R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.
- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- a) where this licence applies to premises, an event has occurred at the premises; or
 - b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
- and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- a) the cause, time and duration of the event;
 - b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - c) the name, address and business hours telephone number of employees or agents of the licensee, or a

Environment Protection Licence

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specified class of them, who witnessed the event;

d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;

e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;

f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and

g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

6 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

7 Pollution Studies and Reduction Programs

U1 Odour Emissions Program

U1.1 Objective:

The objective of this PRP is for the licensee to implement the actions identified in its' letter dated 28 October 2012 to minimise odour emissions from the premises through a three part strategy:

- (i) To reduce generation of odours through biological control of the water system;
- (ii) To effectively capture paper machine odours; and
- (iii) To effectively disperse any odours from the paper machine building to reduce ground level impact.

U1.2 By no later than 28 February 2013, the licensee must, through engagement of an independent and suitably qualified professional, sample and measure odour emission levels from roof vents, vacuum and paper machine hood system exhausts to identify issues affecting ground level concentrations.

U1.3 By no later than 28 March 2013, the licensee must submit in writing to the *Manager Sydney Industry PO*

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Box 668 Parramatta 2124, a report detailing the findings of the actions prescribed by condition U1.2.

- U1.4 By no later than 28 March 2013, the licensee must conduct a mill water system survey and assessment to establish levels of volatile fatty acids and bacterial action and contribution to odour across all Visy mills.
- U1.5 By no later than 28 April 2013, the licensee must submit in writing to the *Manager Sydney Industry PO Box 668 Parramatta 2124*, a report detailing the findings of the actions prescribed by condition U1.4.
- U1.6 By no later than 30 April 2013, the licensee must have completed all phases of the paper machine hood/dryer exhaust system upgrade.
- U1.7 By no later than 31 December 2013, the licensee must complete the building fabric works including roof and wall replacement to optimise the building ventilation system.
- U1.8 By no later than 31 December 2013, the licensee must implement improved discharge arrangements for any significant odour sources that are identified by the actions prescribed by condition U1.2 to ensure free vertical discharge under all meteorological conditions.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .

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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Tim Gilbert

Environment Protection Authority

(By Delegation)

Date of this edition: 02-March-2000

Environment Protection Licence

Licence - 4100



End Notes

- 1 Licence varied by notice 1004813, issued on 17-May-2002, which came into effect on 11-Jun-2002.
- 2 Licence varied by notice 1057757, issued on 19-Mar-2007, which came into effect on 19-Mar-2007.
- 3 Licence varied by change to legislation, issued on 04-Jul-2007, which came into effect on 04-Jul-2007.
- 4 Licence varied by notice 1081702, issued on 14-May-2008, which came into effect on 14-May-2008.
- 5 Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
- 6 Licence varied by notice 1095668, issued on 30-Jan-2009, which came into effect on 30-Jan-2009.
- 7 Licence varied by notice 1106814, issued on 16-Oct-2009, which came into effect on 16-Oct-2009.
- 8 Licence varied by notice 1112786, issued on 05-May-2010, which came into effect on 05-May-2010.
- 9 Licence varied by notice 1500561 issued on 10-Aug-2011
- 10 Licence varied by notice 1502362 issued on 28-Oct-2011
- 11 Licence varied by notice 1507429 issued on 19-Jul-2012
- 12 Licence varied by notice 1510202 issued on 29-Nov-2012
- 13 Licence varied by notice 1517771 issued on 21-Oct-2013

**SMITHFIELD PACKAGE BOILER
REINSTATEMENT PROJECT**

ENVIRONMENTAL ASSESSMENT

13 NOVEMBER 2014

DA13/94

**ATTACHMENT 3 MARUBENI
ENVIRONMENTAL PROTECTION
LICENCE**

Environment Protection Licence



Licence - 5701

Licence Details

Number:	5701
Anniversary Date:	28-August

Licensee

SMITHFIELD INVESTORS NO 1 PTY LTD
PO BOX 2097
SMITHFIELD NSW 2164

Licence Type

Premises

Premises

SMITHFIELD ENERGY FACILITY
33 HERBERT PLACE
SMITHFIELD NSW 2164

Scheduled Activity

Electricity generation

Fee Based Activity

Generation of electrical power from gas - Sydney Basin

Scale

> 1000 - 4000 Gwh generated

Region

Metropolitan
Level 3, NSW Govt Offices, 84 Crown Street
WOLLONGONG NSW 2500
Phone: 02 4224 4100
Fax: 02 4224 4110

PO Box 513 WOLLONGONG EAST
NSW 2520

Environment Protection Licence

Licence - 5701



Environment,
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& Water

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act); and
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

The EPA publication "A Guide to Licensing" contains information about how to calculate your licence fees.

Environment Protection Licence

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The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

SMITHFIELD INVESTORS NO 1 PTY LTD
PO BOX 2097
SMITHFIELD NSW 2164

subject to the conditions which follow.

1 Administrative conditions

A1 What the licence authorises and regulates

A1.1 Not applicable.

A1.2 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity

Electricity generation

Fee Based Activity	Scale
Generation of electrical power from gas - Sydney Basin	> 1000 - 4000 Gwh generated

A1.3 Not applicable.

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A2 Premises to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
SMITHFIELD ENERGY FACILITY
33 HERBERT PLACE
SMITHFIELD
NSW
2164
33/850596

A3 Other activities

A3.1 Not applicable.

A4 Information supplied to the EPA

A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- (a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- (b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to air and water and applications to land

P1 Location of monitoring/discharge points and areas

P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Description of Location
1	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Stack from gas turbine 1 identified on "Site Plan Overview" submitted with licence information form and received on 26th July 1999
2	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Stack from gas turbine 2 identified on "Site Plan Overview" submitted with licence information form and received on 26th July 1999
3	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Stack from gas turbine 3 identified on "Site Plan Overview" submitted with licence information form" and received on 26th July 1999

P1.2 Not applicable.

P1.3 Not applicable.

3 Limit conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

L2.1 The actual load of an assessable pollutant discharged from the premises during the reporting period must not exceed the load limit specified for the assessable pollutant in the table below.

Note: An assessable pollutant is a pollutant which affects the licence fee payable for the licence.

L2.2 The actual load of an assessable pollutant must be calculated in accordance with the relevant load calculation protocol.

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Assessable Pollutant	Load limit (kg)
Nitrogen Oxides (Air)	215000
Nitrogen Oxides - Summer (Air)	60000

L3 Concentration limits

- L3.1 For each monitoring/discharge point or utilisation area specified in the table\>s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.
- L3.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.
- L3.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\>s.

Air

POINT 1

Pollutant	Units of measure	100 percentile concentration limit
Nitrogen Oxides	parts per million	25

POINT 2

Pollutant	Units of measure	100 percentile concentration limit
Nitrogen Oxides	parts per million	25

POINT 3

Pollutant	Units of measure	100 percentile concentration limit
Nitrogen Oxides	parts per million	25

- L3.4 The concentration limit for a Point above does not apply to that Point during the following periods:
- (a) a start-up period – that is, while the gas turbine discharging at that Point is being brought up to normal operation following a period of inactivity; or
 - (b) a shut-down period – that is, while a gas turbine discharging at that Point is being taken out of service from normal operation to inactivity.

Note: While the concentration limits specified for Points 1, 2 and 3 (above) may not apply, the licensee is subject to the requirements of section 128(2) of the Protection of the Environment Operations Act in relation to the prevention and minimisation of air pollution.

L4 Volume and mass limits

L4.1 Not applicable.

L5 Waste

L5.1 Not applicable.

L6 Noise Limits

Residential Premises

L6.1 Noise from the premises must not exceed:

- (a) An LA10 (15 minute) noise emission criterion of 46 dB(A) between 0700 to 2200 Monday to Friday, and 0700 to 1230 Saturdays; and
- (b) An LA10 (15 minute) noise emission criterion of 41 dB(A) at all other times, except as expressly provided by this licence.

L6.2 Noise from the premises is to be measured or computed at any point within one metre of any residential boundary at Cooper Crescent, Solo Crescent and Alt Street, Fairfield to determine compliance with condition L6.1. 5dB(A) must be added if the noise is tonal or impulsive in character.

During periods of maintenance and servicing of plant and equipment the allowable noise limits specified in L6.1 may be increased by 5dB(A).

L6.3 Noise from the premises must not exceed:

- (c) An LA10 (15 minute) noise emission criterion of 48 dB(A) between 0700 to 2200 Monday to Friday, and 0700 to 1230 Saturdays; and
- (d) An LA10 (15 minute) noise emission criterion of 43 dB(A) at all other times, except as expressly provided by this licence.

L6.4 Noise from the premises is to be measured or computed at any point within one metre of any residential boundary at Kiola Street, Fairfield to determine compliance with condition L6.3. 5dB(A) must be added if the noise is tonal or impulsive in character.

During periods of maintenance and servicing of plant and equipment the allowable noise limits specified in L6.3 may be increased by 5dB(A).

Western Plant Boundary

L6.5 Noise from the premises must not exceed:

- (e) An LA10 (15 minute) noise emission criterion of 70 dB(A) between 0700 to 2200 Monday to Friday, and 0700 to 1230 Saturdays; and
- (f) An LA10 (15 minute) noise emission criterion of 65 dB(A) at all other times,

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except as expressly provided by this licence.

- L6.6 Noise from the premises is to be measured or computed at any point within one metre of the western boundary of the premises to determine compliance with condition L6.5. 5dB(A) must be added if the noise is tonal or impulsive in character.

During periods of maintenance and servicing of plant and equipment the allowable noise limits specified in L6.5 may be increased by 5dB(A).

- L6.7 For the purpose of assessing compliance with noise limits, noise measurements must be taken over a sufficient period of time to assess the noisiest activities and periods of greatest noise impact on the nearest affected residences and the western plant boundary.

A minimum of three sites must be used for the noise measurements. The detailed methodology, time of day, atmospheric conditions, together with the operating conditions of the premises must be recorded when undertaking monitoring.

Note: In the event of significant noise complaint(s) being received by the EPA, the EPA may request noise monitoring to be carried out by an accredited acoustic consultant to assess compliance with noise limit conditions.

L7 Potentially offensive odour

- L7.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

4 Operating conditions

O1 Activities must be carried out in a competent manner

- O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- (a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- (b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

- O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
- (a) must be maintained in a proper and efficient condition; and
 - (b) must be operated in a proper and efficient manner.

5 Monitoring and recording conditions

M1 Monitoring records

- M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.
- M1.2 All records required to be kept by this licence must be:
- (a) in a legible form, or in a form that can readily be reduced to a legible form;
 - (b) kept for at least 4 years after the monitoring or event to which they relate took place; and
 - (c) produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- (a) the date(s) on which the sample was taken;
 - (b) the time(s) at which the sample was collected;
 - (c) the point at which the sample was taken; and
 - (d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

- M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

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Air

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Moisture content	percent by volume	Yearly	TM-22
Nitric oxide	parts per million	Yearly	TM-11
Nitrogen Oxides	parts per million	Yearly	TM-11
Nitrogen dioxide	parts per million	Yearly	TM-11
Oxygen (O ₂)	percent by volume	Yearly	TM-25

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Moisture content	percent by volume	Yearly	TM-22
Nitric oxide	parts per million	Yearly	TM-11
Nitrogen Oxides	parts per million	Yearly	TM-11
Nitrogen dioxide	parts per million	Yearly	TM-11
Oxygen (O ₂)	percent by volume	Yearly	TM-25

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Moisture content	percent by volume	Yearly	TM-22
Nitric oxide	parts per million	Yearly	TM-11
Nitrogen Oxides	parts per million	Yearly	TM-11
Nitrogen dioxide	parts per million	Yearly	TM-11
Oxygen (O ₂)	percent by volume	Yearly	TM-25

All oxides of nitrogen (NO_x) concentrations must be corrected to the following reference conditions:
Dry, 273 K, 101.3 kPa and 15% O₂

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

- any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
- if no such requirement is imposed by or under the Act, any methodology which a condition of

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this licence requires to be used for that testing; or

- (c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The Protection of the Environment Operations (Clean Air) Regulation 2002 requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Not applicable.

Note: Testing methods - load limit

Note: Clause 18 (1), (1A) and (2) of the Protection of the Environment Operations (General) Regulation 1998 requires that monitoring of actual loads of assessable pollutants listed in L2.1 must be carried out in accordance with the testing method set out in the relevant load calculation protocol for the fee-based activity classification listed in condition A1.2.

M4 Recording of pollution complaints

- M4.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.
- M4.2 The record must include details of the following:
 - (a) the date and time of the complaint;
 - (b) the method by which the complaint was made;
 - (c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - (d) the nature of the complaint;
 - (e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - (f) if no action was taken by the licensee, the reasons why no action was taken.
- M4.3 The record of a complaint must be kept for at least 4 years after the complaint was made.
- M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

- M5.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.
- M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a

complaints line so that the impacted community knows how to make a complaint.

- M5.3 Conditions M5.1 and M5.2 do not apply until 3 months after:
- (a) the date of the issue of this licence or
 - (b) if this licence is a replacement licence within the meaning of the Protection of the Environment Operations (Savings and Transitional) Regulation 1998, the date on which a copy of the licence was served on the licensee under clause 10 of that regulation.

M6 Requirement to monitor volume or mass

- M6.1 Not applicable.

6 Reporting conditions

R1 Annual return documents

What documents must an Annual Return contain?

- R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
- (a) a Statement of Compliance; and
 - (b) a Monitoring and Complaints Summary.
- A copy of the form in which the Annual Return must be supplied to the EPA accompanies this licence. Before the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

Period covered by Annual Return

- R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

- R1.3 Where this licence is transferred from the licensee to a new licensee:
- (a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
 - (b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

- R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:

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- (a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
- (b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

Deadline for Annual Return

- R1.5 The Annual Return for the reporting period must be supplied to the EPA by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

Notification where actual load can not be calculated

- R1.6 Where the licensee is unable to complete a part of the Annual Return by the due date because the licensee was unable to calculate the actual load of a pollutant due to circumstances beyond the licensee's control, the licensee must notify the EPA in writing as soon as practicable, and in any event not later than the due date. The notification must specify:
- (a) the assessable pollutants for which the actual load could not be calculated; and
 - (b) the relevant circumstances that were beyond the control of the licensee.

Licensee must retain copy of Annual Return

- R1.7 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

Certifying of Statement of Compliance and signing of Monitoring and Complaints Summary

- R1.8 Within the Annual Return, the Statement of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
- (a) the licence holder; or
 - (b) by a person approved in writing by the EPA to sign on behalf of the licence holder.
- R1.9 A person who has been given written approval to certify a certificate of compliance under a licence issued under the Pollution Control Act 1970 is taken to be approved for the purpose of this condition until the date of first review of this licence.

R2 Notification of environmental harm

Note: The licensee or its employees must notify the EPA of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.
- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

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R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- (a) where this licence applies to premises, an event has occurred at the premises; or
 - (b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
- and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- (a) the cause, time and duration of the event;
 - (b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - (c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - (d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
 - (e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
 - (f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
 - (g) any other relevant matters.
- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

General conditions

G1 Copy of licence kept at the premises

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

Pollution studies and reduction programs

U1 Pollution Reduction Program Completion Table

PRP No	Description	Completed Date
1	Continuous Emission Monitoring Program	June 2010

Special conditions

E1 Not applicable.

Dictionary

General Dictionary

In this licence, unless the contrary is indicated, the terms below have the following meanings:

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
assessable	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998

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pollutants

BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 1998.
flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 1998
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.

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plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste

Mr Grahame Clarke

Environment Protection Authority

(By Delegation)

Date of this edition - 27-Jul-2010

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End Notes

1	Licence varied by notice 1004078, issued on 06-Jun-2002, which came into effect on 01-Jul-2002.
2	Licence varied by correction to EPA Sub Region data record, issued on 20-Sep-2002, which came into effect on 20-Sep-2002.
3	Licence varied by notice 1063890, issued on 13-Jun-2007, which came into effect on 13-Jun-2007.
4	Licence varied by change to legislation, issued on 04-Jul-2007, which came into effect on 04-Jul-2007.
5	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
6	Licence varied by change to fba for summer pollutant, issued on 19-Jan-2009, which came into effect on 19-Jan-2009.
7	Licence varied by notice 1099053, issued on 25-Mar-2009, which came into effect on 25-Mar-2009.
8	Licence varied by notice 1116784, issued on 27-Jul-2010, which came into effect on 27-Jul-2010.

**SMITHFIELD PACKAGE BOILER
REINSTATEMENT PROJECT
ENVIRONMENTAL ASSESSMENT
13 NOVEMBER 2014**

DA13/94

**ATTACHMENT 4 AIR IMPACT
ASSESSMENT**

**AIR QUALITY IMPACT ASSESSMENT
REPORT FOR SMITHFIELD BOILERS REINSTATEMENT
PROJECT
HERBERT PLACE, SMITHFIELD**

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Report No: 141108_Air_Rev3
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Attachments

Attachment 1: Quotation No ABC-140317-1 Design, fabrication, supply and commissioning of 3 off 20 MW packaged water tube boilers and associated auxiliary equipment suitable for limited attended operation

Attachment 2: AERMOD vs AUSPLUME

Attachment 3: AERMOD Output file





1. INTRODUCTION

Benbow Environmental has been engaged by Build Run Repair Pty Ltd on behalf of Visy Paper Smithfield to prepare an air impact assessment for the proposed Boiler House at the site located at 6 Herbert Place, Smithfield. This has been initiated as part of the proposed modification under Section 75W of the Environment Planning and Assessment Act 1979. This air report will form part of the Environmental Assessment.

The limits in the exhaust stacks of the three fire tube boilers are set by the Protection of the Environment (Clean Air) Regulation 2010.

The operation of the three boilers would be assessed for the scenario of the boilers operating independent of the Marubeni Energy Plant and also operating in conjunction with this Plant. The Marubeni Energy Plant provides steam for the paper recycling plants of Visy Paper.

The selection of the boiler types has been heavily dependent on the need to use low NO_x emitting burners.

The manufacturer of the burners selected is recognised as a world leader in the flame technology that results in low concentrations of NO_x being generated.

The site is located within the industrial area of Smithfield. The nearest sensitive residential receptors were noted as being approximately 400 metres south of the site boundary.

This assessment has been carried out in accordance with the following relevant guidelines and documents:

- *NSW Environment Protection Authority Industrial Noise Policy* (EPA 2000);
- *Holroyd Development Control Plan 2013 Part D: Industrial Controls*;
- *Protection of the Environment Operations Act, 1997*; and
- *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*.

1.1 SCOPE OF WORKS

This assessment has been limited to the following scope of works:

- Conduct a site visit and examine the existing operations;
- Determine the local meteorology and terrain of the site and its contribution to air dispersion of emissions;
- Identify applicable emission rates based on the current guidelines and expectations from NSW EPA and prepare these figures for use in air dispersion modelling;
- Conduct air dispersion modelling to determine currently approved impacts and compare these with the proposed impacts, which will also outline the series of controls approved by the proponent; and
- Prepare a summary report which outlines the methodology and the outcomes of the assessment, including, if necessary, any recommendations that are necessary to achieve compliance with the NSW EPA guidelines.

2. DESCRIPTION OF THE PROPOSAL

In this Section of the report the proposal is described in detail. The specification of the boilers and the burners are presented in Attachment 1. A summary of the type of boilers and the low NOx generating burners is provided.

Figure 2-1 shows the site layout. This plan shows the industrial buildings that form the Visy Paper site.

The proposed location of the boilers has been selected for the following reasons:

- The original location on the eastern side of the Visy Paper plant has inadequate floor space available for the necessary steam generation now required.
- The chosen location is relatively close to the Marubeni Energy Plant and near the steam pipelines that convey the steam to the paper recycling machines (in the Visy Paper Plant). As a consequence, steam can be more readily piped into the boilers to keep these at a semi-operational temperature enabling full steam to be produced within 30 minutes. This has the advantage of the boilers being able to be operational without being on high fire (maximum gas consumption) for a period of an hour or longer.
- The chosen location is ideally placed for noise management.

Figure 2-2 to 2-4 show the layout of the proposed boiler house, the boiler configuration and deaerator.

Figure 2-1: Package boiler site

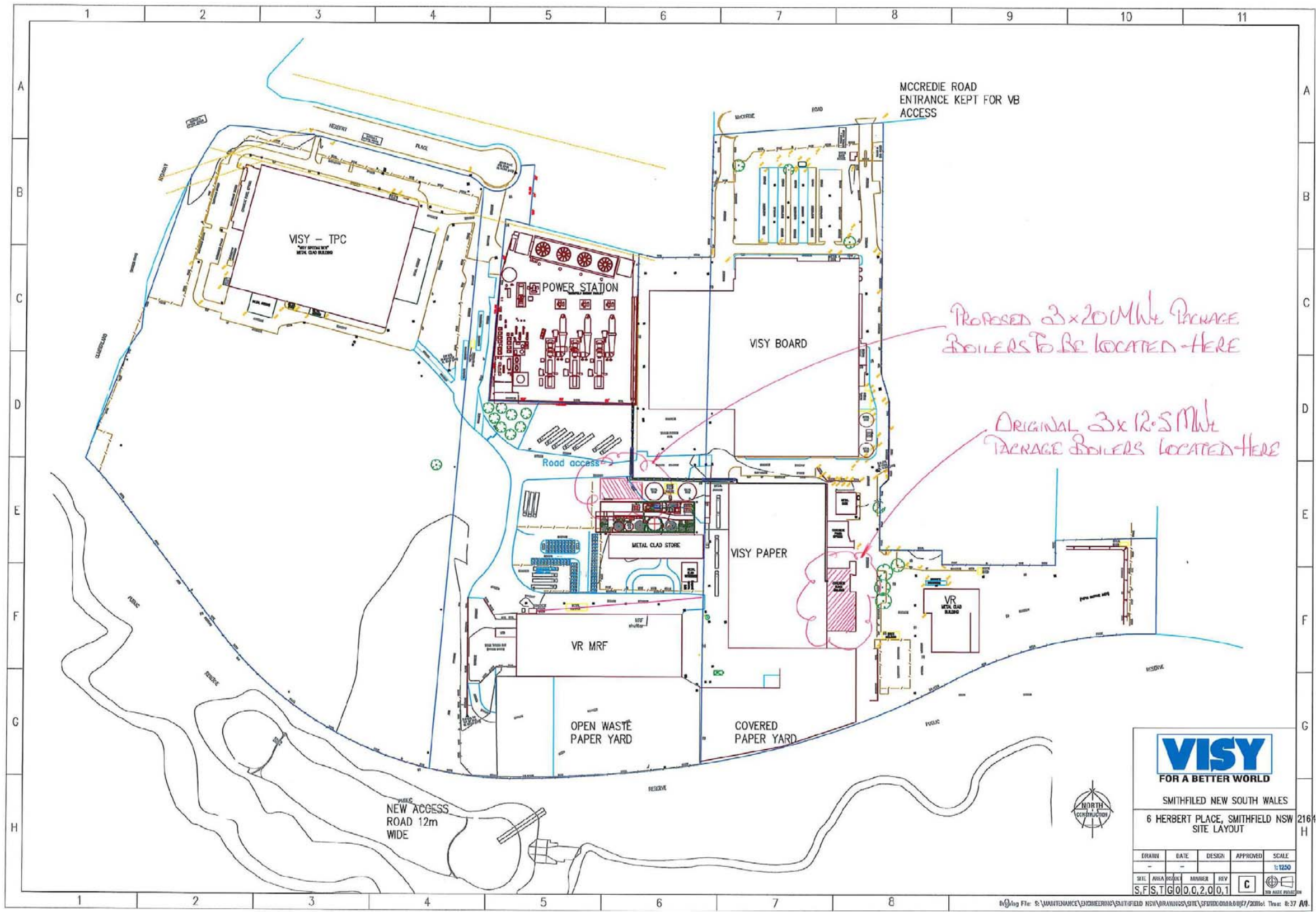


Figure 2-3: Boiler House Layout

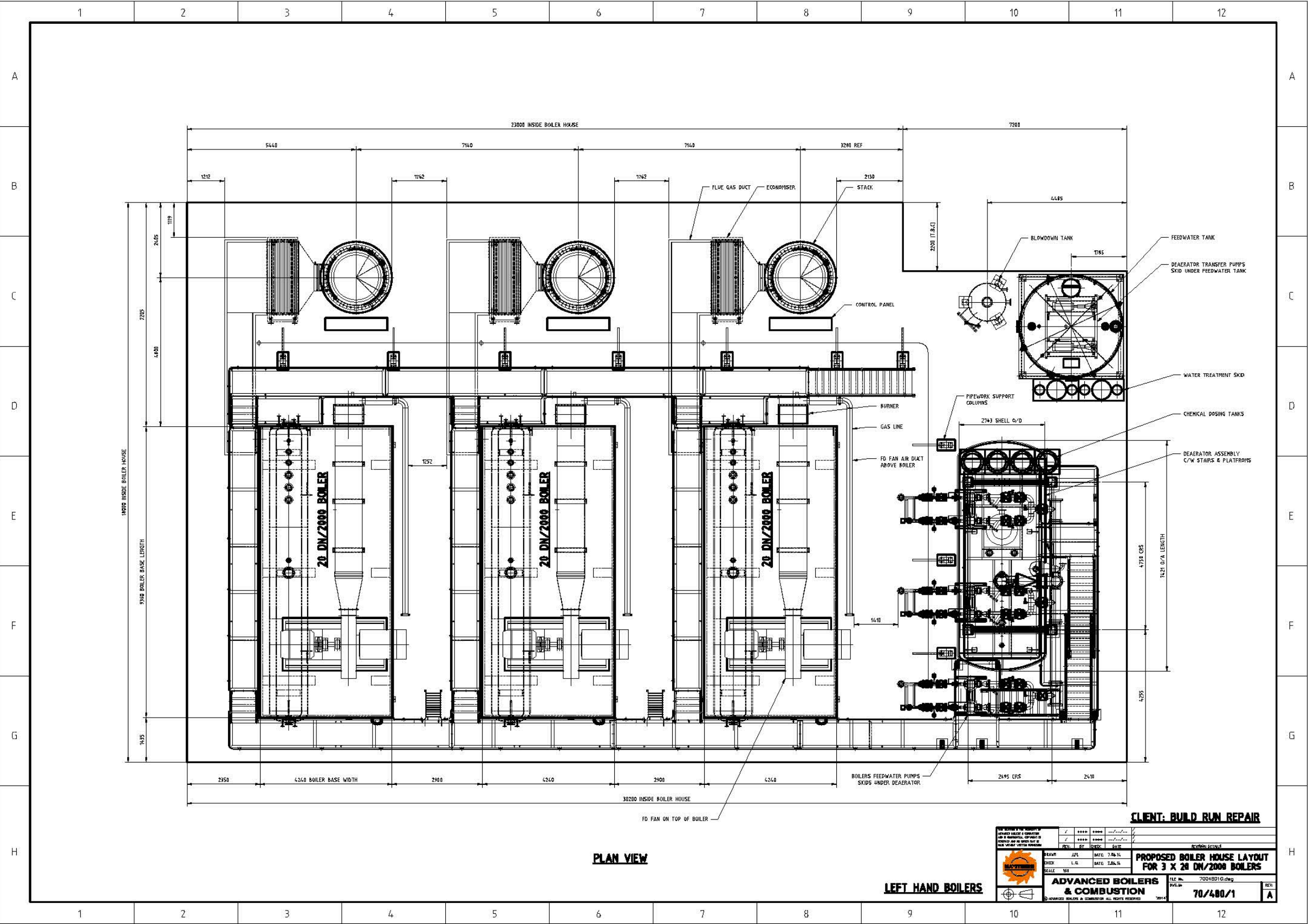
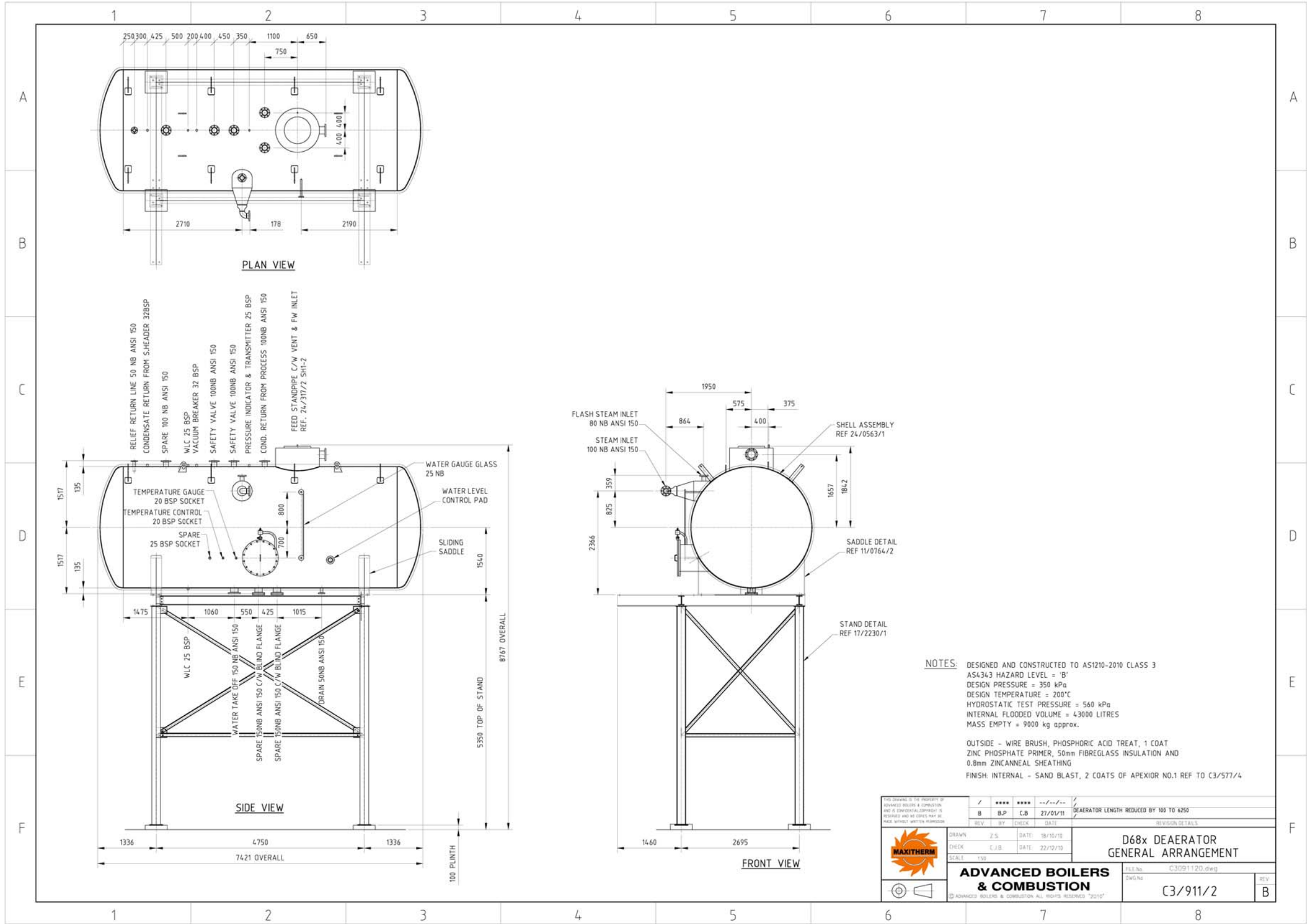


Figure 2-4: C3091120 DA Deaerator



2.1 LAND USE OF THE REGIONAL PROJECT SITE LOCATION

With reference to the Holroyd City Council Local Environmental Plan Land Zoning Map (2012), the Project Site is situated in an industrial area (IN1). The area is bounded by the Prospect Creek waterway, the foreshore of which is a public recreation and environmental conservation areas to the South and other industrial properties to the North, east and west. Just over 500m east of the Project Site and beyond, the area is a low density residential area.

Figure 2-5 shows the various land uses surrounding the location of the subject site.

Figure 2-5: Excerpt of Holroyd City Council Land Use Zoning Map



Source: Holroyd City Council

Available at URL: <http://www.holroyd.nsw.gov.au/wp-content/uploads/downloads/2013/09/LEP2013-Zoning-Map.pdf>

2.2 BOILER DETAILS

The boiler stacks would be on the northern side of the boiler house. The stacks would be 30 m high.

Each boiler has an economiser to capture heat present in the combustion products often referred to as flue gases. The stack temperature at discharge point is 121°C as a result.

The boilers are each of 20 MW capacity. The boilers' design is Maxitherm MDN Series Packaged Steam Boilers. The boilers are the water tube type (as opposed to fire tube).

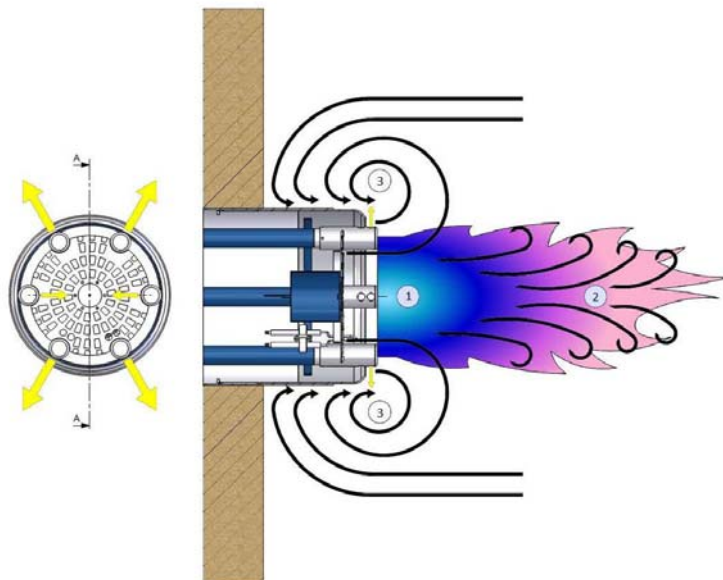
The burner type is a Dunphy BG7.270 which is designed to generate low concentrations of NO_x typically 150–250 mg/m³ at 3% oxygen and well within the requirements of the Protection of the Environment (Clean Air) Regulation 2010. This Regulation sets a concentration for Group 6 plant of 450 mg/m³ at 3% oxygen.

The Dunphy burner achieves this low level of NO_x generation using a multi-nozzle system as discussed below in information provided by the burner manufacturer.

There are three primary sources of NO_x in the combustion process; thermal NO_x, fuel NO_x and prompt NO_x.

Prompt NO_x can be ignored in most cases as it is negligible in comparison to the other two forms. Fuel NO_x becomes significant when the fuel has a significant nitrogen content i.e. fuel oil. Thermal NO_x is highly temperature dependant and is the main source of NO_x in many combustion processes and is dominant when burning natural gas. The formation rate is primarily a function of temperature and the residence time of nitrogen at that temperature.

The Dunphy ultra-low NO_x burner mitigates the formation of thermal NO_x through careful burner head design, staged combustion and internal flue gas recirculation.



First of all a sub-stoichiometric combustion zone is created in Zone 1 of the flame envelope keeping flame temperatures low and forming a stable root to the flame. Secondary staged combustion takes place in zone 2 completing the combustion process whilst maintaining low flame temperatures. Bluff body thermodynamics in zone 3 induce inert flue gases back into the core of the flame. This form of internal flue gas recirculation, slows the combustion process down even further through oxygen reduction thus lowering the flame temperature and resulting NO_x levels.

For the air assessment the following modelling scenarios will be presented in Section 7 Air Dispersion Modelling:

- The three 20MW boilers operating;
- The Marubeni Energy Plant operating; and
- Both operating conjointly.

2.3 NOX GENERATION

The objective of this section of the report is to compare the NOx mass emission rate from the existing three boilers GT/HRSC located at the Smithfield Investors No1 Pty Ltd site with the with the proposed boilers to be located nearby.

The Environment Protection Licences of these two sites are Smithfield Investors No. 1 Pty Ltd – EPL #5701. Smithfield Investors P/L is referred to in the report as the Marubeni Energy Plant. Visy Paper Pty Ltd has EPL #4100.

Following the review of the Annual Returns for the Marubeni Energy Plant from 2007 until 2013 and the air emission monitoring conducted for the same period by NATA accredited consultants, a summary of relevant parameters to assist in the comparison exercise is listed below.

Based on the information supplied by the manufacturers, the information presented in Table 2-1 has been compiled.

Table 2-1: New boilers' specifications

Item	Specifications	Conditions
Stack height	30 m	15 m/sec discharge velocity
Stack/flue temperature	121°C = 394°K	
NOx emission rates / concentration	150-200 mg/m ³ @3% O ₂	3% O ₂
Flue mass flow rate	32133 kg/hr @STP	STP
Flue volume flow rate	38298 m ³ /hr	Flue gas temperature

Initially, the NOx emission rate at 3% O₂ should be converted to NOx emission rate at 15% O₂. The following formula is used:

$$Cr = Cm \times (20.9 - r) / (20.9 - m)$$

where:

Cr = corrected concentration in a dry gas having a specified reference volume % O₂ = r

Cm = measured concentration in a dry gas having a measured volume % O₂ = m

Hence, the highest NOx emission rate of 200 mg/m³ at 3% O₂ is equivalent to 65.92 mg/m³ at 15% O₂ and the lowest NOx emission rate of 150 mg/m³ at 3% O₂ is equivalent to 49.44 mg/m³ at 15% O₂.

At flue gas temperature, the flue volume flow rate is 38298 m³/hr. Hence, for the highest NOx emission rate of 65.92 mg/m³ at 15% O₂, the NO_x volume flow rate is 38298x65.92 = 2524604.16 mg/hr or 2524.604 g/h or 2.524 kg/h.

Summary of results of air emission monitoring for the Marubeni Plant as reported in the Annual Returns are included in Table 2-2. GT#1–GT#3 refers to each of the gas turbines.

Table 2-2: Summary of results of air emission monitoring and other flue specifications

AR 2007 - 2008	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)	23	21	19	18	10	9.2
Flue temperature (°K)	364		366		362	
NOx emission rates						
Flue mass flow rate (kg/hr)	550000		540000		550000	
Flue volume flow rate (m ³ /s)	160	120	160	120	160	120
NOx mass						
Velocity (m/s)	21	21	21	21	21	21
Gas density (kg/m ³)	1.31	1.28				
O ₂ (%)	14.8	14.8	14.8	14.7	14.6	14.6
AR 2008 - 2009	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)	16	14	17	16	15	12
Flue temperature (°K)	369		374		365	
NOx emission rates						
Flue mass flow rate (kg/hr)	560000		530000		540000	
Flue volume flow rate (m ³ /s)	160	120	160	120	160	120
NOx mass						
Velocity (m/s)	22	22	22	22	21	21
Gas density (kg/m ³)	1.31	1.28				
O ₂ (%)	14.5	14.4	14.5	14.5	14.7	14.6
AR 2009 - 2010	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)	14	13	18	17	12	12
Flue temperature (°K)	368		367		368	
NOx emission rates						
Flue mass flow rate (kg/hr)	540000		540000		530000	
Flue volume flow rate (m ³ /s)	160	120	160	120	160	120
NOx mass						
Velocity (m/s)	22	22	22	22	21	21
Gas density (kg/m ³)	1.31	1.28				
O ₂ (%)	14.6	14.6	14.6	14.6	14.7	14.7

Table 2-2: Summary of results of air emission monitoring and other flue specifications

AR 2010- 2011	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)	19	13	13	13	11	10
Flue temperature (°K)	370		376		367	
NOx emission rates						
Flue mass flow rate (kg/hr)	560000		540000		560000	
Flue volume flow rate (m ³ /s)	160	120	160	120	160	120
NOx mass						
Velocity (m/s)	22	22	22	22	22	22
Gas density (kg/m ³)	1.30	1.28	1.31	1.27	1.31	1.28
O ₂ (%)	15.6	15.6	14.7	14.7	14.8	14.7
AR 2011- 2012	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)	13	12	15	14	17	16
Flue temperature (°K)	373		366		370	
NOx emission rates						
Flue mass flow rate (kg/hr)	550000		560000		550000	
Flue volume flow rate (m ³ /s)	160	120	160	120	160	120
NOx mass						
Velocity (m/s)	22	22	22	22	22	22
Gas density (kg/m ³)	1.31	1.28	1.31	1.28	1.31	1.28
O ₂ (%)	14.6	14.6	15.0	14.9	15.0	15.0
AR 2012- 2013	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)	9.3	8.2	11	9.8	12	11
Flue temperature (°K)	372		367		368	
NOx emission rates						
Flue mass flow rate (kg/hr)						
Flue volume flow rate (m ³ /s)	170	120	160	120	170	120
NOx mass						
Velocity (m/s)	23	23	22	22	23	23
Gas density (kg/m ³)	1.30		1.30		1.30	
O ₂ (%)	14.6	14.6	14.5	14.5	14.5	14.5

Table 2-2: Summary of results of air emission monitoring and other flue specifications

AR 2013- 2014	GT #1		GT#2		GT#3	
	Highest	Average	Highest	Average	Highest	Average
NOx concentration g/m ³ O ₂ corrected (ppm)						
Flue temperature (°K)						
NOx emission rates						
Flue mass flow rate (kg/hr)						
Flue volume flow rate (m ³ /s)						
NOx mass						
Gas density (kg/m ³)						
Gas density						
O ₂ (%)						

For the existing GT/HRSC Unit 1 relevant information is included in Table 2-3.

Table 2-3: GT/HRSC Unit 1 specifications

Item	Measured/Specifications	
	Average of the highest values	Average of the average values (if applicable)
NOx concentration g/m ³ O ₂ corrected (ppm)	15.7	13.5
Flue height (metres)	35	35
Flue temperature (°K)	369.33	
NOx emission rates		
Flue mass flow rate (kg/hr)	552000	552000
Flue volume flow rate (m ³ /s)	161.67	110
NOx mass		
Velocity (m/s)	22	22
Gas density (kg/m ³)	1.31	
O ₂ (%)	14.78	14.77

For the existing GT/HRSC Unit 12 relevant information is included in Table 2-4.

Table 2-4: GT/HRSC Unit 2 specifications

Item	Measured/Specifications	
	Average of the highest values	Average of the average values (if applicable)
NOx concentration g/m ³ O ₂ corrected (ppm)	15.5	14.6
Flue height (metres)	35	35
Flue temperature (°K)	369.33	
NOx emission rates		
Flue mass flow rate (kg/hr)	542000	542000
Flue volume flow rate (m ³ /s)	160	110
NOx mass		
Velocity (m/s)	21.83	21.83
Gas density (kg/m ³)	1.31	
O ₂ (%)	14.68	14.65

For the existing GT/HRSC Unit 3 relevant information is included in Table 2-5.

Table 2-5: GT/HRSC Unit 3 specifications

Item	Measured/Specifications	
	Average of the highest values	Average of the average values (if applicable)
NOx concentration g/m ³ O ₂ corrected (ppm)	12.8	11.7
Flue height (metres)	35	35
Flue temperature (°K)	366.67	
NOx emission rates		
Flue mass flow rate (kg/hr)	546000	
Flue volume flow rate (m ³ /s)	161.67	110
NOx mass		
Velocity (m/s)	21.67	21.67
Gas density (kg/m ³)	1.31	
O ₂ (%)	14.72	14.68

Following review of all the information available to Benbow Environmental including the above analysis, there are different ways of determining the NOx mass emission rates. However, by relying on the information submitted to the EPA, the following is confirmed:

For the GTs the average NOx mass emission rate is 2.81 kg/hour for each GT or 8.42 kg/hour for the three (3) GTs.

Hence, the existing boilers produce much higher NOx on an hourly basis so it all depends on the number of hours and days these boilers will be used.

The following subsections show the general locality, terrain effects which are very limited, as well as the nearest receptors are shown.

2.4 SENSITIVE RECEPTORS

The nearest sensitive receptors are listed in Table 2-6 and their location is shown in Figure 2-6. These receptors are considered to represent the primary receptors likely to be affected by noise emissions associated with the proposed development and were also considered to be the receptors most likely to be affected by air emissions.

Table 2-6: Nearest Sensitive Receptors

Receptors	Address	Approximate Distance to Proposed Development (m)	Direction	Description
R1	6 Low Street, Smithfield	447	W	Residential
R2	12 Kiola Street, Smithfield	425	WSW	Residential
R3	20 Vineyard Avenue, Smithfield	407	SW	Residential
R4	31 Chisholm Street, Smithfield	310	S	Residential
R5	44 Solo Crescent, Smithfield	336	SSE	Residential
R6	124 Granville Street, Fairfield	494	SE	Residential
R7	126 Fairfield Road, Guilford West	1006	ESE	Residential
R8	127 McCredie Road, Guilford West	848	ENE	Residential
R9	79 Warren Road, Woodpark	1079	NE	Residential
R10	9 Magnolia Street, Greystanes	1564	N	Residential
R11	17 Rhondda Street, Smithfield	1727	NW	Residential



Figure 2-6: Nearest Sensitive Residential Receptors



3. METEOROLOGY AND LOCAL AIR QUALITY

3.1 PROJECT SITE REPRESENTATIVE METEOROLOGICAL DATA

The meteorological station data utilised within this assessment were obtained from the automatic weather station (AWS) located at Horsley Park. The monitoring station at Horsley Park AWS is located approximately 5.6 kilometres from the Project Site. Weather conditions at this monitoring station are logged hourly and it was considered appropriate to use data from Sydney Olympic Park AWS (Archery) for the subject area given the proximity and terrain conditions surrounding the subject Project Site. Therefore, Sydney Olympic Park AWS (Archery) was considered to be the most appropriate due to the completeness and latest data available for carrying out dispersion modelling.

3.2 ATMOSPHERIC STABILITY

The “stability” of the atmosphere is a classification used to describe the structure of the atmosphere in terms of temperature, specifically, how temperature changes in the atmosphere with altitude. Classification is often done according to the Pasquill-Gifford classification system that consists of six stability class groups, shown in Table 3-1. The class “A” describes an atmosphere where the air is well-mixed and there is little hindrance of dispersion into the atmosphere. At the other end of the scale is class “F”, which describes conditions under which temperature inversions would occur, where winds are calm or absent and air close to the earth’s surface cannot rise into the atmosphere due to the presence of warmer air layers above. The classes in between A and F indicate changing degrees of stability due to variations in temperature in the atmosphere.

Table 3-1: Pasquill-Gifford Stability Class System

Stability Class	Description
A	Extremely Unstable
B	Unstable
C	Slightly Unstable
D	Neutral
E	Slightly Stable
F	Very Stable

Worst case dispersion conditions from the Project Site would be best associated with F-class stability conditions – generally associated with still / light winds and clear skies during the night time or early morning period (stable conditions).

Analysis of the referenced Project Site-specific meteorological data indicates the F-class dispersion conditions were present for approximately 9.94% of the time for the Horsley Park AWS file.

Looking at Table 3-3, it can be seen that stability class frequencies in the meteorological file have not been biased by the Bureau of Meteorology towards giving enhanced dispersive conditions. Stability class D is the most frequent, with an occurrence of 42.754%. Stability classes A, B, C, which offered the best dispersion condition, occur with frequencies of 10.94%, 7.78% and 16.25% respectively. Stability class E occurred 12.35% of the time.

Table 3-2: Wind Direction / Stability Class Frequency Distribution (Count) for Referenced Meteorological Data Input File – Bureau of Meteorology Horsley Park AWS , Archery (2012)

Frequency Distribution (Count)							
Direction (Blowing From)	Stability Class						
	A	B	C	D	E	F	Total
N	196	118	216	517	118	241	1406
NE	171	66	51	151	51	37	527
E	102	65	173	306	62	49	757
SE	68	79	259	469	104	54	1033
S	75	62	217	483	127	84	1048
SW	86	99	198	1063	380	137	1963
W	136	120	149	381	140	143	1069
NW	127	74	164	385	103	128	981
Total	961	683	1427	3755	1085	873	8784

Table 3-3: Wind Direction / Stability Class Frequency Distribution (Percentage) for Referenced Meteorological Data Input File – Bureau of Meteorology Horsley Park AWS , Archery (2012)

Frequency Distribution (Percentage %)							
Direction (Blowing From)	Stability Class						
	A	B	C	D	E	F	Total
N	2.23	1.34	2.46	5.89	1.34	2.74	16.01
NE	1.95	0.75	0.58	1.72	0.58	0.42	6.00
E	1.16	0.74	1.97	3.48	0.71	0.56	8.62
SE	0.77	0.90	2.95	5.34	1.18	0.61	11.76
S	0.85	0.71	2.47	5.50	1.45	0.96	11.93
SW	0.98	1.13	2.25	12.10	4.33	1.56	22.35
W	1.55	1.37	1.70	4.34	1.59	1.63	12.17
NW	1.45	0.84	1.87	4.38	1.17	1.46	11.17
Total	10.94	7.78	16.25	42.75	12.35	9.94	100.00

3.3 WIND ROSE PLOTS

Wind rose plots show the direction from which the wind is coming with triangles known as “petals”. The petals of the plots in the figure summarise wind direction data into 8 compass directions ie. north, north-east, east, south-east, etc.

The length of the triangles, or “petals”, indicates the frequency that the wind blows from the direction presented. Longer petals for a given direction indicate a higher frequency of wind from that direction. Each petal is divided into segments, with each segment representing one of the six wind speed classes. Thus, the segments of a petal show what proportion of wind for a given direction falls into each class.

The proportion of time for which wind speed is equal to or less than 0.5 m/s, when speed is negligible, is referred to as calm hours or “calms”. Calms are not shown on a wind rose as they have no direction, but the proportion of time that they make up for the period under consideration is noted under each wind rose.

The concentric circles in each wind rose are the axes that denote wind frequencies. In comparing the plots it should be noted that the axis varies between wind roses, although all wind roses are the same size. The frequencies shown in the first quadrant (top-left quarter) of each wind rose are stated beneath the wind rose.

3.4 LOCAL WIND TRENDS

At Horsley Park AWS Figure 3-1 shows that south-westerly winds dominate over the course of the year, with a frequency of approximately 21%. All other directions contribute wind with frequencies of approximately 12% or less.

In summer, the southerly and south easterly winds prevail, both at a frequency of approximately 17%. Low to moderate winds frequently blow from the east (13%) and south-west (12%), while the remainder of the wind directions have minor contributions of less than 9%.

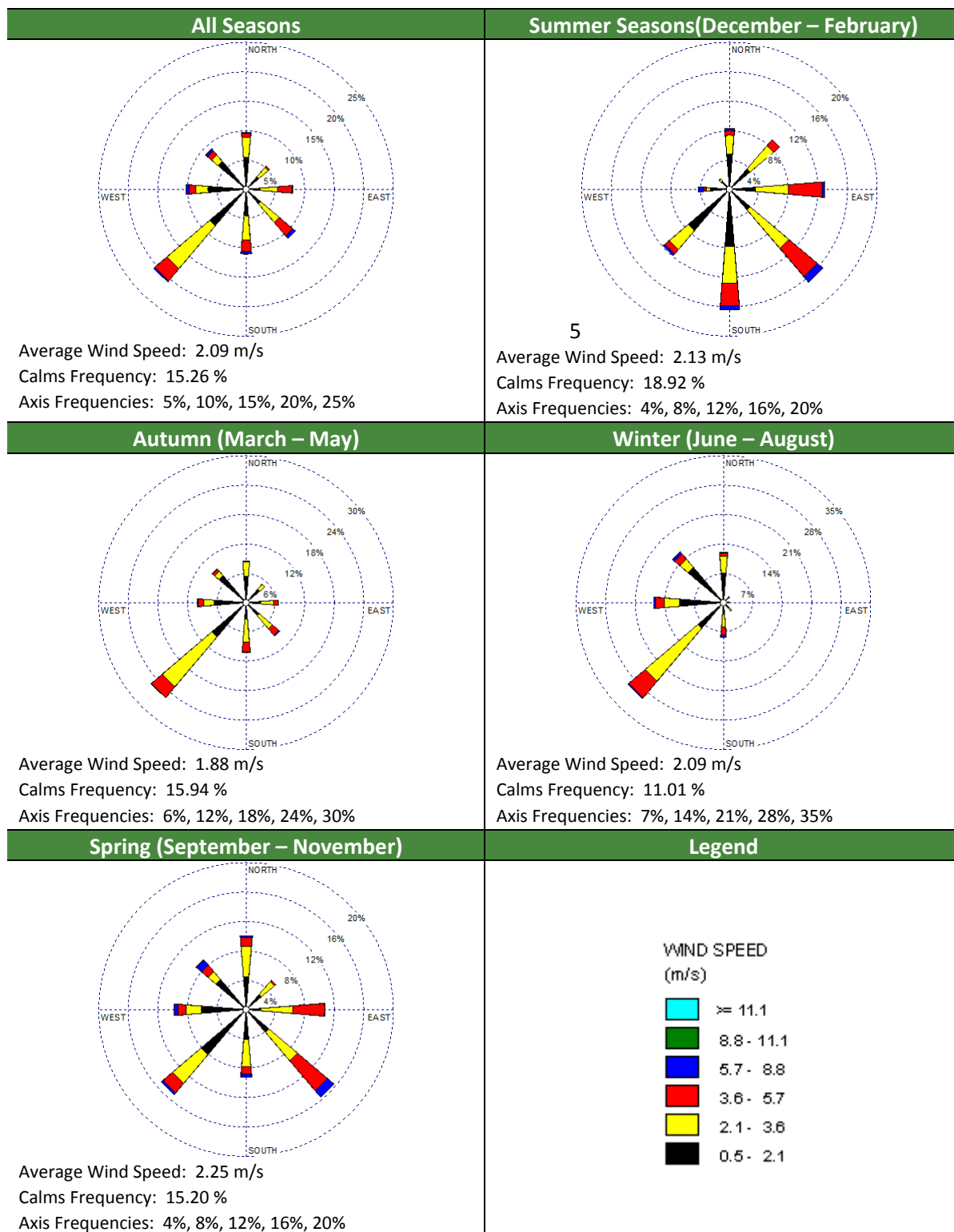
Autumn shows the most similarities to the annual average wind trends with dominant winds from the south-west (26%) and the remainder of wind directions have a minor contribution of 10% or less.

The south westerly winds continue to dominate over the winter season, with a frequency of approximately 30%. Winds from the west and north-west are observed around 18% of the time, followed by low winds from the other directions of less than 11% each.

Moderate winds from the south-west and south-east dominate in spring with a frequency of approximately 16%. All other directions have a minor contribution of less than 10%.

The average wind speeds of autumn and winter are 1.88m/s and 2.09m/s, whilst summer and spring has slightly higher wind speeds of 2.13m/s and 2.25 m/s. Calms were observed to be similar in autumn (15.94%) and spring (15.20%). However, calms in in summer were 18.92 and 11.01% in winter.

Figure 3-1: Wind Rose Plots for the Referenced Meteorological Station – Bureau of Meteorology Horsley Park (2012)



3.5 TERRAIN AND STRUCTURAL EFFECTS ON DISPERSION

The meteorological condition known as katabatic flow (or katabatic drift) is often identified as the condition under which maximum environmental impacts from primarily ground-based sources are likely to occur. Katabatic flow is simply the movement of cold air down a slope, generally under stable atmospheric conditions. Under such circumstances, dispersion of airborne pollutants is generally slow and the associated impacts can reach their peak.

Katabatic flow is unlikely to affect any emissions from the subject Project Site because katabatic flow only affects receptors that are located at a lower terrain elevation compared to the Project Site's elevation. Figure 3-2 and Figure 3-3 shows these elevation differences, highlighted by the exaggerated z-axis image (Figure 3-3). As such, no wind direction-specific katabatic flow would be expected to occur.

Figure 3-2: Two-Dimensional View of the Terrain Elevation

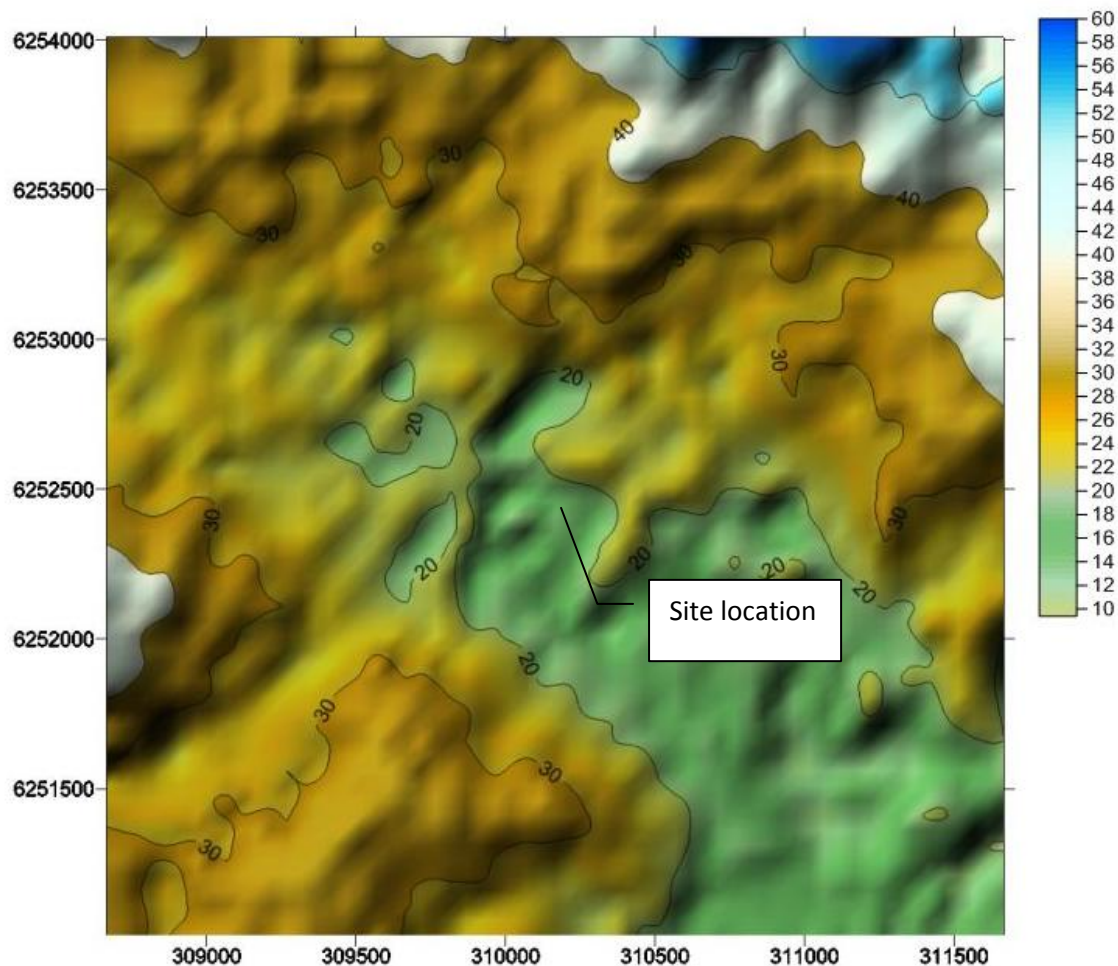
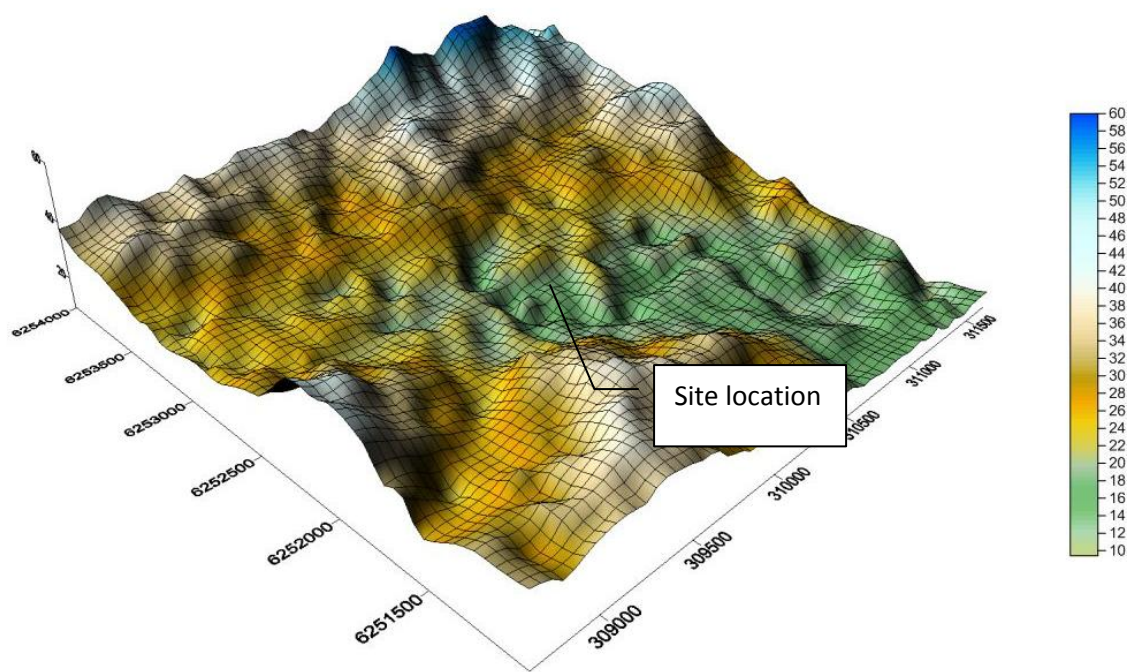


Figure 3-3: Three-Dimensional Terrain Elevation Diagram – Z-Axis Exaggerated by a Factor of 5



3.6 LOCAL AIR QUALITY

Background air quality parameters were obtained from the nearest NSW EPA ambient air monitoring station, which is located at Prospect, NSW. The relevant assessable pollutant parameters available from the monitoring station are NO₂ 1-hour annual maximum and annual average values for 2012, which have been provided below in pphm.

Maximum 1-hour NO₂: 5.0 pphm
Annual Average: 1.0 pphm

A table of conversion factors provided on the NSW EPA website is provided as follows. This allows comparison of the above data to that of other sources.

Table 3-4: Conversion factors, courtesy NSW EPA website

Pollutant	Units	Convert to	Multiply by
Ozone	pphm	µg/m ³ (0°C)	21.4
		µg/m ³ (25°C)	19.6
Nitric oxide (NO)	pphm	µg/m ³ (0°C)	13.4
		µg/m ³ (25°C)	12.3
Nitrogen dioxide (NO ₂)	pphm	µg/m ³ (0°C)	20.5
Nitrogen oxides (NO _x)	pphm	µg/m ³ (25°C)	18.8
Sulfur dioxide (SO ₂)	pphm	µg/m ³ (0°C)	28.6
		µg/m ³ (25°C)	26.2
Lead	µg/m ³ (0°C)	µg/m ³ (25°C)	0.92
Carbon monoxide	ppm	mg/m ³ (0°C)	1.25
		mg/m ³ (25°C)	1.15

To convert the data to µg/m³, we multiply 18.8 to give the following background:

Maximum 1-hour NO₂: **94.0 µg/m³**
Annual Average NO₂: **18.8 µg/m³**

4. AIR QUALITY CRITERIA AND GUIDELINES

The air impact assessment applies the air quality criteria and guidelines of the NSW EPA.

The legislative framework is the Protection of the Environment Operations Act 1997. The following therefore applies.

4.1 PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) applies the following definitions relating to air pollution:

“Air pollution” means the emission into the air of any air impurity.

While “air impurity” includes smoke, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, mists odours, and radioactive substances

The following clauses of this Act have most relevance to the Project Site:

- *Clause 124 (Operation of Plant)*

The occupier of any premises who operates any plant in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupier’s failure:

(a) to maintain the plant in an efficient condition, or

(b) to operate the plant in a proper and efficient manner.

- *Clause 126 (Dealing with Materials)*

(1) The occupier of any premises who deals with materials in or on those premises in such a manner as to cause air pollution from those premises is guilty of an offence if the air pollution so caused, or any part of the air pollution so caused, is caused by the occupiers failure to deal with those materials in a proper and efficient manner.

(2) In this section:

***deal** with materials means process, handle, move, store or dispose of the materials.*

***Materials** includes raw materials, materials in the process of manufacture, manufactured materials, by-products or waste materials.*



- *Clause 127 Proof of causing pollution*

To prove that air pollution was caused from premises within the meaning of Sections 124 – 126, it is sufficient to prove that air pollution was caused on the premises, unless the defendant satisfies the court that the air pollution did not cause air pollution outside the premises.

- *Clause 128 Standards of air impurities not to be exceeded*

(1) The occupier of any premises must not carry on any activity, or operate any plant, in or on the premises in such a manner as to cause or permit the emission at any point specified in or determined in accordance with the regulations of air impurities in excess of:

(a) The standard of concentration and the rate, or

(b) The standard of concentration or the rate.

Prescribed by the regulations in respect of any such activity or any such plant.

(2) Where neither such a standard nor rate has been so prescribed, the occupier of any premises must carry on any activity, or operate any plant, in or on the premises by such practicable means as may be necessary to prevent or minimise air pollution.

The proposed development would be required to meet the requirements of this Act.

4.2 PROTECTION OF ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010

In accordance with Part 5 of the *Protection of the Environment Operations (Clean Air) Regulation 2010* (herein referred to as the Clean Air Regulation 2010), the activities and plant would belong to Group 6 as it is to be *commenced to be carried on, or to operate, on or after 1 September 2005 as a result of an Environment Protection Licence granted under the POEO Act 1997 pursuant to an application made on or after 1 September 2005.*

Schedule 4 of the Clean Air Regulation 2010 provides standards of concentration for scheduled premises for general activities and plant.

The proposed development would be required to meet the requirements of this Regulation.

Under Schedule 4, any boiler operating on gas, Group 5 or 6, is required to meet an air impurity concentration for nitrogen dioxide (NO₂) or Nitric oxide (NO) or both as NO₂ equivalent of 350 mg/m³ at reference conditions stipulated in Schedule 5, Part 3. These reference conditions are Dry, 273K and 101.3 kPa (273.15K equates to a temperature of 0°C). The boiler burners meet this requirement.

4.3 NSW ENVIRONMENT PROTECTION AUTHORITY GUIDELINES

The document, “*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*” (AMMAAP) published by the NSW Environment Protection Authority (NSW EPA) provides guidance on methodology and thresholds that are to be used for the air impact assessment of a proposed development. This air impact assessment has been conducted in accordance with this guideline, and assessable pollutants (along with their corresponding limits) are summarised in Table 4-1.

Table 4-1: Relevant Limits from the Approved Methods for Modelling and Assessment of Air Pollutants in New South Wales (2005)

Pollutant	Averaging Period	Concentration		Source
		pphm	µg/m ³	
Nitrogen Dioxide (NO ₂)	1 hour	12	246	NEPC (1998)
	Annual	3	62	NEPC (1998)
PM ₁₀	24 hours	-	50	NEPC (1998)
	Annual	-	30	EPA (1998)
Total Suspended Particulates (TSP)	Annual	-	90	NHMRC (1996)
		g/m ² /month ^a	g/m ² /month ^b	
Deposited Dust	Annual	2	4	NERDDC (1988)

PM₁₀ and deposited dust are not significant for the operation of these boilers and have not been modelled during construction or operation. As this does not require extensive excavation there would be a very low risk of dust emissions being generated that would contribute to the existing levels of PM₁₀ and deposited dust.

Similarly negligible emissions of PM₁₀, TSP and therefore deposited dust would occur.



5. ASSESSMENT OF AIR QUALITY IMPACTS FROM CONSTRUCTION

Air quality impacts associated with the construction of the building and installation of the boilers are anticipated to be minimal to negligible. The component of the construction works which would involve the release of dust emissions would be the construction of the concrete floor and associated stormwater drainage. Only a small portion of the land would be excavated and therefore minimal dust emissions are expected.

Construction works for a boiler house would typically range between 6 to 8 weeks and the construction and installation of the proposed development is anticipated to occur between 20 to 26 weeks.

Air emissions from the type of construction works to be undertaken are typically very minor and would be sufficiently managed through the existing ISO 14001 certified Environmental Management Plan of the site. Therefore, no further assessment was determined to be required to assess the impacts of the construction phase of the proposal.



6. ASSESSMENT OF AIR QUALITY IMPACTS FROM THE PROPOSED OPERATIONS

6.1 AIR EMISSION SOURCES

The air emission sources are the three stacks of the proposed 20 MW boilers and the three existing stacks of the Marubeni Energy Plant.

The 20 MW stacks would each be 30 m high with a discharge velocity of 15 m/sec and a temperature of the “flue” gases of 121°C.

The detail for the Marubeni Energy Plant stacks is presented in the annual returns provided by the pollution licence holder, Smithfield Investors No. 1 Pty Limited.

6.2 AIR EMISSION FACTORS

The following air emission rates were used:

- Each of the 3 x 20 MW 162 gm/min of NO_x
100% conversion of the NO_x to NO₂
- Gas turbine stack 1 – 130 g/min of NO_x
Stack 2 – 150 g/min of NO_x
Stack 3 – 170 g/min of NO_x
100% conversion of the NO_x to NO₂

7. AIR DISPERSION MODELLING

7.1 METHODOLOGY

The AERMOD model, was used for the quantification of air impacts from the proposed development. The methods used to quantify the impacts through AERMOD have been conducted in accordance with the document *“Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales”* (herein referred to as the AMMAAP) published by the NSW EPA. A justification for using AERMOD instead of Ausplume (version 6.0) is presented in Attachment 2.

The air dispersion modelling was conducted on behalf of Benbow Environmental by pDs Consultancy, Principal Dr Piya Dewundegge. Model output files are provided in Attachment 3.

AERMOD is a steady-state plume model that in Victoria, has replaced AUSPLUME from 1 January 2014. The model was used to estimate the concentration impacts on receptors for each hour of input meteorology. The AERMOD dispersion model was preferred as it provides greater accuracy as discussed in Attachment 2.

Although the terrain of the site is flat to the location of nearest receptors and has gently undulating slopes to the north and north east, the use of AERMOD was preferred because of its reported improved accuracy in the near field.

A site-specific meteorological data was used (described in Section 3.1) in accordance with the AMMAAP guidelines. Contribution from the presence of buildings on and within proximity to the subject Project Site was also accounted for in the AERMOD. Emission rates were estimated using actual emission data as referred to in the previous Section of this report.

7.2 RESULTS OF DISPERSION MODELLING

The following tables (Table 7-1 and Table 7-4) provide a summary of results from the dispersion modelling. An extract of the sample output file has been provided in Attachment 3.

Results have been presented for the following scenarios:

Scenario 1 – Visy boilers’ stacks contribution only;

Scenario 2 – Marubeni stacks contribution only; and

Scenario 3 – Cumulative impacts from Visy and Marubeni stacks operating simultaneously.

Table 7-1: Scenario 1 - Results for NO_x, 1 hour Averaging Period – Visy Only

Receivers	Incremental Impact (µg/m ³)	Background Air Quality (µg/m ³)	Cumulative Impact (µg/m ³)	Limit (µg/m ³)	Pass (Yes/No)
R1	44.0	94	138.0	246	Yes
R2	44.5		138.5		Yes
R3	37.2		131.2		Yes
R4	44.0		138.0		Yes
R5	42.0		136.0		Yes
R6	28.6		122.6		Yes
R7	19.5		113.5		Yes
R8	19.0		113.0		Yes
R9	25.3		119.3		Yes
R10	18.8		112.8		Yes
R11	20.4		114.4		Yes

Figure 7-1: Contour 1Hr Average NO₂ – Visy Only

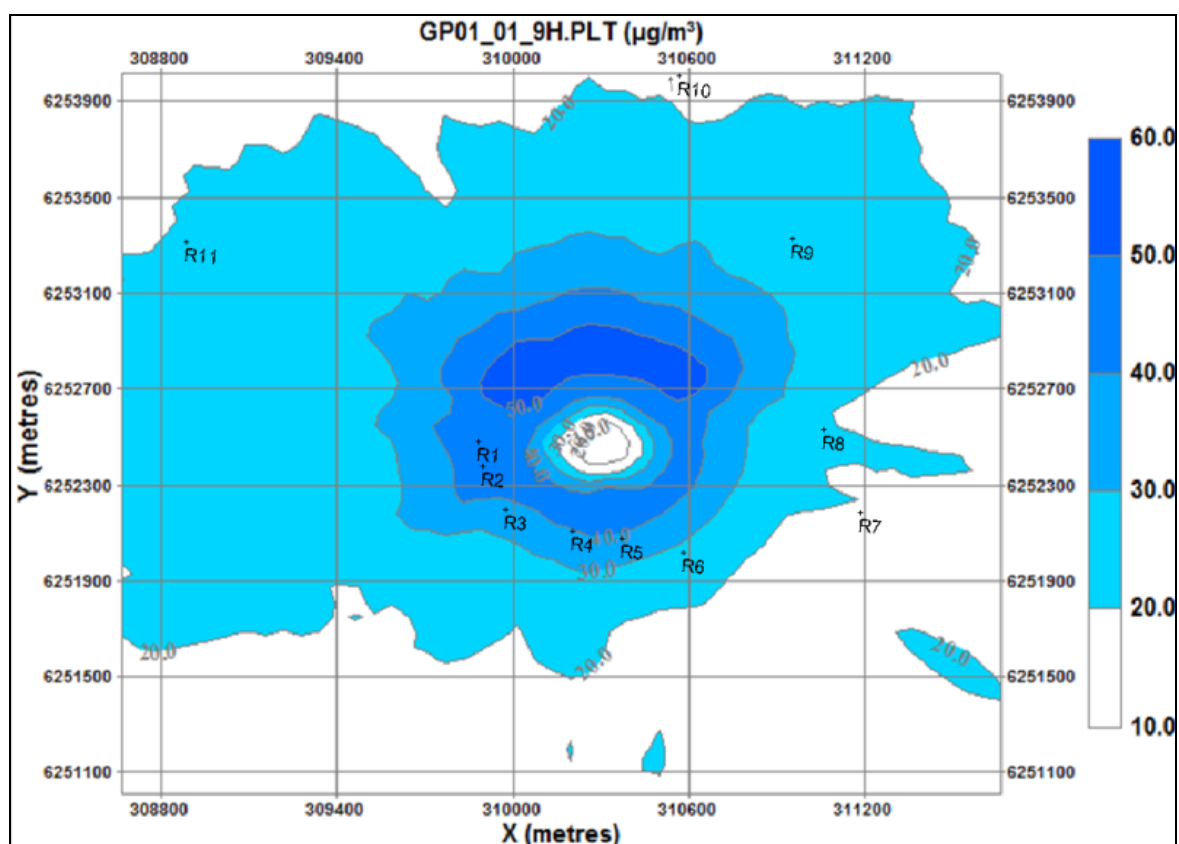


Figure 7-2: Contour 1Hr Average NO₂ – Visy Only

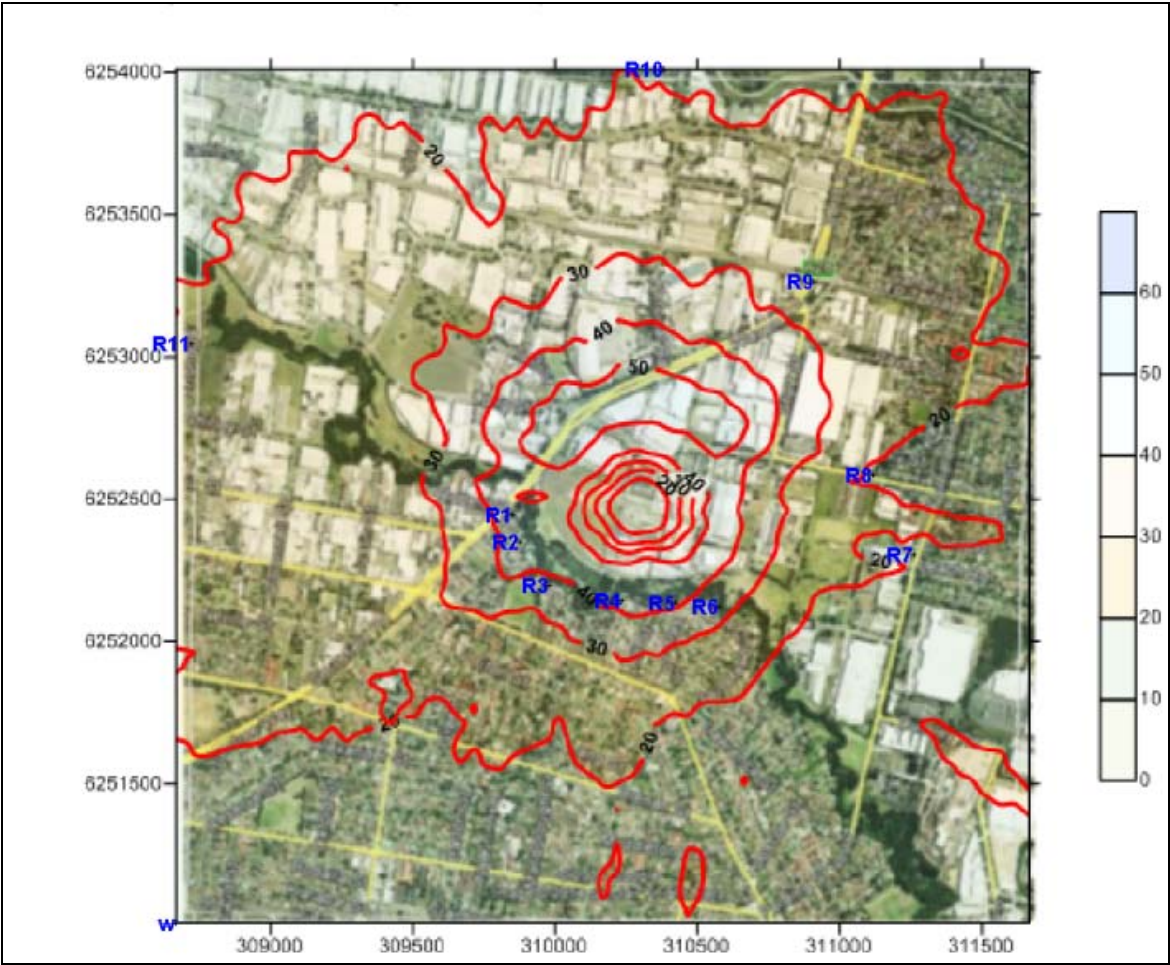


Table 7-2: Scenario 2 - Results for NO_x, 1 hour Averaging Period – Marubeni Only

Receivers	Incremental Impact (µg/m ³)	Background Air Quality (µg/m ³)	Cumulative Impact (µg/m ³)	Limit (µg/m ³)	Pass (Yes/No)
R1	10.60	94	104.6	246	Yes
R2	10.21		104.2		Yes
R3	9.45		103.5		Yes
R4	11.18		105.2		Yes
R5	11.54		105.5		Yes
R6	9.01		103.0		Yes
R7	5.86		99.9		Yes
R8	7.54		101.5		Yes
R9	7.59		101.6		Yes
R10	8.01		102.0		Yes
R11	4.77		98.8		Yes

Figure 7-3: Contour 1Hr Average NO₂ – Marubeni Only

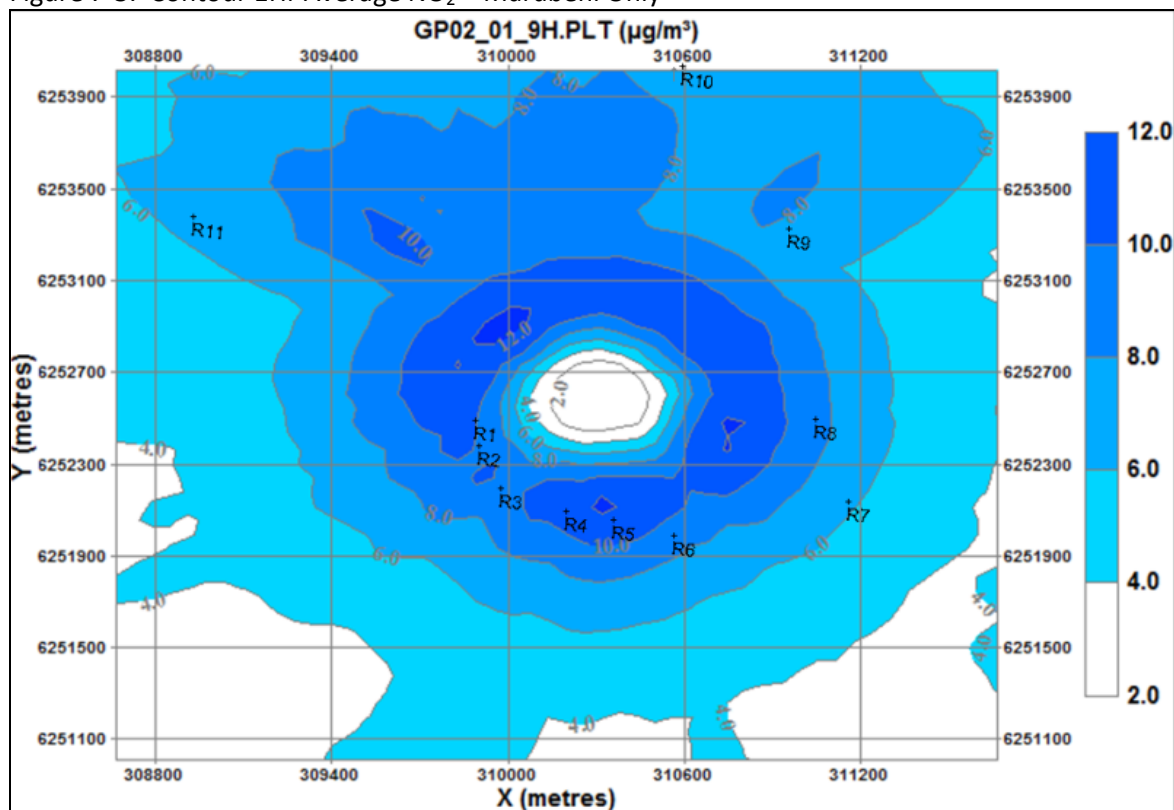


Figure 7-4: Contour 1Hr Average NO₂ – Marubeni Only

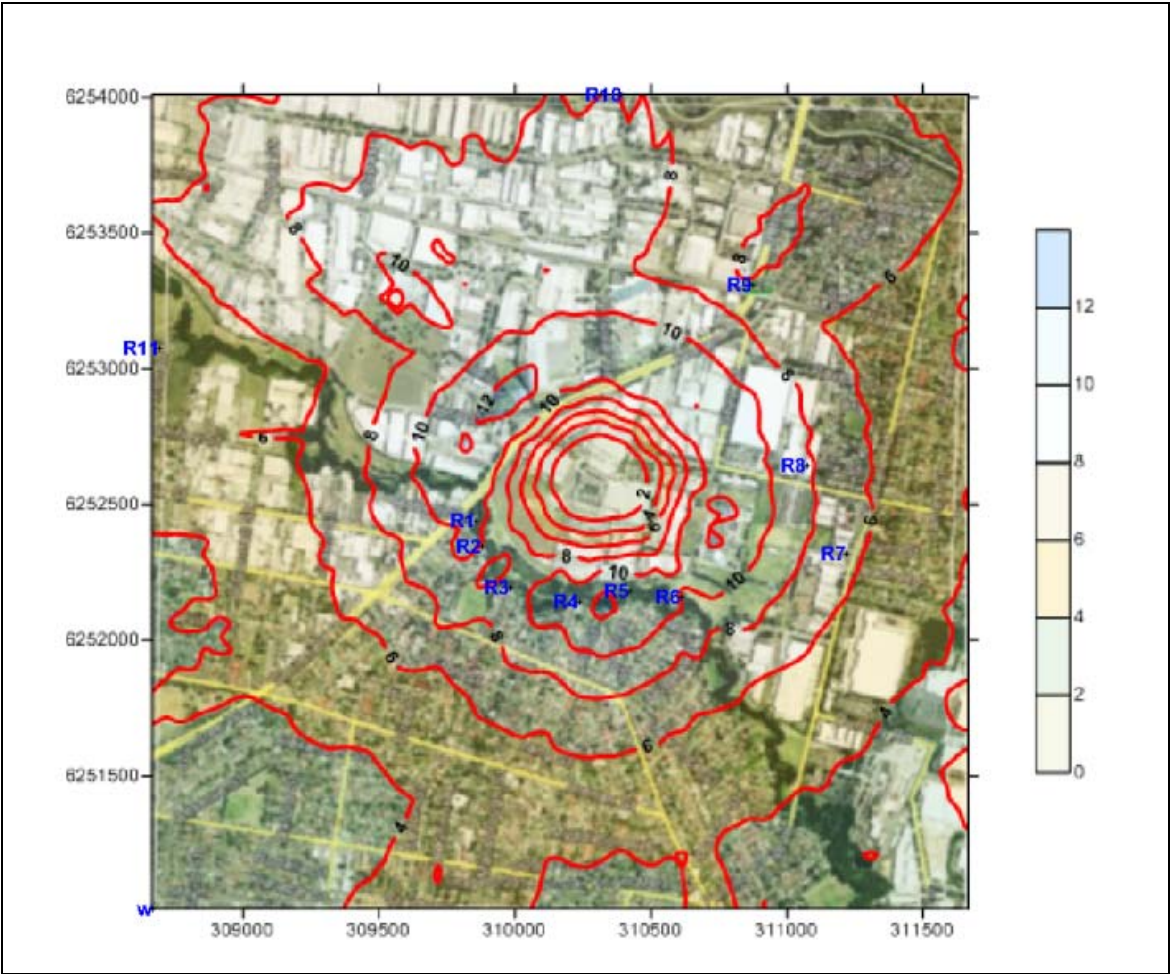


Table 7-3: Scenario 3 - Results for NO_x, 1 hour Averaging Period – Combined Visy and Marubeni

Receivers	Incremental Impact (µg/m ³)	Background Air Quality (µg/m ³)	Cumulative Impact (µg/m ³)	Limit (µg/m ³)	Pass (Yes/No)
R1	44.05	94	138.0	246	Yes
R2	45.14		139.1		Yes
R3	43.77		137.8		Yes
R4	54.61		148.6		Yes
R5	50.81		144.8		Yes
R6	36.17		130.2		Yes
R7	19.80		113.8		Yes
R8	20.42		114.4		Yes
R9	26.68		120.7		Yes
R10	20.97		115.0		Yes
R11	20.73		114.7		Yes

Figure 7-5: Contour 1Hr Average NO₂ - Combined Visy and Marubeni

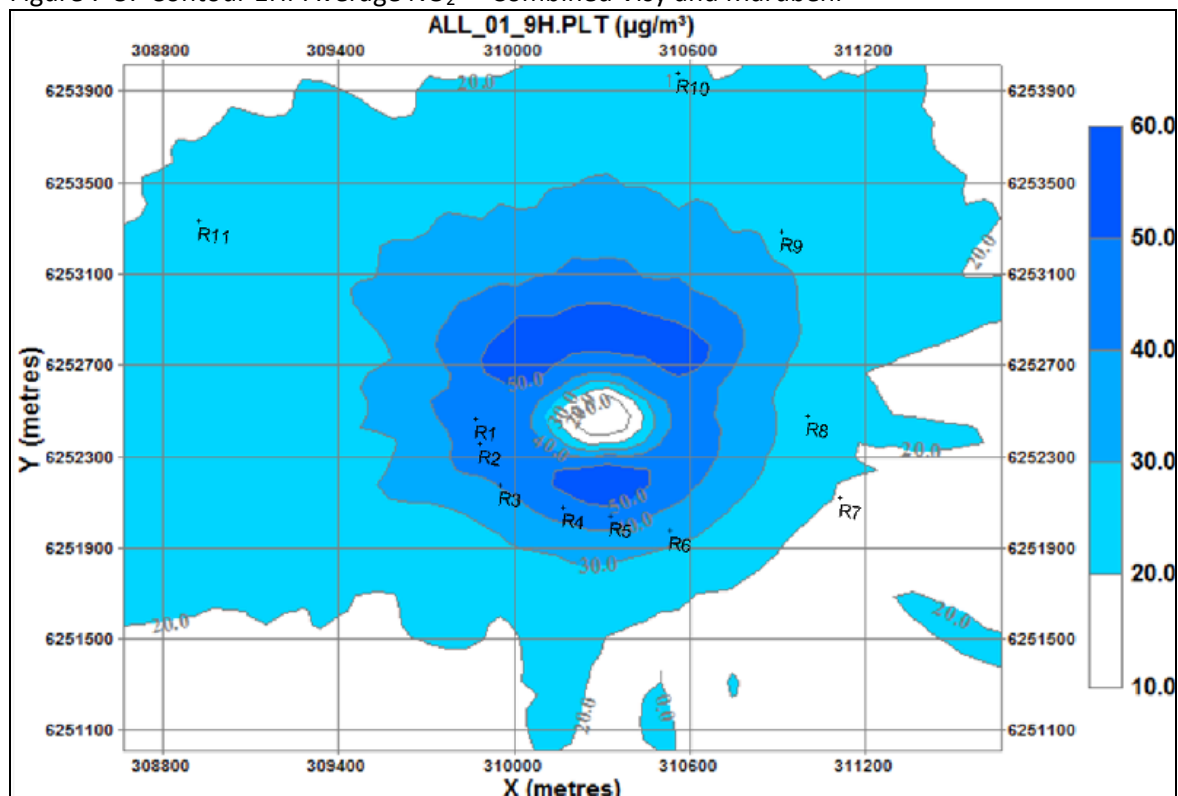


Figure 7-6: Contour 1Hr Average NO₂ – Combined Visy and Marubeni

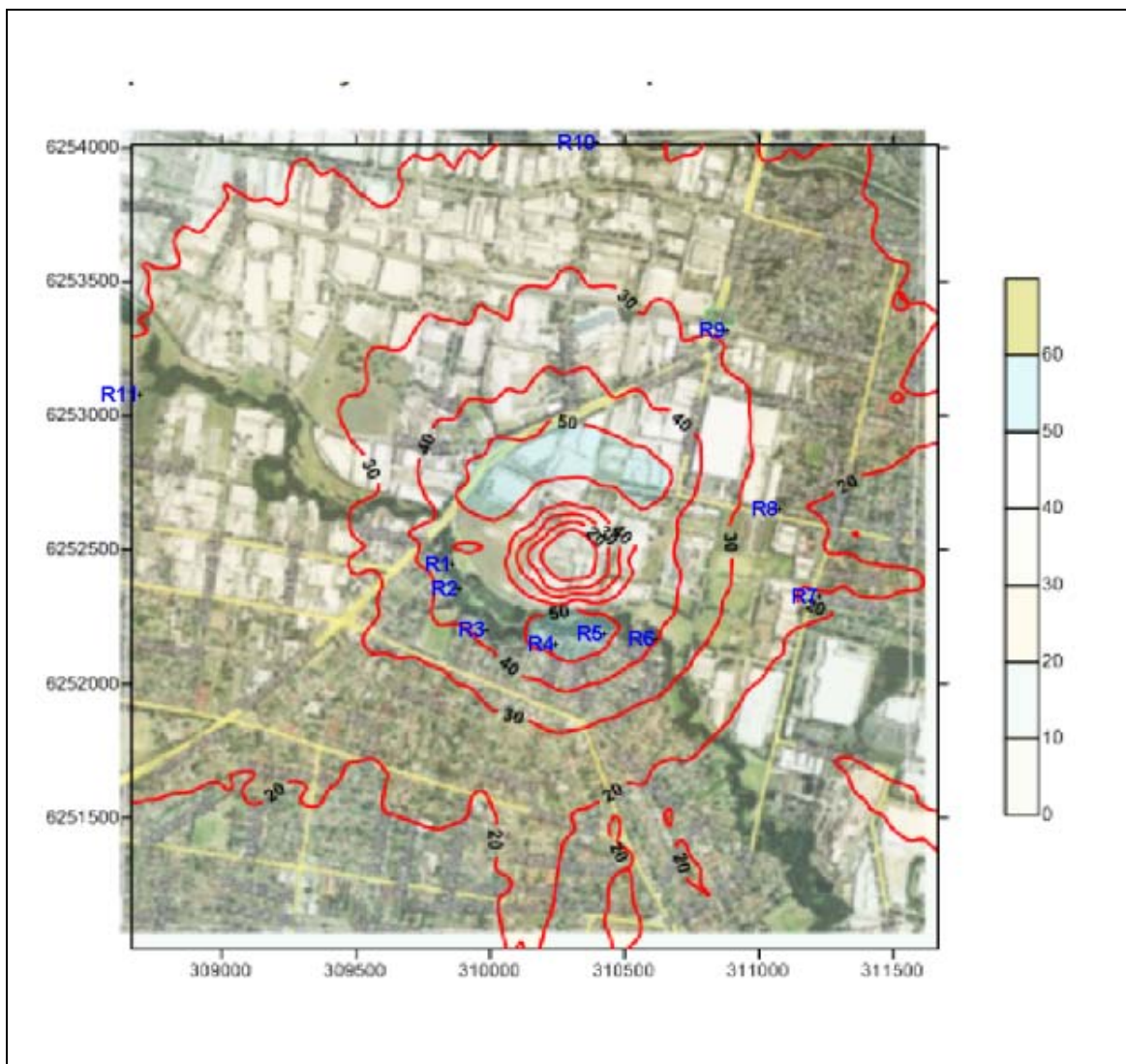


Table 7-4: Scenario 1 - Results for NOx, 1 Year Averaging Period – Visy Only

Receptors	Incremental Impact ($\mu\text{g}/\text{m}^3$)	Background Air Quality ($\mu\text{g}/\text{m}^3$)	Cumulative Impact ($\mu\text{g}/\text{m}^3$)	Limit ($\mu\text{g}/\text{m}^3$)	Pass (Yes/No)
R1	1.3	18.8	20.1	62	Yes
R2	1.2		20.0		Yes
R3	1.1		19.9		Yes
R4	1.7		20.5		Yes
R5	1.7		20.5		Yes
R6	1.2		20.0		Yes
R7	1.0		19.8		Yes
R8	1.2		20.0		Yes
R9	2.1		20.9		Yes
R10	0.9		19.7		Yes
R11	0.8		19.6		Yes

Figure 7-7: Contour for NOx, 1 Year Averaging Period – Visy Only

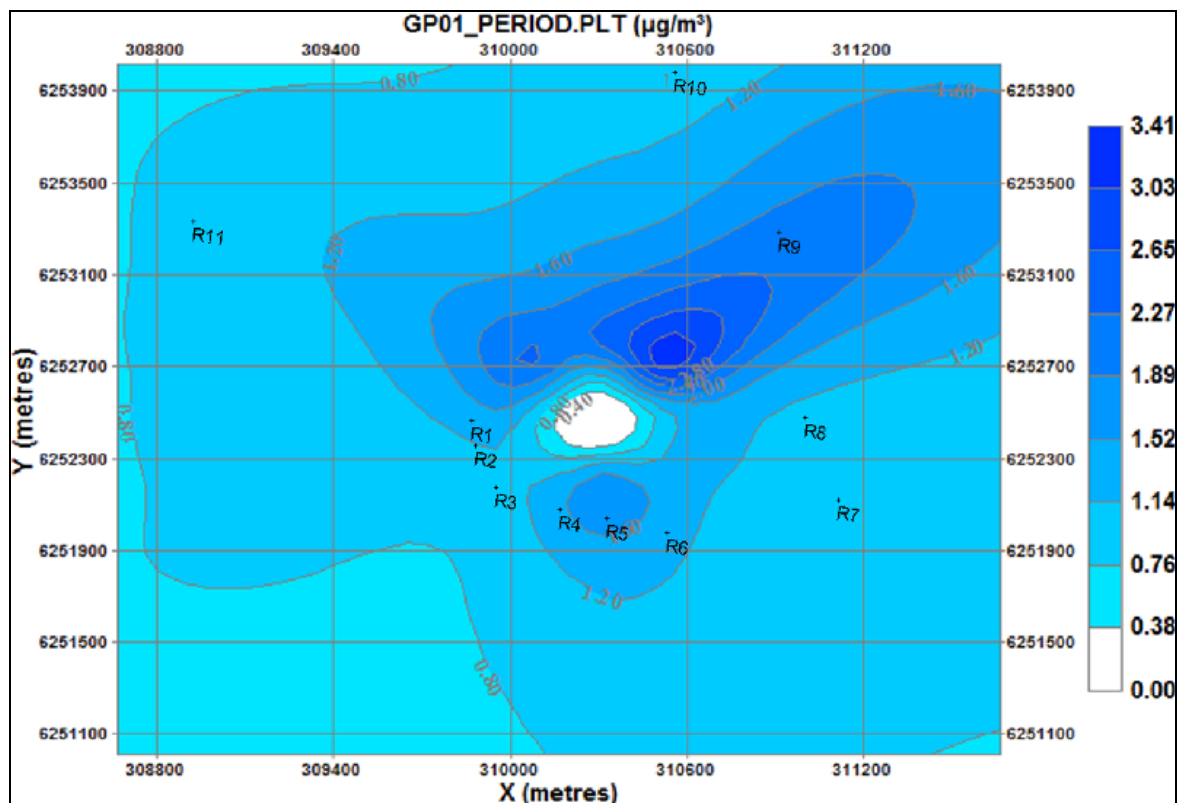


Figure 7-8: Contour for NOx, 1 Year Averaging Period – Visy Only



Table 7-5: Scenario 2 - Results for NOx, 1 Year Averaging Period – Marubeni Only

Receptors	Incremental Impact ($\mu\text{g}/\text{m}^3$)	Background Air Quality ($\mu\text{g}/\text{m}^3$)	Cumulative Impact ($\mu\text{g}/\text{m}^3$)	Limit ($\mu\text{g}/\text{m}^3$)	Pass (Yes/No)
R1	0.14	18.8	18.9	62	Yes
R2	0.13		18.9		Yes
R3	0.14		18.9		Yes
R4	0.23		19.0		Yes
R5	0.23		19.0		Yes
R6	0.15		18.9		Yes
R7	0.13		18.9		Yes
R8	0.14		18.9		Yes
R9	0.32		19.1		Yes
R10	0.20		19.0		Yes
R11	0.13		18.9		Yes

Figure 7-9: Contour for NOx, 1 Year Averaging Period – Marubeni Only

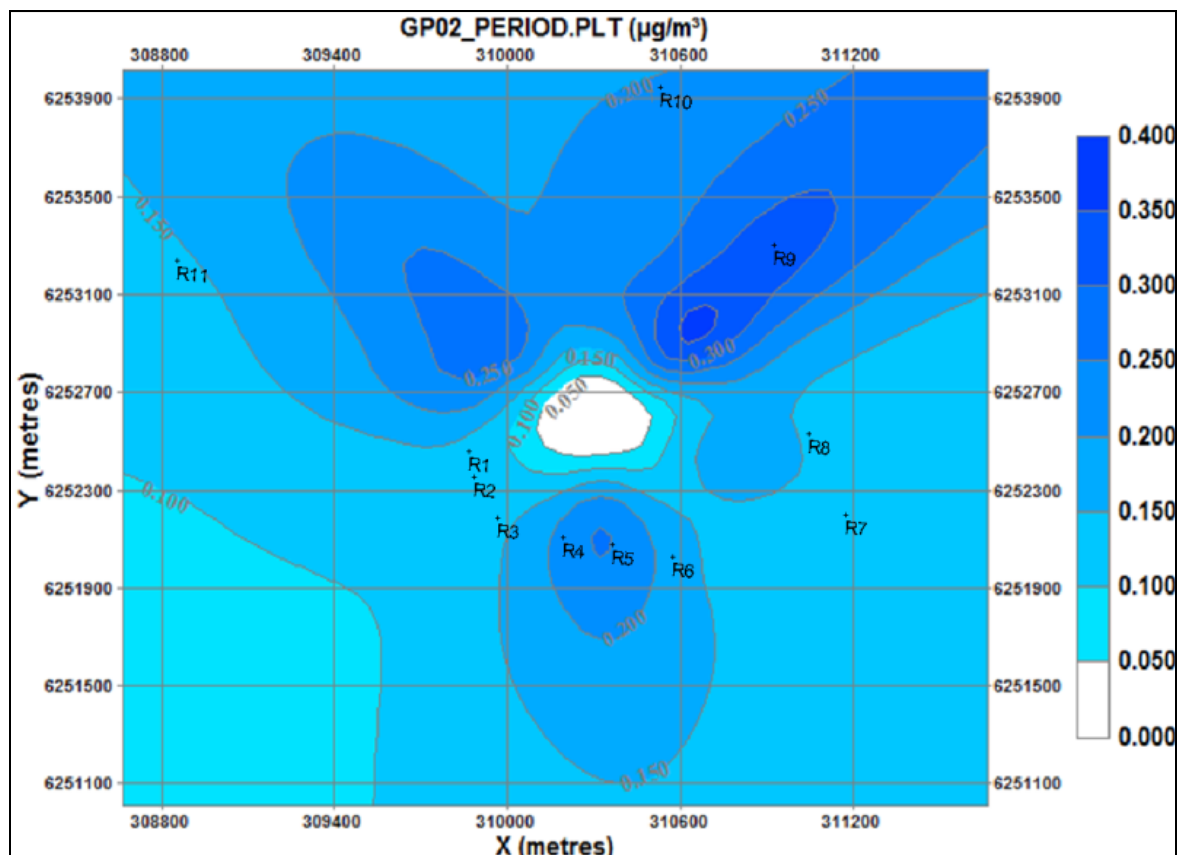


Figure 7-10: Contour for NO_x, 1 Year Averaging Period – Marubeni Only

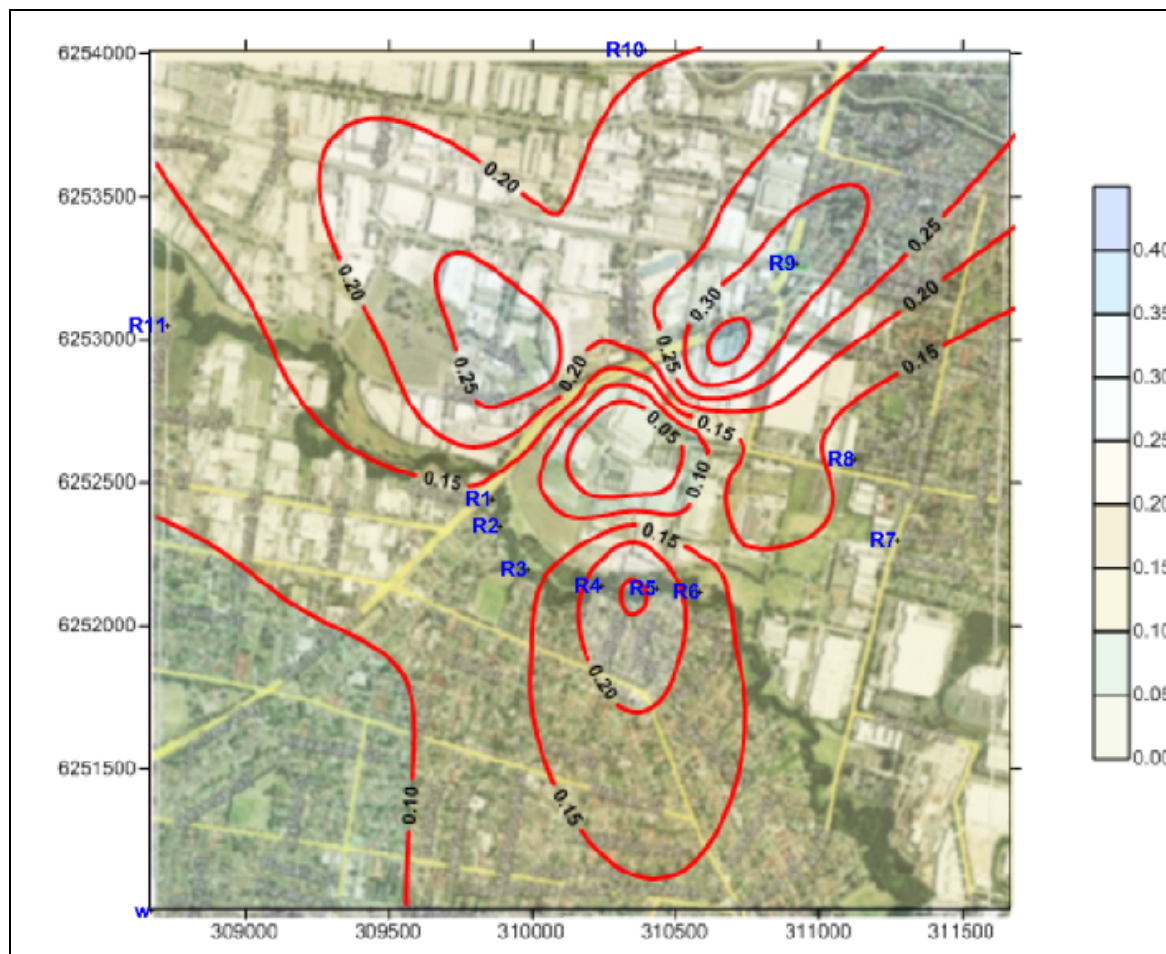


Table 7-6: Scenario 3 - Results for NOx, 1 Year Averaging Period – Combined Visy and Marubeni

Receptors	Incremental Impact ($\mu\text{g}/\text{m}^3$)	Background Air Quality ($\mu\text{g}/\text{m}^3$)	Cumulative Impact ($\mu\text{g}/\text{m}^3$)	Limit ($\mu\text{g}/\text{m}^3$)	Pass (Yes/No)
R1	1.46	18.8	20.3	62	Yes
R2	1.32		20.1		Yes
R3	1.26		20.1		Yes
R4	1.98		20.8		Yes
R5	1.97		20.8		Yes
R6	1.37		20.2		Yes
R7	1.18		20.0		Yes
R8	1.33		20.1		Yes
R9	2.46		21.3		Yes
R10	1.13		19.9		Yes
R11	0.92		19.7		Yes

Figure 7-11: Contour for NOx, 1 Year Averaging Period – Combined Visy and Marubeni

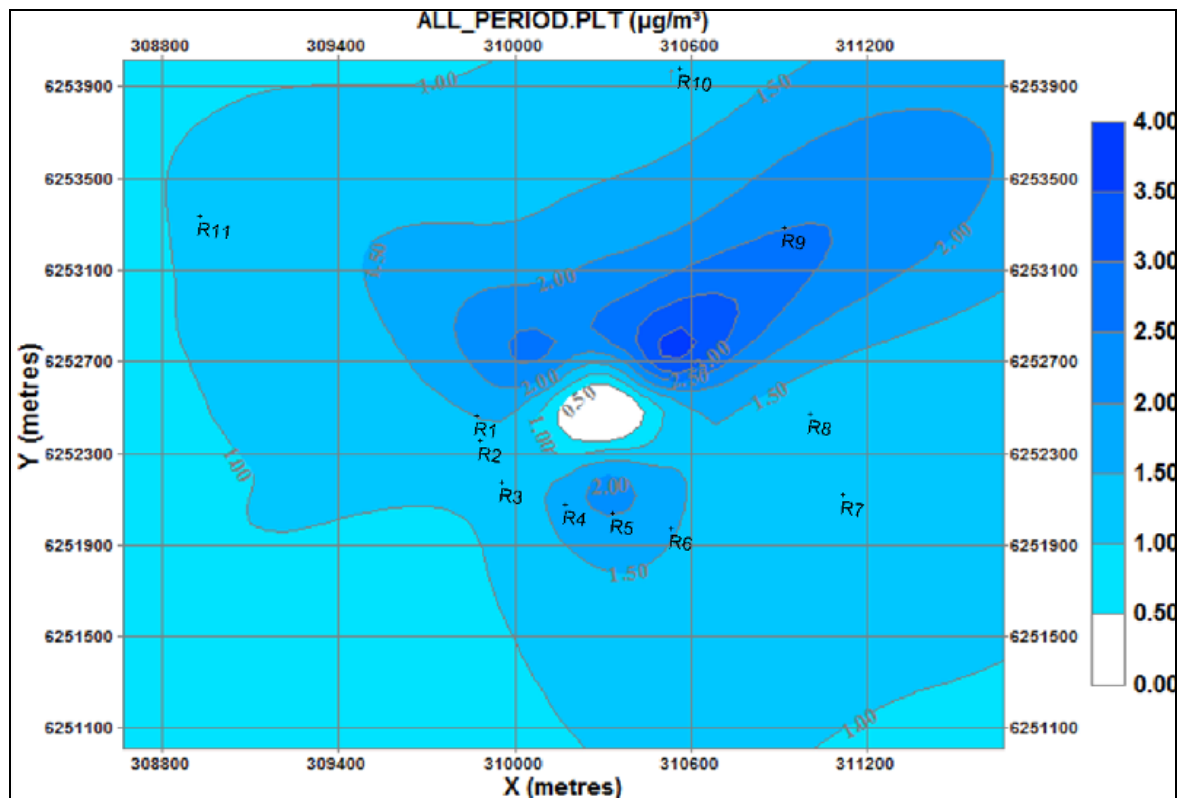
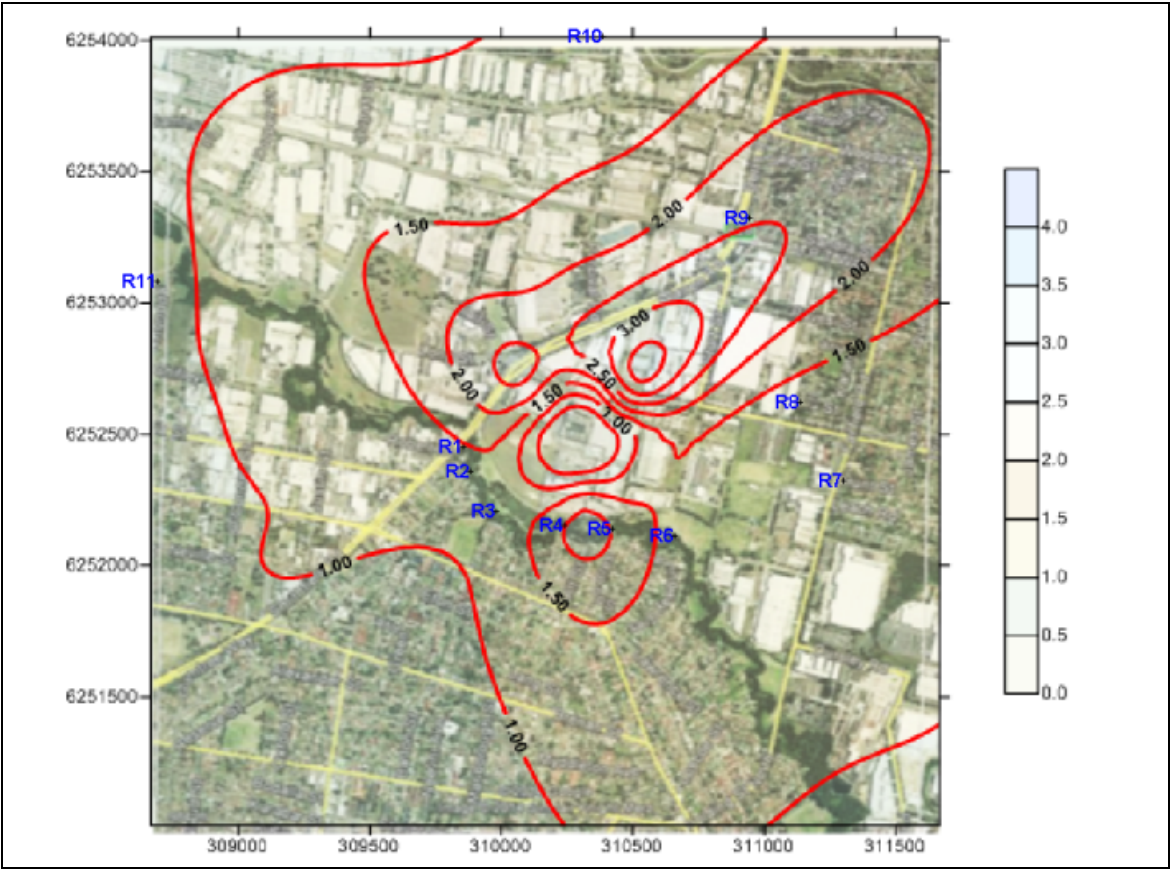


Figure 7-12: Contour for NOx, 1 Year Averaging Period – Combined Visy and Marubeni





8. STATEMENT OF POTENTIAL AIR IMPACT

An air quality impact assessment was undertaken to assess the air emissions from the proposed boiler house. This has been initiated as part of the proposed modification under Section 75W of the Environment Planning and Assessment Act 1979. This air report will form part of the Environmental Assessment.

The assessment was undertaken in accordance with the NSW EPA guidelines “Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales”. Air emission impacts were quantified using AERMOD to determine whether or not exceedances to health-impact derived assessment criteria were apparent.

The dispersion modelling undertaken has shown that no exceedances to the referenced air quality limits were predicted. Given no application of further air emission reduction controls are required, it is to be expected that no air impact issues are associated with the proposal. The assessment concludes that the proposal meets the most relevant and applicable air assessment criteria in accordance with the NSW EPA guidelines and is expected to not cause any impact or harm to any of the nearest potentially affected residences.

This concludes the report.

A handwritten signature in black ink, appearing to read 'R T Benbow'.

R T Benbow
Principal Consultant

A handwritten signature in black ink, appearing to read 'Daniele Albanese'.

Daniele Albanese
Senior Environmental Engineer

A handwritten signature in black ink, appearing to read 'L. Zanotto'.

Linda Zanotto
Senior Environmental Engineer



9. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Build Run Repair Pty Ltd – Visy Paper, as per our agreement for providing environmental services. Only Build Run Repair Pty Ltd – Visy Paper is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Build Run Repair Pty Ltd – Visy Paper for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: Quotation No ABC-140317-1 Design, fabrication, supply and commissioning of 3
off 20 MW packaged water tube boilers and associated auxiliary equipment suitable for limited
attended operation



Quotation No ABC-140317-1



Design, fabrication, supply and commissioning of 3 off 20 MW packaged water tube boilers and associated auxiliary equipment suitable for Limited attended operation.

John Crosher
Build Run Repair Pte Ltd
8 Temasek Boulevard
#11-01 Suntec Tower 3
Singapore 038988

17th March 2014

Quotation No: ABC-140317-1

Advanced Boilers & Combustion have the pleasure in providing this Quotation to supply three new limited attended 20 MW gas fired Maxitherm Water tube Steam Boilers.

In accordance with your enquiry and specification, Advanced Maxitherm Boilers offer the well proven Maxitherm "D" type water tube boiler, a boiler that is widely used in a range of industries throughout Australia and South East Asia.

It is a compact steam generating system, which has been designed and approved for continuous operation and the minimum of supervision.

All of Maxitherm boiler construction is performed in accordance with a rigid Quality Management System, which provides the checks of material quality, construction methods, and workmanship to guarantee compliance with the approved design standard and the Inspection Authority's requirements.

If you require any further information, please do not hesitate to contact me

Kind Regards

A handwritten signature in blue ink, appearing to read "Laurie Grigg", is written over a light blue rectangular background.

Laurie Grigg

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1 Engineer, Design & Documentation

Advanced Boilers & Combustion will provide the following documentation as part of our proposal

1. Detailed execution plan.
2. Boilerhouse general arrangement
3. Boiler general arrangement
4. Deaerater general arrangement
5. Blowdown vessel general arrangement
6. Steam header general arrangement
7. Electrical schematics
8. Switchgear & control assembly drawings
9. Layout foundation drawing
10. Process & instrumentation diagram to instrument level
11. All other drawings listed in 5,6.3 of the tender document

2 Boilers

Supply of 3 x 20 MW Maxitherm unattended steam boilers

Maxitherm MDN Series Packaged Steam Boilers

The MAXITHERM "D" type watertube boiler is designed for Australian conditions, designed and developed by the Maxitherm Engineering Department with more than 50 years of experience and hundreds of installations of watertube boilers, providing a product to match the best in the world.

All of MAXITHERM'S boiler construction is performed in accordance with a rigid "QUALITY MANAGEMENT SYSTEM", which provides the checks of material quality, construction methods, and workmanship to guarantee compliance with the approved design standard and the Inspection Authority's requirements.

The MAXITHERM "D" Type boiler is a compact steam generating system, which has been designed and approved for continuous operation and the minimum of supervision.

The design, material and workmanship of all pressure parts will be in strict conformity with the rules and regulations in effect at the date of contract required by:-



- 1: AS1200-Pressure Equipment
- 2: AS1228-Pressure Equipment Boilers
- 3: AS2593 Boilers-Unattended & Limited Attendance
- 4: AS1853 for Automatic Oil & Gas Burners
- 5: The regulations and Laws of the State in which the equipment is to be installed
- 6: Requirements of the Inspecting Authority under whose supervision the pressure parts of each unit shall be constructed.

CERTIFICATION

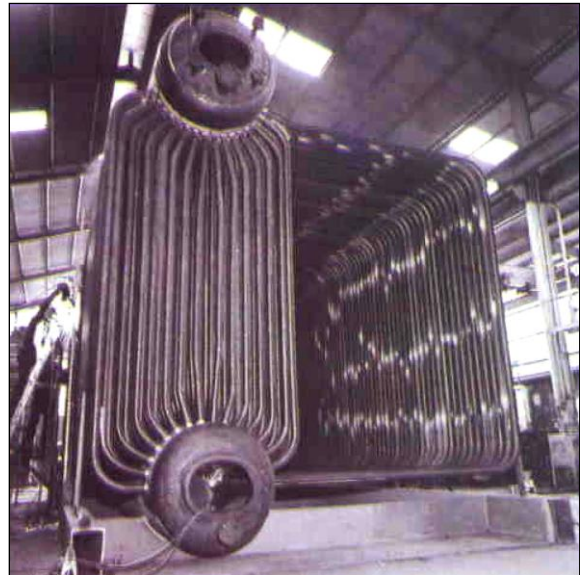
Upon completion of the boiler, a Manufacturer's Data Report will be issued which confirms all material certification, construction data, testing and inspection results.

PRESSURE PARTS

The pressure vessel assembly will be of the natural circulation two drum water tube boiler type. The boiler drums are manufactured from carbon steel complying with AS1548 or an equivalent standard. All welding procedures and non-destructive examination will comply with requirements of AS1228.

Steam/water separation is effected by use of a steam drier from which dry steam is delivered to the steam connection and moisture separated from the steam, returned to the boiler water.

The lower drum is provided with at least one blowdown line connected for draining the discharge of precipitates or the connection of the automatic blowdown system.



TUBES

All tubes in the convection section are electric-resistance- welded carbon steel boiler or super heater tube, with material specification to BS3059.

All tubes are bent to a uniform radius using the minimum number of bends to facilitate internal cleaning.

WATER WALLS

The combustion chamber and each outer wall is constructed of fin tubes, seal welded to form a gas tight area.

UNHEATED DOWNCOMERS

A row of **unheated down comers** is fitted between the top drum and bottom drum to facilitate circulation, water line stability and fast response to steam load fluctuations.

INSULATION AND REFRACTORY

The steam drum and all outer walls are insulated with fiberglass with a thickness of 100mm. All surfaced will be maintained below 55 deg C. Refractory used for seals or jointing are of a top quality high alumina type.

Inspection Procedures

Inspection & test plans & quality control documents will be made readily available should Advanced Boilers & Combustion be the successful contractor.

The manufacture of all pressure parts is inspected by a third party (Sucofindo) and Advanced Boilers & Combustion welcome & recommends BRR view any stage of manufacture by attending our manufacturing premises in Jakarta.

Employment of an Australian agent to witness any particular manufacture stage would also be welcomed.

Warranty

Controls	1 year warranty
Pressure vessel	5 years conditional upon correct water treatment & boiler operation

3 Boiler Fittings

Safety Valves

Leser safety valves will be installed on each boiler steam drum, and comply with AS1271 Section 3 & AS 2593 Section 12.

Main Boiler stop valve

The boiler main stop valve will comply with AS1271 & AS2593,
The valve will be Armstrong brand

Intermittent Boiler Blowdown

A manual blowdown valve will be provided to permit on-line removal of sludge or sediment when the boiler is in normal operation in accordance with AS 3892.

Blowdown valves will comply with the requirements of AS2593 Section 12.3.

Automatic Boiler Blowdown

The automatic blowdown will be of TDS automated solenoid valve type

Pressure Gauges

Each boiler will be fitted with a minimum of one pressure indicator, being of the Bourdon type, marked to indicate normal & safety valve lift pressures, and be protected from high temperature by a siphon tube

Gauge Glasses

Two Klinger AB18 gauge glasses will be fitted to the boiler vessel with glasses to indicate water level. The gauge glasses conform to AS1271 and are installed so that the lowest visible reading will show the water level at 50mm above the point where overheating will occur.

Air vent

An air vent will be installed on the boiler to allow air to escape during start-up.

Access / Inspection Openings

The boiler vessel contains two access doors on both the top and bottom drums of the boiler.

An access doorway is fitted to the boiler furnace to allow access for inspection and cleaning.

All doorways conform to AS1210 section 3.20 and as 1228 section 3.9.

Data Sheet 1: Boiler Heat Balance & Thermal Performance

3x20 MW Steam boiler	Units (metric)	MCR
Maximum boiler rating (per boiler)	MW	20
Steam flow for process (per boiler)	kg/h	30,430
Maximum boiler rating (total for 3 boilers)	MW	60
Steam flow for process (total for 3 boilers)	kg/h	91,290
Steam pressure at stop valve	kPa(g)	1,750
Steam temperature at stop valve	°C	208.5
Steam quality	%	99.5
Make-up water temperature (assumed)	°C	20
Condensate return (advised by client)	%	70
Condensate temperature (advised by client)	°C	135
Steam for deaerator heating (per boiler)	kg/h	220
Steam for deaerator heating (total for 3 boilers)	kg/h	660
Feedwater temperature at deaerator outlet	°C	105
Feed water temperature at economizer outlet	°C	141
Feedwater TDS (assumed)	ppm	30
Rate of blowdown (based on above)	%	0.5
Blowdown flow (per boiler)	kg/h	152
Blowdown flow (total for 3 boilers)	kg/h	456
Ambient air temperature (advised by client)	°C	17
Ambient air humidity (assumed)	%	80
<i>Combustion data: Natural gas (per boiler)</i>		
Excess Air	%	15
Air required for combustion	kg/h	30,568
Air required for combustion (@ Air temperature)	m ³ /h	25,232
Gross calorific value of fuel	MJ/Sm ³	37.5
Fuel firing rate	kg/h	1644
Fuel firing rate	Sm ³ /h	2273
Flue gas emissions:		
CO ₂	% dry basis	10.2
	g/s	1,200
O ₂	% dry basis	3.0

3x20 MW Steam boiler	Units (metric)	MCR
N ₂	% dry basis	86.8
SO ₂	% dry basis	0
NO _x at MCR (as NO ₂)	ppm 3%O ₂	<100
	ppm 11%O ₂	<55
Flue gas rate	kg/h	32,133
Flue gas rate (@flu gas temperature)	m ³ /h	38,298
Gross thermal efficiency	%	84.5
Nett thermal efficiency	%	93.9
<u>Gas Temperatures</u>		
Leaving furnace	°C	1200
Leaving boiler bank	°C	260
Leaving economizer	°C	128
At top of chimney	°C	121
<u>Heat Balance</u>		
Heat to steam flow	MW	20.0
Heat loss due to sensible heat in dry flue gas	MW	0.88
Heat loss due to enthalpy of water vapour in dry flu gas	MW	2.66
Heat loss due to moisture in air	MW	0.02
Heat loss due to radiation	MW	0.11
Other unaccounted heat loss	MW	0.0
Total available heating capacity of fuel	MW	23.66

Data sheet 2: Boiler

20 MW Steam boiler	Units	
Technology Supplier	-	Maxitherm
Manufacturer	-	Boustead Maxitherm Industries
Place of manufacture	-	Jakarta, Indonesia
Type	-	Watertube
Shipping weight	kg	61,100
Flooded weight	kg	80,700
Circulation ratio	#	30
Design pressure	kPa	2,000
Design temperature	°C	250
Electrical consumption	kW	197
<u>Furnace Dimensions</u>		
Width inside tubes	m	2.481
Depth inside tubes	m	8.232
Height, mean dimension	m	2.61
Volume	m ³	53.3
Furnace back pressure	Pa	1500
Casing design pressure	Pa	2,000
Tube OD	mm	50.8
Tube material specification		BS3059 PT1 ER320 or ASTM A192
Total radiant area	m ²	75
Percentage of heat absorbed in radiant area	%	45
<u>Convective Bank</u>		
Total convective heating surface	m ²	556
Tube OD	mm	50.8
Tube material specification		BS3059 PT1 ER320 or ASTM A192
Percentage of heat absorbed in convective area	%	55
Total effective heating surface (radiant + convective)	m ²	631
Heat transfer area	m ² /MW	31.5
Heat transfer rate	kW/m ²	31.7

20 MW Steam boiler	Units		
Furnace heat release	kW/m ³	431.3	
Maximum gas velocity	m/s	12	
Tubes plain or finned?	-	Plain	
<u>Drum</u>		Steam Drum	Water Drum
Internal diameter	mm	1200	800
Length of shell	mm	8378	8378
Drum Material		ASTM 515/516 GR70	ASTM 515/516 GR70
Description of steam separation intervals		Baffles	Baffles
Drum centre's	mm	3125	3125

Data Sheet 3: Combustion system/ Burners

Burner	Units	
Technology supplier	-	Dunphy
Manufacturer	-	Dunphy (UK)
Model	-	BG-7.270 ME
Number of burners	#	1
Turndown ratio		7:1 (10:1 achievable)
Oxygen control system		Siemens PLL (LMV integrated)
Gas control methodology (e.g. independent modulating valve)		Servo motor fitted to Gas butterfly valve.
Air control methodology (e.g. independent modulating valve)		Servo motor fitted to burner air inlet dampers and burner mixing head.

Data Sheet 4: Pumps

Boiler Feedwater Pumps	Units	
<u>Feed Pumps</u>		
Pump Application		Boiler Feedwater Pumps
Manufacturer		Grundfos
Type		Vertical multistage centrifugal
Model		CR 45-12-2
Number required	#	2 per boiler
Design capacity	m ³ /h	42
Design discharge head	m	230
Discharge head at MCR	m	205
Efficiency at MCR	%	78
Material of pump head		Cast Iron EN-GJS-500-7 – ASTM 80-55-06
Material of shaft		Stainless Steel 1.4057 – AISI 431
Material of impeller and diffusers		Stainless Steel 1.4301 – AISI 304
Number of stages		12
Description of shaft seals		Grundfos shaft seal HQQE
Motor size	kW	45
Motor speed	rpm	2920
NPSH _R	m	2.2

Data Sheet 4: Pumps

Deaerator Transfer pumps	Units	
<u>Feed Pumps</u>		
Pump Application		Deaerator Transfer Pumps
Manufacturer		Grundfos
Type		Horizontal single stage, end suction pump
Model		NB 100-250/245
Number required	#	2
Design capacity	m ³ /h	170
Design discharge head	m	20
Discharge head at MCR	m	15
Efficiency at MCR	%	68
Material of casing		Cast Iron
Material of shaft		Stainless Steel
Material of impeller and diffusers		Bronze
Number of stages		1
Description of shaft seals		Mechanica seal BAQE
Motor size	kW	11
Motor speed	rpm	1450
NPSH _R	m	1.5

Data Sheet 5: Blowdown system

Blowdown tank	Units	
Technology Supplier		Maxitherm
Manufacturer		Advanced Boilers & Combustion
<u>Anticipated Design Performance:</u>		
Estimated flow rate (total from 3 boilers)	kg/h	456
Temperature on inlet	°C	155
Temperature on outlet	°C	60
<u>Blowdown vessel</u>		
Model		Maxitherm 24/06
Storage vessel size – shell length	m	3.0
Storage vessel size - diameter	m	1.22
Design pressure	kPag	700
Design temperature	°C	200
Shell thickness	mm	8
Shell corrosion allowance	mm	>0.75
Capacity of storage section - total	m ³	3.8
Capacity of storage section - within normal operating range;	m ³	1.9
Shell material		AS1548-460
Shipping weight	kg	1000

Data Sheet 6: Feedwater system

Feedwater tank	Units	
Technology Supplier		Maxitherm
Manufacturer		Advanced Boilers & Combustion
Operating volume (30min operation @MCR)	Litres	32000
Design Temperature	°C	100
<u>Vessel Details</u>		
Tank size – inside diameter	m	3.2
Tank size - height	m	4.5
Shell thickness	mm	10
Shell material		AS 3678-250
Paint – internal		2 coats 'APEXIOR' No.1
Paint – external		1 coat 'GALMET' cold galvanizing
Insulation type		Rockwool
Insulation thickness		50
Cladding		0.8mm Colorbond

Data Sheet 7: Deaerator

D68 Deaerator	Units	
Technology Supplier		Maxitherm
Manufacturer		Advanced Boilers & Combustion
Type		Spray
<u>Anticipated Design Performance:</u>		
Feedwater flowrate	kg/h	108,800
Condensate return (% boiler steam flow)	%	70
Condensate temperature (advised by client)	°C	135
Operating pressure	kPag	20
Steam flowrate (normal operation)	kg/h	660
Steam supply pressure	kPag	1750
Steam temperature at inlet	°C	208
Maximum oxygen content @MCR	ppb	7
Storage vessel size – shell length	m	6.25
Storage vessel size - diameter	m	2.76
Maximum allowable working pressure	kPag	350
Shell thickness	mm	12
Shell corrosion allowance	mm	>0.75
Capacity of storage section - total	m ³	43
Capacity of storage section - within normal operating range; i.e. normal to minimum operating level	m ³	22.2
Material of spray/baffle/trays		SS316
Shell material		AS1548-460
Insulation type		Rockwool
Insulation thickness		50
Cladding		0.8mm Colorbond
Shipping weight	kg	9,000
Flooded weight	kg	52,000

Data Sheet 9: Economizer

Economizer	Units	
Technology supplier	-	Advanced Boilers & Combustion
Manufacturer	-	Advanced Boilers & Combustion
Counter or parallel flow	C or P	C
Coil face area	m ²	3.71
Tube OD and wall thickness	mm	25.4 x 2.77
Tube material		A192 Carbon steel
Finning length	mm	2285
No. tubes wide	-	36
No. tubes deep	-	16
Fin material		11x1.2 carbon steel
Water inlet temperature	°C	105
Water outlet temperature	°C	141
Gas inlet temperature	°C	260
Gas outlet temperature	°C	128
Heat Recovered	kW	1,340
Fuel saving	%	6.7

Data Sheet 10: Stack and Ducting

Stack – 1 per boiler	Units	
Type		Parallel
Diameter	mm	1,400
Height	m	30
Material		Carbon steel AS3678-250
Design temperature	°C	250
Emission velocity	m/s	15
Insulation thickness	mm	50
Insulation material	-	Rockwool
Insulation cladding type	-	0.8mm Colorbond
Type of support		Self Supported
Ducting	Units	
<u>Maximum Ducting Velocities at MCR</u>		
Air inlet duct	m/s	12
Economizer outlet	m/s	10
Material of ducting		AS 3678-250
<u>Expansion Joints</u>		
Manufacturer		Advanced Boilers & Combustion
Type of joint		Fabric sealed

5 Boiler Control & Supervisory System

Each boiler will be supplied with its own unattended control system, complying with all parts of AS2595

5.1 Panel

The control panel will comprise of Rital TS 8 baying system panels, mounted together on a 200mm plinth. Exhaust fans are fitted to the panel.

5.2 Level Checking System

Spirax Sarco High Integrity probes will be used as the level checking system. The probe system does not have any moving parts, eliminating faults to magnetic switches, dunk coil/solenoids & Level checking/watchdog timers. The probe system offers High reliability & low maintenance



5.3 Level control

The boiler water level measurement will be achieved by fitting a Yokagowa differential transmitter across the gauge glass measuring distance of the steam drum. The water level is scaled & displayed as 0 – 100% of visible gauge glass on the touch screen. High & low level alarms are adjustable. A second pump 'kick in' is also programmable, preventing low water levels when a pump is down in capacity or excessive load is drawn from the boiler. The feedwater control valve will be a Fischer control valve.

5.4 Motor control

The motor control cubicle will contain Allan Bradley motor circuit breakers mounted on a bus bar rail system, Allan Bradley contactors, main switch & control circuit breakers.

The variable speed drive will be an AllenBradley Powerflex 752

VSD control will be installed on both feedwater pumps & the combustion air fan of each new boiler

5.5 PLC

Siemens S7300

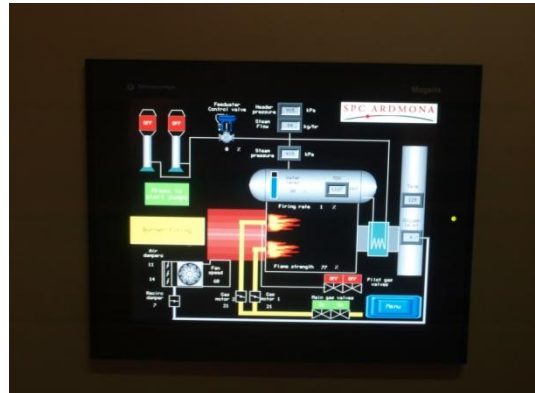
Ethernet is available for plant BMS

15% spare I/O

5.7 Operator Interface

An Siemens touch screen will be installed into the front door of the control panel. The touch screen is menu driven, giving easy operation with maximum visual display. Some displayed parameters are

- Burner Gas Flow
- Gas motor position
- Air motor position
- VSD Speed
- Flame Strength
- Boiler Water level
- Ignition Status
- Burner status
- Steam pressure
- Water control valve
- Feed pump operation
- Feed water pump sequencing
- Boiler pressure indication
- Boiler Steam Flow



Steam & water PID loops have full trending & adjustment, ensuring that plant pressure is controlled smoothly.

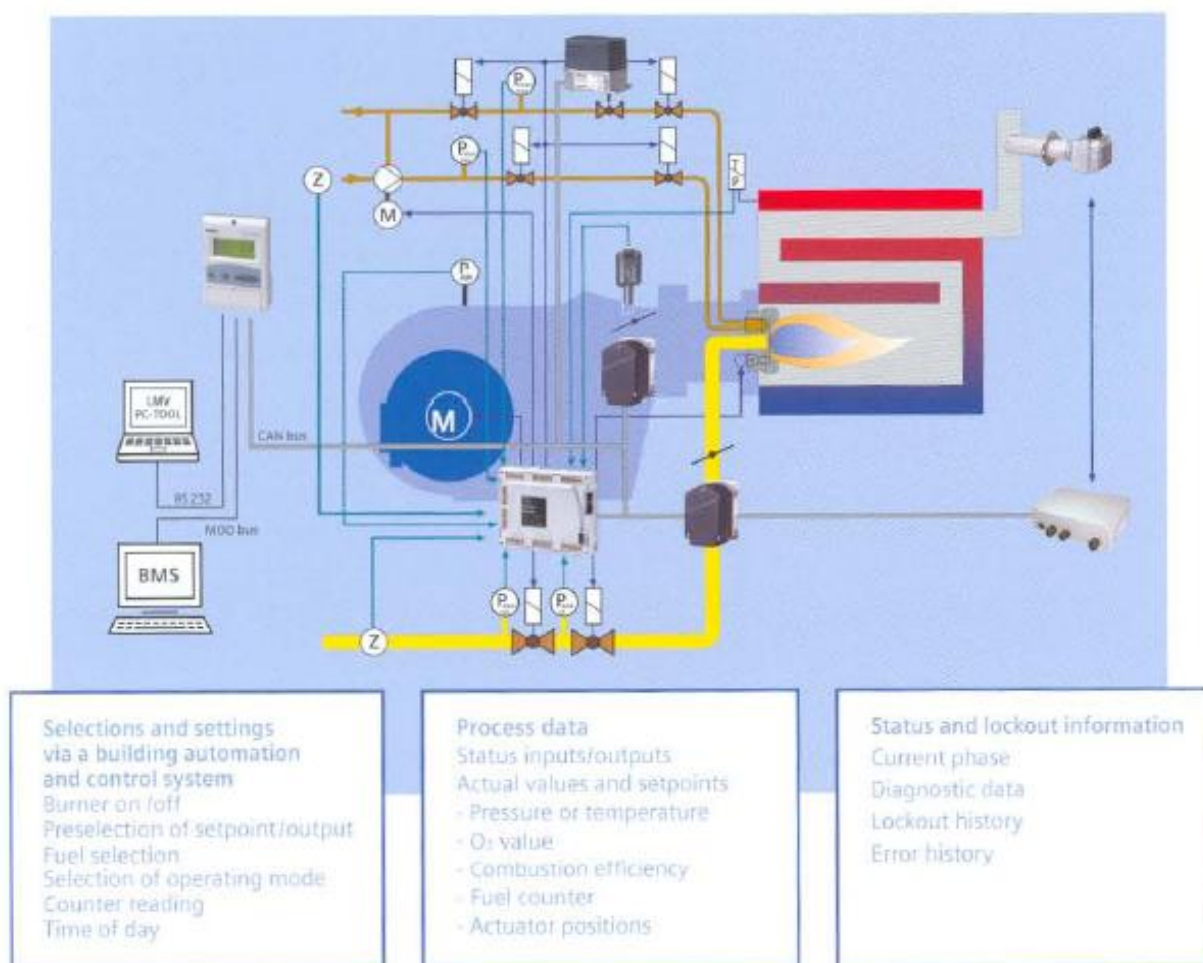
All alarms are monitored & logged in the alarm history

5.8 Combustion Control

The Siemens LMV 52 is an electronic burner management controller. There are no mechanical linkages between dampers & gas control motors.

Efficient combustion is achieved by electronic programming of up to 15 points of a ratio curve. The LMV52 monitors all alarms & controls the following

- Burner start/ stop sequence
- Valve pressure proving
- Air fuel ratio control
- Flame supervision
- Load control
- VFD control
- Oxygen control



6 Water Treatment

Water treatment plant will consist of

Water softeners, 100,000lt/hr. throughput, <2ppm CaCO₃

5 cooled water sampling pots

9 chemical pumps

7 Commissioning

Commissioning will be carried out by a qualified, licensed trained person

Commissioning will include the necessary checks to allow

- The gas to be admitted to the appliances.
- The burners to be fired
- The controls to be set up for unattended operation
- All pumps operable
- Safety valves to be tested
- The boilers to be set to work

After each boiler has operated satisfactorily in unattended mode for 24 hours the specified performance tests can be conducted.

All gas approvals will be obtained at this stage

8 Performance testing

Performance testing will be carried out as per the specification, to confirm the boiler performance to the figures supplied in the boiler specification..

It is assumed that a steam load equivalent to MCR of each boiler will be available;
Provisions for test steam venting outlets have not been provided.

9 Operator Training

3 training sessions to train staff will be provided

10 Delivery & assembly

The boiler and ancillary will be delivered to sit.

The boiler will be positioned & assembled ready for installation

The ancillary equipment will be positioned & assembled ready for installation.

No other installation component has been allowed for

A Comparison of AERMOD and AUSPLUME (6.0)

AERMOD was developed around the year 2000 to provide a more accurate steady state Gaussian plume model for near field modelling and where terrain and meteorology may be more influencing factors.

The information presented in this Attachment is compiled from a Tutorial Guide prepared as part of the pDs Consultancy AERMOD Technical Training Manual.

Similar comments are presented in the Good Practice Guide for Atmospheric Dispersion Modelling Ministry for the Environment, NZ.

AERMOD incorporates state of the art micro meteorology and dispersion. It uses more detailed input meteorology and is more representative of real life situations where corrective dispersion and complex terrain plume interactions may occur.

The overall model evaluation results for AERMOD conducted in the US (reference pDs Consultancy) are 0.97 overall predicted – to observed ratio for short-term averages using AERMOD. This would favour modelling of air quality criteria that have a health-based (hourly) limit.

The US EPA adopted AERMOD in 2006 and the Victorian EPA in January 2014.

The maximum concentration predicted by AERMOD is typically higher than the same source-modelling predicted by AUSPLUME (version 6.0).

The differences are likely to be even greater in terrain that is moderate to complex. AERMOD follows the terrain and uses algorithms that more accurately conform to the physics of plume buoyancy during unstable atmospheric conditions.

AERMOD, as used by pDs Consultancy, is able to handle the atmospheric reaction that converts NO to NO₂.

AERMOD for this project uses an accepted method of converting NO₂ based on in-stack ratio of 30% and an ambient ratio of 70%. 100% conversion of NO to NO₂ is assumed to occur.

AERMOD also has the ability to use the US EPA's Ozone Limiting Method (OLM).

Ozone Generation

A photochemical smog analysis has not been undertaken. Further advice will be sought from the NSW EPA's Air Technical Advisory Services Unit. This analysis is not a necessary part of the Air Quality Impact Assessment.

The closest monitoring station for Ozone is at Prospect. The results for 2012 are the latest results.

The results including the OLM method for the combined operation are shown in Table A below.

Daily maximum 1 hour average concentrations (2012) are:

Highest value 0.09 ppm

Second highest value 0.078 ppm

Daily maximum rolling 4 hour average concentrations (2012) Highest value 0.073 ppm and second highest value 0.070 ppm

The current ground level criteria are 0.100 ppm for 1 hour and 4 hour is 0.080 ppm.

The adoption of low NO_x burners for the boilers is therefore commendable to assist in the management, long term, of the prevention of photochemical smog exceeding the criteria.

Table A: Results for NO_x with OLM , 1 hour Averaging Period – Combined Visy and Marubeni

Receivers	Incremental Impact (µg/m ³)	Background Air Quality (µg/m ³)	Cumulative Impact (µg/m ³)	Limit (µm/m ³)	Pass (Yes/No)
R1	39.6	94	133.6	246	Yes
R2	40.6		134.6		Yes
R3	39.4		133.4		Yes
R4	49.1		143.1		Yes
R5	45.7		139.7		Yes
R6	32.5		126.5		Yes
R7	17.8		111.8		Yes
R8	18.4		112.4		Yes
R9	24.0		118.0		Yes
R10	18.9		112.9		Yes
R11	18.7		112.7		Yes

Results for NO_x with OLM , 1 Year Averaging Period – Combined Visy and Marubeni

Receptors	Incremental Impact (µg/m ³)	Background Air Quality (µg/m ³)	Cumulative Impact (µg/m ³)	Limit (µm/m ³)	Pass (Yes/No)
R1	1.3	18.8	20.1	62	Yes
R2	1.2		20.0		Yes
R3	1.1		19.9		Yes
R4	1.8		20.6		Yes
R5	1.8		20.6		Yes
R6	1.2		20.0		Yes
R7	1.1		19.9		Yes
R8	1.2		20.0		Yes
R9	2.2		21.0		Yes
R10	1.0		19.8		Yes
R11	0.8		19.6		Yes

Attachment 3: AERMOD Output file

* AERMOD (14134): Impact of NO2 from NOx burners

09/25/14

* AERMET (12345):

14:47:11

* MODELING OPTIONS USED: NonDEFAULT CONC FLAT NOCHKD OLM BETA

* RANK-FILE OF UP TO 100 TOP 1-HR VALUES FOR 3 SOURCE GROUPS

* INCLUDES OVERALL MAXIMUM VALUES WITH DUPLICATE DATA PERIODS REMOVED

* FORMAT: (1X,I6,1X,F13.5,1X,I8.8,2(1X,F13.5),3(1X,F7.2),2X,A8)

* RANK AVERAGE CONC DATE X Y ZELEV ZHILL ZFLAG

GRP

*

1	69.98256	12030418	310316.00000	6252761.00000	0.00	0.00	0.00	GP01
2	68.55045	12020721	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
3	68.43747	12022918	310466.00000	6252711.00000	0.00	0.00	0.00	GP01
4	68.17429	12011406	310116.00000	6252711.00000	0.00	0.00	0.00	GP01
5	67.92126	12020918	310016.00000	6252311.00000	0.00	0.00	0.00	GP01
6	67.88411	12030104	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
7	67.86679	12020720	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
8	67.45990	12022919	310116.00000	6252711.00000	0.00	0.00	0.00	GP01
9	67.45609	12030523	310116.00000	6252711.00000	0.00	0.00	0.00	GP01
10	67.42661	12013123	310166.00000	6252761.00000	0.00	0.00	0.00	GP01
11	67.41394	12022019	310116.00000	6252761.00000	0.00	0.00	0.00	GP01
12	67.32609	12012019	309966.00000	6252411.00000	0.00	0.00	0.00	GP01
13	67.25140	12122923	310116.00000	6252711.00000	0.00	0.00	0.00	GP01
14	67.20930	12020106	310266.00000	6252761.00000	0.00	0.00	0.00	GP01
15	67.20357	12122024	310116.00000	6252711.00000	0.00	0.00	0.00	GP01
16	67.16615	12013124	310266.00000	6252761.00000	0.00	0.00	0.00	GP01
17	67.15009	12011402	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
18	67.14744	12122023	310216.00000	6252761.00000	0.00	0.00	0.00	GP01
19	67.10446	12121719	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
20	67.09079	12112220	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
21	67.05919	12120218	310066.00000	6252711.00000	0.00	0.00	0.00	GP01
22	66.99423	12020820	310016.00000	6252661.00000	0.00	0.00	0.00	GP01
23	66.95438	12041718	310316.00000	6252761.00000	0.00	0.00	0.00	GP01
24	66.95260	12021801	310516.00000	6252661.00000	0.00	0.00	0.00	GP01
25	66.94187	12122423	310416.00000	6252761.00000	0.00	0.00	0.00	GP01
26	66.93222	12020923	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
27	66.93222	12031023	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
28	66.93222	12040720	310066.00000	6252661.00000	0.00	0.00	0.00	GP01
29	66.88291	12122922	310066.00000	6252711.00000	0.00	0.00	0.00	GP01
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32	66.79546	12121119	310266.00000	6252811.00000	0.00	0.00	0.00	GP01
33	66.76191	12030201	310416.00000	6252761.00000	0.00	0.00	0.00	GP01
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43	66.46424	12022811	310366.00000	6252261.00000	0.00	0.00	0.00	GP01
44	66.44403	12011420	310066.00000	6252611.00000	0.00	0.00	0.00	GP01
45	66.43070	12013121	310016.00000	6252661.00000	0.00	0.00	0.00	GP01
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47	66.39821	12020105	310366.00000	6252761.00000	0.00	0.00	0.00	GP01
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56	66.20617	12112219	310066.00000	6252711.00000	0.00	0.00	0.00	GP01
57	66.18261	12121101	310316.00000	6252761.00000	0.00	0.00	0.00	GP01
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82	65.71579	12121003	310416.00000	6252761.00000	0.00	0.00	0.00	GP01
83	65.70939	12121019	310166.00000	6252761.00000	0.00	0.00	0.00	GP01
84	65.69455	12111320	310116.00000	6252761.00000	0.00	0.00	0.00	GP01
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87	65.62609	12122524	310516.00000	6252711.00000	0.00	0.00	0.00	GP01
88	65.62444	12111001	310216.00000	6252761.00000	0.00	0.00	0.00	GP01
89	65.60050	12040722	310016.00000	6252661.00000	0.00	0.00	0.00	GP01
90	65.59936	12120222	310116.00000	6252711.00000	0.00	0.00	0.00	GP01
91	65.59192	12020719	310216.00000	6252761.00000	0.00	0.00	0.00	GP01
92	65.57020	12041705	310516.00000	6252661.00000	0.00	0.00	0.00	GP01
93	65.54631	12112720	310066.00000	6252711.00000	0.00	0.00	0.00	GP01
94	65.53502	12020304	310466.00000	6252711.00000	0.00	0.00	0.00	GP01
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97	65.47454	12032204	310216.00000	6252811.00000	0.00	0.00	0.00	GP01
98	65.45730	12112221	310116.00000	6252761.00000	0.00	0.00	0.00	GP01
99	65.45560	12020103	310316.00000	6252811.00000	0.00	0.00	0.00	GP01
100	65.41305	12121002	310316.00000	6252811.00000	0.00	0.00	0.00	GP01
1	13.50044	12122019	309816.00000	6253311.00000	0.00	0.00	0.00	GP02
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4	12.42755	12122817	310016.00000	6252861.00000	0.00	0.00	0.00	GP02
5	12.42148	12120218	309666.00000	6253211.00000	0.00	0.00	0.00	GP02
6	12.38731	12013119	309566.00000	6253111.00000	0.00	0.00	0.00	GP02
7	12.37600	12122411	310316.00000	6252161.00000	0.00	0.00	0.00	GP02
8	12.36873	12072214	310216.00000	6252961.00000	0.00	0.00	0.00	GP02
9	12.31266	12013013	310366.00000	6252161.00000	0.00	0.00	0.00	GP02
10	12.30393	12122011	310716.00000	6252411.00000	0.00	0.00	0.00	GP02
11	12.27851	12122013	310666.00000	6252811.00000	0.00	0.00	0.00	GP02
12	12.25334	12102012	310716.00000	6252761.00000	0.00	0.00	0.00	GP02
13	12.22097	12120921	310016.00000	6253461.00000	0.00	0.00	0.00	GP02
14	12.21804	12120914	310066.00000	6252961.00000	0.00	0.00	0.00	GP02
15	12.20675	12122014	310666.00000	6252811.00000	0.00	0.00	0.00	GP02
16	12.18745	12092815	310516.00000	6252211.00000	0.00	0.00	0.00	GP02
17	12.13843	12122012	310766.00000	6252561.00000	0.00	0.00	0.00	GP02
18	12.12927	12122020	309966.00000	6253411.00000	0.00	0.00	0.00	GP02
19	12.12909	12122412	310266.00000	6252161.00000	0.00	0.00	0.00	GP02
20	12.12780	12081715	310666.00000	6252511.00000	0.00	0.00	0.00	GP02
21	12.09530	12110113	310466.00000	6252211.00000	0.00	0.00	0.00	GP02
22	12.09232	12100513	310766.00000	6252461.00000	0.00	0.00	0.00	GP02
23	12.06506	12111822	310066.00000	6253461.00000	0.00	0.00	0.00	GP02
24	12.04832	12090714	310716.00000	6252411.00000	0.00	0.00	0.00	GP02
25	12.02527	12081015	310316.00000	6253011.00000	0.00	0.00	0.00	GP02
26	12.00387	12011914	309966.00000	6252861.00000	0.00	0.00	0.00	GP02
27	11.97692	12120514	310666.00000	6252861.00000	0.00	0.00	0.00	GP02
28	11.96789	12090716	310666.00000	6252361.00000	0.00	0.00	0.00	GP02
29	11.94940	12082314	310516.00000	6252161.00000	0.00	0.00	0.00	GP02
30	11.92819	12122315	309866.00000	6252761.00000	0.00	0.00	0.00	GP02
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32	11.92226	12122410	310166.00000	6252161.00000	0.00	0.00	0.00	GP02
33	11.91593	12120919	309966.00000	6253411.00000	0.00	0.00	0.00	GP02
34	11.89853	12102013	310666.00000	6252861.00000	0.00	0.00	0.00	GP02
35	11.89518	12122416	309816.00000	6252511.00000	0.00	0.00	0.00	GP02
36	11.86397	12013111	310516.00000	6252961.00000	0.00	0.00	0.00	GP02
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38	11.85655	12092913	310616.00000	6252261.00000	0.00	0.00	0.00	GP02
39	11.85146	12122316	309866.00000	6252811.00000	0.00	0.00	0.00	GP02
40	11.84943	12030413	310266.00000	6252161.00000	0.00	0.00	0.00	GP02
41	11.83744	12013114	310416.00000	6253011.00000	0.00	0.00	0.00	GP02
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43	11.83577	12030512	310316.00000	6253011.00000	0.00	0.00	0.00	GP02
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50	11.77253	12013112	310466.00000	6253011.00000	0.00	0.00	0.00	GP02
51	11.77047	12112714	309866.00000	6252761.00000	0.00	0.00	0.00	GP02
52	11.75785	12010912	310666.00000	6252761.00000	0.00	0.00	0.00	GP02
53	11.75658	12013014	310366.00000	6252111.00000	0.00	0.00	0.00	GP02
54	11.75206	12090613	310716.00000	6252361.00000	0.00	0.00	0.00	GP02
55	11.74524	12092813	310422.80000	6252142.00000	0.00	0.00	0.00	GP02
56	11.74357	12102712	310016.00000	6252911.00000	0.00	0.00	0.00	GP02
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58	11.72295	12110615	309916.00000	6252811.00000	0.00	0.00	0.00	GP02
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63	11.69991	12112516	309866.00000	6252811.00000	0.00	0.00	0.00	GP02
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65	11.68387	12120913	309966.00000	6252911.00000	0.00	0.00	0.00	GP02
66	11.67209	12111212	310366.00000	6252161.00000	0.00	0.00	0.00	GP02
67	11.66053	12092812	310416.00000	6252111.00000	0.00	0.00	0.00	GP02
68	11.64846	12013012	310316.00000	6252111.00000	0.00	0.00	0.00	GP02
69	11.62782	12090611	310616.00000	6252261.00000	0.00	0.00	0.00	GP02
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71	11.61373	12081014	310216.00000	6253011.00000	0.00	0.00	0.00	GP02
72	11.60526	12120412	310666.00000	6252811.00000	0.00	0.00	0.00	GP02
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78	11.55299	12030913	310766.00000	6252461.00000	0.00	0.00	0.00	GP02
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83	11.54359	12090612	310666.00000	6252261.00000	0.00	0.00	0.00	GP02
84	11.54102	12112517	309816.00000	6252711.00000	0.00	0.00	0.00	GP02
85	11.54011	12102115	310766.00000	6252461.00000	0.00	0.00	0.00	GP02
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87	11.53757	12030813	310316.00000	6253011.00000	0.00	0.00	0.00	GP02
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89	11.52624	12011113	310766.00000	6252461.00000	0.00	0.00	0.00	GP02
90	11.52270	12120414	310766.00000	6252761.00000	0.00	0.00	0.00	GP02
91	11.52230	12120911	309916.00000	6252861.00000	0.00	0.00	0.00	GP02
92	11.50965	12120916	310016.00000	6252961.00000	0.00	0.00	0.00	GP02
93	11.50885	12081713	310422.80000	6252142.00000	0.00	0.00	0.00	GP02
94	11.50690	12122317	309816.00000	6252461.00000	0.00	0.00	0.00	GP02
95	11.50234	12120411	310716.00000	6252761.00000	0.00	0.00	0.00	GP02
96	11.49407	12120512	310716.00000	6252811.00000	0.00	0.00	0.00	GP02
97	11.49342	12032204	310116.00000	6253461.00000	0.00	0.00	0.00	GP02
98	11.48785	12120212	309916.00000	6252761.00000	0.00	0.00	0.00	GP02
99	11.48340	12120410	310766.00000	6252561.00000	0.00	0.00	0.00	GP02
100	11.48081	12022113	310416.00000	6253011.00000	0.00	0.00	0.00	GP02
1	72.45795	12022811	310366.00000	6252261.00000	0.00	0.00	0.00	ALL
2	72.42309	12110611	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
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4	70.25108	12103013	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
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6	70.01020	12030112	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
7	69.39704	12110112	310416.00000	6252261.00000	0.00	0.00	0.00	ALL
8	69.31942	12122811	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
9	68.55502	12020721	310066.00000	6252661.00000	0.00	0.00	0.00	ALL
10	68.50364	12110512	310116.00000	6252361.00000	0.00	0.00	0.00	ALL
11	68.44973	12022918	310466.00000	6252711.00000	0.00	0.00	0.00	ALL
12	68.44842	12120113	310366.00000	6252261.00000	0.00	0.00	0.00	ALL
13	68.26945	12103011	310366.00000	6252261.00000	0.00	0.00	0.00	ALL
14	68.26409	12102111	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
15	68.18985	12011406	310116.00000	6252711.00000	0.00	0.00	0.00	ALL
16	68.18620	12020918	310016.00000	6252311.00000	0.00	0.00	0.00	ALL
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18	67.99814	12102911	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
19	67.89533	12030104	310066.00000	6252661.00000	0.00	0.00	0.00	ALL

20	67.87559	12020720	310066.00000	6252661.00000	0.00	0.00	0.00	ALL
21	67.58379	12092311	310316.00000	6252261.00000	0.00	0.00	0.00	ALL
22	67.47398	12030523	310116.00000	6252711.00000	0.00	0.00	0.00	ALL
23	67.46165	12022919	310116.00000	6252711.00000	0.00	0.00	0.00	ALL
24	67.45486	12022019	310116.00000	6252761.00000	0.00	0.00	0.00	ALL
25	67.43521	12013123	310166.00000	6252761.00000	0.00	0.00	0.00	ALL
26	67.38225	12012019	309966.00000	6252411.00000	0.00	0.00	0.00	ALL
27	67.26279	12122923	310116.00000	6252711.00000	0.00	0.00	0.00	ALL
28	67.22422	12020106	310266.00000	6252761.00000	0.00	0.00	0.00	ALL
29	67.21493	12122024	310116.00000	6252711.00000	0.00	0.00	0.00	ALL
30	67.20918	12110511	310216.00000	6252261.00000	0.00	0.00	0.00	ALL
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81	65.94645	12111323	310066.00000	6252661.00000	0.00	0.00	0.00	ALL
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93	65.80707	12120219	310016.00000	6252711.00000	0.00	0.00	0.00	ALL
94	65.78883	12121720	310066.00000	6252611.00000	0.00	0.00	0.00	ALL
95	65.75674	12120220	310116.00000	6252711.00000	0.00	0.00	0.00	ALL
96	65.75527	12041724	310416.00000	6252761.00000	0.00	0.00	0.00	ALL

97	65.75414	12121003	310416.00000	6252761.00000	0.00	0.00	0.00	ALL
98	65.75364	12122502	310166.00000	6252161.00000	0.00	0.00	0.00	ALL
99	65.72088	12032206	310266.00000	6252811.00000	0.00	0.00	0.00	ALL
100	65.71234	12121019	310166.00000	6252761.00000	0.00	0.00	0.00	ALL

**SMITHFIELD PACKAGE BOILER
REINSTATEMENT PROJECT**

ENVIRONMENTAL ASSESSMENT

13 NOVEMBER 2014

DA13/94

**ATTACHMENT 5 NOISE IMPACT
ASSESSMENT**

**NOISE IMPACT ASSESSMENT
REPORT
BUILD RUN REPAIR PTY LTD
Visy Paper, Herbert St, Smithfield NSW**

Prepared for: John Crosher, Build Run Repair Pty Ltd
Julia Beck, Project Consultant, Visy Paper

Prepared by: Daniele Albanese, Senior Acoustical Engineer
R T Benbow, Principal Consultant

Report No: 141108_NIA_Rev4(FINAL)
October 2014
(Released: 20 October 2014)



Benbow
ENVIRONMENTAL

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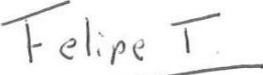
DOCUMENT CONTROL

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Daniele Albanese	Senior Acoustical Engineer		20 October 2014
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Reviewed by:	Position:	Signature:	Date:
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Richard T Benbow	Principal Consultant		20 October 2014
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Felipe Torres	Senior Acoustical Engineer		20 October 2014
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Approved by:	Position:	Signature:	Date:
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Richard T Benbow	Principal Consultant		20 October 2014
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DOCUMENT REVISION RECORD

Revision	Date	Description	Checked	Approved
1	27-08-2014	Draft / Rev 1	M Daniels	R T Benbow
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Attachments

- Attachment 1: Glossary of Noise Terminology
- Attachment 2: Fan, Silencer and Lagging/Sound Enclosure Acoustic Data





1. INTRODUCTION

Benbow Environmental has been engaged by Build Run Repair Pty Ltd on behalf of Visy Paper Smithfield to prepare a noise impact assessment for the proposed Boiler House at the site located at 6 Herbert Place, Smithfield as part of the proposed modification under Section 75W of the Environment Planning and Assessment Act 1979. This noise report will form part of the Environmental Assessment.

The site is located within the industrial area of Smithfield. The nearest sensitive residential receptors were noted as being approximately 400 metres south of the site boundary. Noise predictions were undertaken utilising the noise modelling software, SoundPLAN(v7.3).

This assessment has been carried out in accordance with the following relevant guidelines and documents:

- *NSW Environment Protection Authority Industrial Noise Policy (EPA 2000)* ;
- *Holroyd Development Control Plan 2013 Part D: Industrial Controls*; and
- *Protection of the Environment Operations Act, 1997.*

Reference to other guidelines and Australian Standards has been made throughout the report.

1.1 SCOPE OF WORKS

This noise impact assessment has been limited to the following scope of works:

- a) Site inspection and review of proposed site operations;
- b) Review of the existing Environment Protection Licence (ref. 4100) and establishment of project specific noise levels;
- c) Determine all potential noise sources associated with the proposed boiler house operations;
- d) Collection of required noise source data;
- e) Predict potential noise impacts at the nearest potentially affected receptors to the site;
- f) Assess potential noise impacts against relevant legislation and guidelines;
- g) Investigate ameliorative measures/control solutions (where required); and
- h) The compilation of this report containing concise statements of potential noise impact.

To aid in the review of this report, supporting documentation has been included within the Attachments.

2. SITE IDENTIFICATION

2.1 SITE LOCATION

The subject site is located on the following parcels of land:

- Lot 2 in DP 849480 – 2 Herbert Place, Smithfield;
- Lot 34 in DP 850596 – 6 Herbert Place, Smithfield;
- Lot 12 in DP 808195 – 158-160 McCredie Road, Smithfield.

The proposed development will be located on Lot 34 DP 850596 – 6 Herbert Place, Smithfield.

The site location is shown in Figure 2-1 and the location of the proposed boiler house is displayed in Figure 2-2.

Figure 2-1: Site Location



Figure 2-2: Proposed Boiler House Location



3. NEAREST SENSITIVE RECEPTORS

The nearest sensitive receptors are listed in Table 3-1 and their location is shown in Figure 3-1. These receptors are considered to represent the primary receptors likely to be affected by noise emissions associated with the proposed development.

Table 3-1: Nearest Sensitive Receptors

Receptors	Address	Approximate Distance to Proposed Development (m)	Direction	Description
R1	6 Low Street, Smithfield	447	W	Residential
R2	12 Kiola Street, Smithfield	425	WSW	Residential
R3	20 Vineyard Avenue, Smithfield	407	SW	Residential
R4	31 Chisholm Street, Smithfield	310	S	Residential
R5	44 Solo Crescent, Smithfield	336	SSE	Residential
R6	124 Granville Street, Fairfield	494	SE	Residential
R7	126 Fairfield Road, Guilford West	1006	ESE	Residential
R8	127 McCredie Road, Guilford West	848	ENE	Residential
R9	79 Warren Road, Woodpark	1079	NE	Residential
R10	9 Magnolia Street, Greystanes	1564	N	Residential
R11	17 Rhondda Street, Smithfield	1727	NW	Residential

Figure 3-1: Nearest Sensitive Residential Receptors



4. NOISE ASSESSMENT CRITERIA

4.1 NSW EPA ENVIRONMENT PROTECTION LICENCE

The noise emissions from the existing on-site operations are required to satisfy specific NSW EPA requirements, as outlined in the site's Environment Protection Licence (Licence n.4100, Anniversary Date: 18 September). The following conditions apply:

"L4 Noise limits

L4.1 Noise from the premises must not exceed:

- a) an LA10 (15 minute) noise emission criteria of 53 dB(A) 7.00am to 10pm seven days a week;
- and
- b) at all other times an LA10 (15 minute) noise emission criteria of 43 dB(A);

when measured or computed at any point within one metre of any residential boundary at Cooper Crescent, Solo Crescent, Granville Street and Alt Street, Fairfield.

L4.2 Noise from the premises must not exceed:

- a) an LA10 (15 minute) noise emission criteria of 51 dB(A) 7.00am to 10pm seven days a week; and
- b) at all other times an LA10 (15 minute) noise emission criteria of 41 dB(A);

when measured or computed at any point within one metre of any residential boundary at Kiola Street, Fairfield.

L4.3 Noise from the premises must not exceed:

- a) an LA10 (15 minute) noise emission criteria of 70 dB(A) 7.00am to 10pm seven days a week; and
- b) at all other times an LA10 (15 minute) noise emission criteria of 65 dB(A);

when measured or computed at any point within one metre of the western plant boundary.

L4.4 5dB(A) must be added to the measured noise levels if the noise is substantially tonal or impulsive in character."

4.2 APPLICABLE NOISE CRITERIA

The proposed development is intended to be designed so that the noise emissions associated with the development would not increase the current overall noise emissions from the site.

In order to achieve this requirement the noise criteria is set at 10 dB lower than the criteria specified in the NSW EPA Environment Protection Licence n. 4100 applicable for the site.

The applicable noise criteria are presented in the following Table 4-1.

Table 4-1: Applicable Noise Criteria

Receptors	Noise Criteria as per EPL n.4100		Applicable Noise Criteria	
	L _{A10} (15 minute)		L _{A10} (15 minute)	
	Day and Evening	Night	Day and Evening	Night
R1, R2 and R3	51	41	41	31
R4, R5, R6, R6, R7, R8, R9, R10, R11	53	43	43	33
Western Boundary	70	65	60	55

Note: Day is defined as 7:00am to 6:00pm, Monday to Saturday and 8:00am to 6:00pm Sundays and Public Holidays.
Evening is defined as 6:00pm to 10:00pm, Monday to Saturday, Sundays and Public Holidays.
Night is defined as 10:00pm to 7:00am Monday to Saturday and 10:00pm to 8:00am Sundays and Public Holidays.

5. NOISE IMPACT ASSESSMENT

An outline of the predictive noise modelling methodology and operating scenarios is provided below.

5.1 NOISE MODELLING

Predictive Noise Modelling was implemented by using the Concawe algorithm within SoundPLAN v7.3. This model has been extensively utilised by Benbow Environmental for assessing noise emissions for existing and proposed developments, and it is recognised by regulatory authorities throughout Australia. The model allows for the prediction of noise from a site, at the specified receptor, by calculating the individual contribution of each noise source.

The noise sources as well as the topographical features of the subject area and receptor locations, were all input into the noise model to determine the noise emissions of the proposed development at the nearest potentially affected residences. Based on inspection, the local topography for the area appears to be consistent with levels as printed on the topographic map. On-site structures were included in the model to account for shielding provided by the walls of the existing buildings.

The modelling scenario has been carried out using the L_{Aeq} descriptor. Given that the noise emissions associated with the proposed development would be constant in nature, the L_{Aeq} noise descriptor has been considered equivalent to the L_{A10} noise descriptor. Using this descriptor, noise emission levels were predicted at the nearest potentially affected sensitive receptors to determine the noise impact against the project specific noise levels and other relevant noise criteria in accordance with the NSW EPA Industrial Noise Policy.

It has to be noted that the $L_{10(15 \text{ minute})}$ noise descriptor is no longer utilised to assess the noise emission from an industrial site. With the introduction of the NSW EPA Industrial Noise Policy, the $L_{10(15 \text{ minute})}$ noise descriptor was replaced with the $L_{eq(15 \text{ minute})}$.

5.1.1 Noise Sources

The sound power levels for the identified noise sources associated with the operational activities have been calculated from measurements of sound pressure levels undertaken by the principal consultant from Benbow Environmental during operations at similar facilities.

Additional acoustic data were provided by the manufacturer of the proposed boiler.

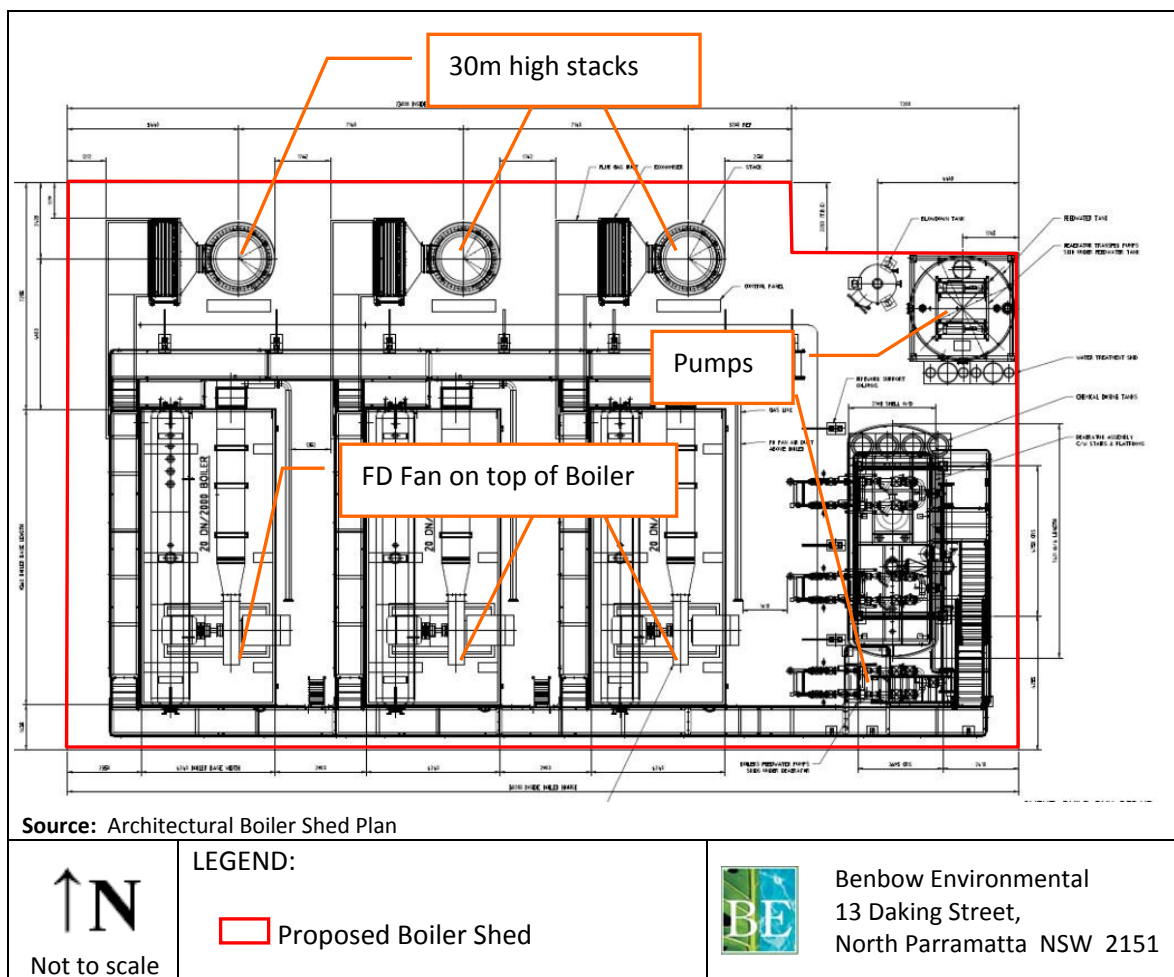
A-weighted third octave band centre frequency sound power levels have been used and are presented in Table 5-1 below. The noise sources utilised as part of this assessment comprise the primary noise generating activities associated with the effective operation of the proposed development.

The table also presents information on the assumed height of the acoustical centre of the noise source and sound power level, expressed in dB(A), for the noise sources associated with the proposed development.

Table 5-1: Sound Power Levels Associated with the Primary Noise Sources, dB(A)

Noise Source	Height [m]	Lmax	Overall	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Stack Outlet and in-duct	30	115	115	74	89	98	110	109	109	107	102
Fan-Casing	4	102	102	70	82	88	97	95	96	94	88
Feedwater Pump	1	88.5	88.5	76	73	73	80	85	81	79	75
De-aerator Transfer Pump	1	88.5	88.5	76	73	73	80	85	81	79	75
Duct Breakout	8 to 30	102	102	70	82	88	97	95	96	94	88

Figure 5-1: Operational Noise Source Locations



5.1.2 Meteorological Factors

Wind and temperature inversions may affect the noise emission from the site and these need to be assessed when they are considered to be a feature of the area.

This section of the report presents the analysis undertaken on the 2013 weather data in order to establish whether wind and temperature inversions are features of the area.

5.1.2.1 Wind Effects

Wind is considered to be a feature where source-to-receptor wind speeds (at 10m above ground) of 3 m/s or below occur for 30% or more of the time in any assessment period in any season.

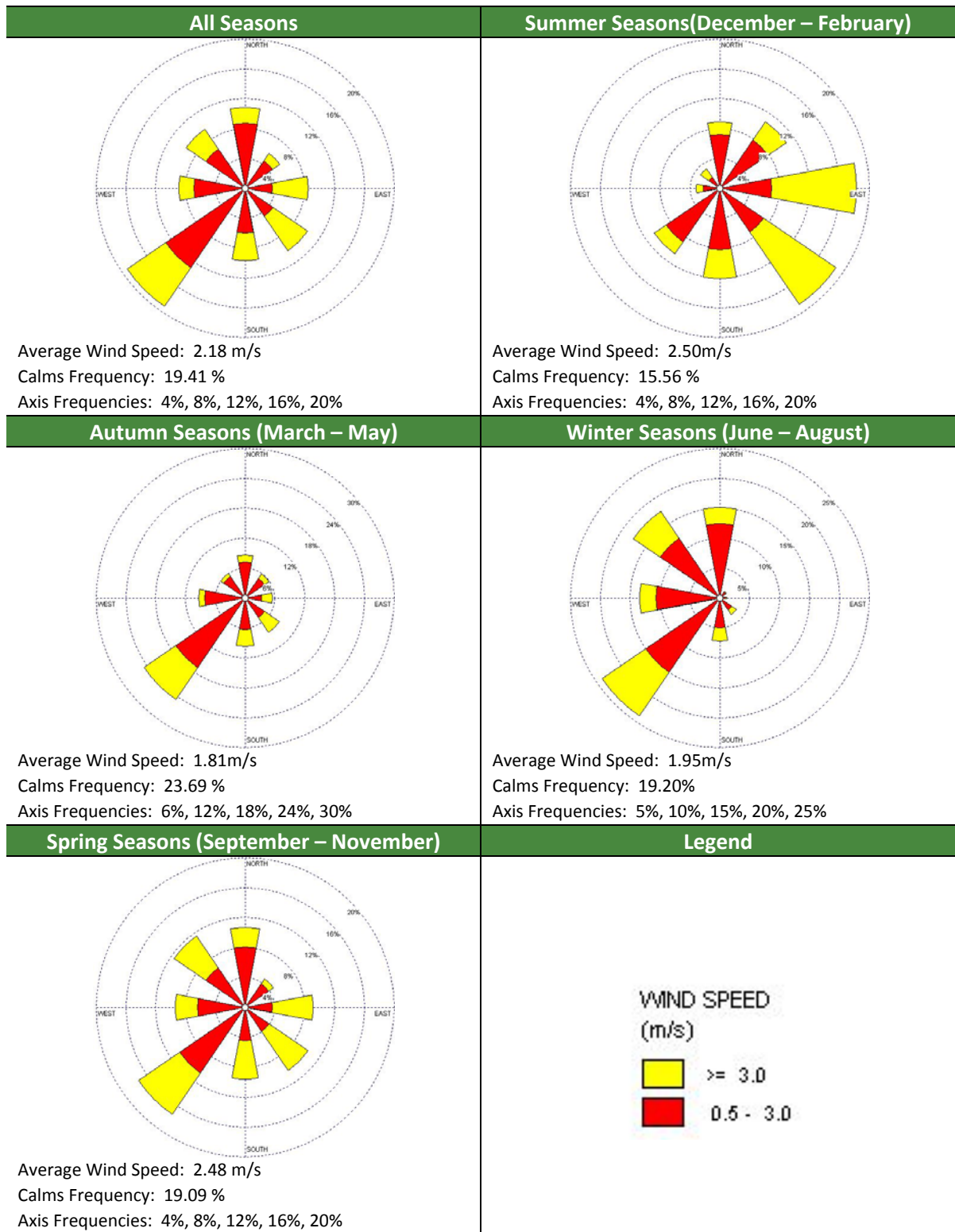
The meteorological data was obtained from the weather station operated by the Bureau of Meteorology (BoM) located at Horsley Park (Station No. 067119).

Seasonal wind rose plots for the site-representative meteorological file have been included in the following, based on the BoM data received.

Based on the wind rose analysis source-to receptor wind speeds of 3 m/s or below are present for less than 30% of the time, wind effects have not been considered in the assessment.

Figure 5-2 shows the wind roses plot for the year 2013 at the abovementioned weather station.

Figure 5-2: Wind Rose Plots for the Referenced Meteorological Station – Bureau of Meteorology Horsley Park (2013)



5.1.2.2 Temperature Inversion

Temperature inversion is considered a feature where this occurs more than 30% of the nights in winter.

Temperature inversion conditions would be best associated with F-class stability conditions – generally associated with still/light winds and clear skies during the night time or early morning period (these are referred to as stable atmospheric conditions).

The analysis conducted on the 2013 weather data highlighted that during winter 18.81% of the nights presented temperature inversion conditions, therefore less than 30% of the nights in winter. Temperature inversion effects are not to be considered in the noise impact assessment as per NSW EPA INP.

5.1.2.3 Weather Conditions Considered in the Assessment

The following condition was considered:

- Condition A: neutral weather conditions.

The meteorological condition considered in the noise model has been displayed in detail in Table 5-2 below.

Table 5-2: Meteorological Conditions Assessed in Noise Propagation Modelling

Condition	Classification	Ambient Temp.	Ambient Humidity	Wind Speed	Wind Direction (blowing from)	Temperature Inversion	Affected Receptors	Applicability
A	Neutral	10 °C	70%	–	–	–	All	All periods

5.2 MODELLING SCENARIOS

Operational scenarios were configured to provide an assessment of maximum operations for the proposed facility. The scenario was established for the model to provide an accurate estimate of potential noise impacts at the aforementioned residential, industrial and other noise sensitive receptors under the proposed maximum operating conditions.

The following scenarios were implemented:

Scenario 1 – Boiler house operating at full capacity – No noise controls applied.

Scenario 2 – Boiler house operating at full capacity – Silencers mounted at stack inlet.

Scenario 3 – Boiler house operating at full capacity – Silencer mounted at stack inlet and lagging/sound enclosure built on fan casing.

All scenarios were implemented based on the assumption listed as follows.

5.2.1 Modelling Assumptions

The assumptions used for the predictive noise model are based on maximum operational procedures typical for this type of facility.

The following assumptions were applied to the model:

- The boiler house is operational 24/7;
- Noise generating activities were assessed over a 15 minute assessment period;
- Boiler shed is constructed of the following materials:
 - ▶ Ground: concrete
 - ▶ Walls: 0.42mm BMT Colorbond Monoclad
 - ▶ Roof: 0.42mm BMT Colorbond Monoclad
 - ▶ Wall insulation: 75mm Anticon blanked insulation
 - ▶ Roof insulation: 75mm Anticon blanked insulation on safety mesh
- Three roller shutter doors located on the southern facade of the boiler shed – 7.4m x 6m motorised industrial roller shutters with powder coat finish;
- Two public access doors made of 920mm solid core, located on the northern and eastern facades of the boiler shed;
- The boiler shed is free of gaps or imperfections that would reduce the insulation properties of the shed;
- Fan type: S-RNN8B/630/200/1 (data provided in Attachment 2);
- Silencer: Rectangular attenuator 454 L=1200 W=325 (data provided in Attachment 2);
- Lagging/sound enclosures SL2 (100mm, 1.5mm steel) (data provided in Attachment 2);
- Three stack outlets were modelled as point sources at a height of 30 metres, stack outlet directivity was applied to the point sources;
- Three stack ducts were modelled as industrial buildings at a height from 8 to 30 metres;
- All the noise sources located within the proposed boiler shed were modelled as a point source;
- The SoundPLAN function “Hallout (In>Out)” was utilised to calculate the noise breakout through the proposed boiler shed;
- A ground factor equal to zero (0) was utilised for all ground surfaces. This represents a totally reflecting surface (e.g. concrete).

5.3 MODELLING RESULTS

Noise emissions from the proposed facility have been predicted utilising a conservative approach, assuming all equipment and machinery operate simultaneously over the 15 minute assessment period.

The predicted noise levels at the considered residential locations for the above operational scenarios are displayed in Table 5-3, Table 5-4 and Table 5-5.

Table 5-3: Noise Modelling Results – Scenario 1 – No Noise Controls

Receptors	Applicable Noise Criteria		Predicted Noise Levels	Compliance ( yes -  no)	
	L _{Aeq} (15 minute)		L _{Aeq} (15 minute)		
	Day and Evening	Night	Day, Evening and Night	Day and Evening	Night
R1	41	31	53		
R2	41	31	54		
R3	41	31	54		
R4	43	33	57		
R5	43	33	55		
R6	43	33	52		
R7	43	33	44		
R8	43	33	47		
R9	43	33	44		
R10	43	33	40		
R11	43	33	38		
Western Boundary	60	55	53		

Table 5-4: Noise Modelling Results – Scenario 2 – Silencer at stack inlet

Receptors	Applicable Noise Criteria		Predicted Noise Levels	Compliance ( yes -  no)	
	L _{Aeq} (15 minute)		L _{Aeq} (15 minute)		
	Day and Evening	Night	Day, Evening and Night	Day and Evening	Night
R1	41	31	37		
R2	41	31	37		
R3	41	31	37		
R4	43	33	36		
R5	43	33	34		
R6	43	33	34		
R7	43	33	26		
R8	43	33	28		
R9	43	33	24		
R10	43	33	21		
R11	43	33	22		
Western Boundary	60	55	34		

Table 5-5: Noise Modelling Results – Scenario 3 – Silencer at stack inlet and Lagging/ Noise enclosure at fan casing

Receptors	Applicable Noise Criteria		Predicted Noise Levels	Compliance (☒ yes - ☒ no)	
	L _{Aeq} (15 minute)		L _{Aeq} (15 minute)		
	Day and Evening	Night	Day, Evening and Night	Day and Evening	Night
R1	41	31	29	✓	✓
R2	41	31	29	✓	✓
R3	41	31	30	✓	✓
R4	43	33	31	✓	✓
R5	43	33	28	✓	✓
R6	43	33	27	✓	✓
R7	43	33	20	✓	✓
R8	43	33	22	✓	✓
R9	43	33	19	✓	✓
R10	43	33	16	✓	✓
R11	43	33	15	✓	✓
Western Boundary	60	55	28	✓	✓

Comments:

Noise levels associated with the proposed boiler house were predicted to exceed the project specific noise levels at all the considered receptors during night-time when no noise control measures are implemented. This scenario was modelled as Scenario 1 and compliance would be achieved only at R10 and R11 during daytime.

The installation of a silencer at the duct's inlet would significantly reduce the noise emissions. However, based on the modelling results (Scenario 2), the noise reduction would not be sufficient to achieve compliance with the PSNL at all the considered receptors.

Compliance with the PSNL was predicted at all the receptor after implementing a lagging/noise enclosure of the fan casings (Scenario 3).



6. RECOMMENDATIONS AND CONCLUSION

Benbow Environmental has been engaged by Build Run Repair Pty Ltd on behalf of Visy Paper Smithfield to prepare a noise impact assessment for the proposed Boiler House at the site located at 6 Herbert Place, Smithfield as part of the proposed modification under Section 75W of the Environment Planning and Assessment Act 1979. This noise report will form part of the Environmental Assessment.

The project specific noise levels were derived from the existing applicable NSW EPA Environment Protection Licence n. 4100.

The proposed development is intended to be designed so that the noise emissions associated with the development would not increase the current overall noise emissions from the Visy Industries site and also the Marubeni site. The basis of the noise controls summarised below is to meet the EPL limits for both Visy Industries and the separate noise limits in the EPL of Marubeni. Therefore both the proposed Visy Boiler House and the Marubeni cogeneration plants are assumed to be operating simultaneously.

In order to achieve this, the project specific noise levels were set at 10 dB lower than the criteria specified in the above mentioned EPL.

Compliance with the project specific noise levels was achieved at all the considered residential receptors only after the implementation of noise control measures.

The recommended noise control measures consist of the following:

- Installation of silencers at the duct inlets;
- Construction of lagging/sound enclosure of the fan casing;

Details of these noise controls are included in Attachment 2.

In addition, there are several safeguards that are recommended, aimed at reducing potential noise emission issues. These are detailed below.

Maintenance of Equipment:

Mechanical equipment in poor condition will create more noise than well maintained equipment. It is important to ensure that all machinery and ancillary equipment meet the appropriate environmental noise requirements.

Avoid Gaps in Building Structures:

Openings/gaps within the proposed boiler shed walls and roof shall be avoided.
All the openings utilised for ducts or other purposes must be sealed.

Details of sealing materials and techniques will be provided at a later stage of the development prior to the issue of a construction certificate.



This concludes the report.

Prepared by:

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Senior Acoustical Engineer

R T Benbow
Principal Consultant



7. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use of Build Run Repair Pty Ltd , as per our agreement for providing environmental services. Only Build Run Repair Pty Ltd is entitled to rely upon the findings in the report within the scope of work described in this report. Otherwise, no responsibility is accepted for the use of any part of the report by another in any other context or for any other purpose.

Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that otherwise required by law) in relation to any of the information contained within this document. We accept no responsibility for the accuracy of any data or information provided to us by Build Run Repair Pty Ltd for the purposes of preparing this report.

Any opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal advice.

ATTACHMENTS

Attachment 1: Glossary of Noise Terminology

‘A’ FREQUENCY WEIGHTING

The ‘A’ frequency weighting roughly approximates to the Fletcher-Munson 40 phon equal loudness contour. The human loudness perception at various frequencies and sound pressure levels is equated to the level of 40 dB at 1 kHz. The human ear is less sensitive to low frequency sound and very high frequency sound than midrange frequency sound (i.e. 500 Hz to 6 kHz). Humans are most sensitive to midrange frequency sounds, such as a child’s scream. Sound level meters have inbuilt frequency weighting networks that very roughly approximates the human loudness response at low sound levels. It should be noted that the human loudness response is not the same as the human annoyance response to sound. Here low frequency sounds can be more annoying than midrange frequency sounds even at very low loudness levels. The ‘A’ weighting is the most commonly used frequency weighting for occupational and environmental noise assessments. However, for environmental noise assessments, adjustments for the character of the sound will often be required.

AMBIENT NOISE

The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. usually assessed as an energy average over a set time period ‘T’ ($L_{Aeq,T}$).

AUDIBLE

Audible refers to a sound that can be heard. There are a range of audibility grades, varying from “barely audible”, “just audible” to “clearly audible” and “prominent”.

BACKGROUND NOISE LEVEL

Total silence does not exist in the natural or built-environments, only varying degrees of noise. The Background Noise Level is the minimum repeatable level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc.. It is quantified by the noise level that is exceeded for 90 % of the measurement period ‘T’ ($L_{A90,T}$). Background Noise Levels are often determined for the day, evening and night time periods where relevant. This is done by statistically analysing the range of time period (typically 15 minute) measurements over multiple days (often 7 days). For a 15 minute measurement period the Background Noise Level is set at the quietest level that occurs at 1.5 minutes.

‘C’ FREQUENCY WEIGHTING

The ‘C’ frequency weighting approximates the 100 phon equal loudness contour. The human ear frequency response is more linear at high sound levels and the 100 phon equal loudness contour attempts to represent this at various frequencies at sound levels of approximately 100 dB.

DECIBEL

The decibel (dB) is a logarithmic scale that allows a wide range of values to be compressed into a more comprehensible range, typically 0 dB to 120 dB. The decibel is ten times the logarithm of the ratio of any two quantities that relate to the flow of energy (i.e. power). When used in acoustics it is the ratio of square of the sound pressure level to a reference sound pressure level, the ratio of the sound power level to a reference sound power level, or the ratio of the sound intensity level to a reference sound intensity level. See also Sound Pressure Level and Sound Power Level. Noise levels in decibels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dB, and another similar machine is placed beside it, the level will increase to 53 dB (from $10 \log_{10} (10^{(50/10)} + 10^{(50/10)})$) and not 100 dB. In theory, ten similar machines placed side by side will increase the sound level by 10 dB, and one hundred machines increase the sound level by 20 dB. The human ear has a vast sound-sensitivity range of over a thousand billion to one so the logarithmic decibel scale is useful for acoustical assessments.

dBA – See ‘A’ frequency weighting

dBC – See ‘C’ frequency weighting

EQUIVALENT CONTINUOUS SOUND LEVEL, LAeq

Many sounds, such as road traffic noise or construction noise, vary repeatedly in level over a period of time. More sophisticated sound level meters have an integrating/averaging electronic device inbuilt, which will display the energy time-average (equivalent continuous sound level - L_{Aeq}) of the ‘A’ frequency weighted sound pressure level. Because the decibel scale is a logarithmic ratio, the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closer to the L_{Aeq} noise level than any other descriptor.

‘F’(FAST) TIME WEIGHTING

Sound level meter design-goal time constant which is 0.125 seconds.

FLETCHER–MUNSON EQUAL LOUDNESS CONTOUR CURVES

The Fletcher–Munson curves are one of many sets of equal loudness contours for the human ear, determined experimentally by Harvey Fletcher and Wilden A. Munson, and reported in a 1933 paper entitled "Loudness, its definition, measurement and calculation" in the Journal of the Acoustic Society of America.

FREE FIELD

In acoustics a free field is a measurement area not subject to significant reflection of acoustical energy. A free field measurement is typically not closer than 3.5 metres to any large flat object (other than the ground) such as a fence or wall or inside an anechoic chamber.

FREQUENCY

The number of oscillations or cycles of a wave motion per unit time, the SI unit is the hertz (Hz). 1 Hz is equivalent to one cycle per second. 1000 Hz is 1 kHz.

IMPACT ISOLATION CLASS (IIC)

The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation. Not commonly used in Australia.

'I' (IMPULSE) TIME WEIGHTING

Sound level meter time constant now not in general use. The 'I' (impulse) time weighting is not suitable for rating impulsive sounds with respect to their loudness. It is also not suitable for assessing the risk of hearing impairment or for determining the 'impulsiveness' of a sound.

IMPACT SOUND INSULATION ($L_{nT,w}$)

Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured 1/3 octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE

An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

LOUDNESS

The volume to which a sound is audible to a listener is a subjective term referred to as loudness. Humans generally perceive an approximate doubling of loudness when the sound level increases by about 10 dB and an approximate halving of loudness when the sound level decreases by about 10 dB.

MAXIMUM NOISE LEVEL, LAF_{max}

The root-mean-square (rms) maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'F' (Fast) time weighting. Often used for noise assessments other than aircraft.

MAXIMUM NOISE LEVEL, LAS_{max}

The root-mean-square (rms) maximum sound pressure level measured with sound level meter using the 'A' frequency weighting and the 'S' (Slow) time weighting. Often used for aircraft noise assessments.

NOISE RATING NUMBERS

A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the 'A' frequency weighted dB level minus five.

NOISE

Noise is unwanted, harmful or inharmonious (discordant) sound. Sound is wave motion within matter, be it gaseous, liquid or solid. Noise usually includes vibration as well as sound.

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient"

OFFENSIVE NOISE

Reference: Dictionary of the NSW Protection of the Environment Operations Act 1997).
"Offensive Noise means noise:

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE

Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T₆₀

The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T₆₀. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α

Sound is absorbed in porous materials by the viscous conversion of sound energy to a small amount of heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α . An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2 kHz is termed the Noise Reduction Coefficient (NRC).

'S' (SLOW) TIME WEIGHTING

Sound level meter design-goal time constant which is 1 second.

SOUND ATTENUATION

A reduction of sound due to distance, enclosure or some other device. If an enclosure is placed around a machine, or an attenuator (muffler or silencer) is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 20 dB reduces the sound energy by one hundred times.

SOUND EXPOSURE LEVEL (LAE)

Integration (summation) rather than an average of the sound energy over a set time period. Use to assess single noise events such as truck or train pass by or aircraft flyovers. The sound exposure level is related to the energy average ($L_{Aeq, T}$) by the formula $L_{Aeq, T} = L_{AE} - 10 \log_{10} T$. The abbreviation (SEL) is sometimes inconsistently used in place of the symbol (L_{AE}).

SOUND PRESSURE

The rms sound pressure measured in pascals (Pa). A pascal is a unit equivalent to a newton per square metre (N/m^2).

SOUND PRESSURE LEVEL, L_p

The level of sound measured on a sound level meter and expressed in decibels (dB). Where $L_p = 10 \log_{10} (P_a/P_o)^2$ dB (or $20 \log_{10} (P_a/P_o)$ dB) where P_a is the rms sound pressure in Pascal and P_o is a reference sound pressure conventionally chosen is $20 \mu Pa$ (20×10^{-6} Pa) for airborne sound. L_p varies with distance from a noise source.

SOUND POWER

The rms sound power measured in watts (W). The watt is a unit defined as one joule per second. A measures the rate of energy flow, conversion or transfer.

SOUND POWER LEVEL, L_w

The sound power level of a noise source is the inherent noise of the device. Therefore sound power level does not vary with distance from the noise source or with a different acoustic environment. $L_w = L_p + 10 \log_{10} 'a'$ dB, re: $1pW$, (10^{-12} watts) where 'a' is the measurement noise-emission area (m^2) in a free field.

SOUND TRANSMISSION CLASS (STC)

An internationally standardised method of rating the sound transmission loss of partition walls to indicate the sound reduction from one side of a partition to the other in the frequency range of 125 Hz to 4000 kHz. (Refer: Australian Standard AS 1276–1979). Now not in general use in Australia see: weighted sound reduction index.

SOUND TRANSMISSION LOSS

The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS1191 - 2002.

STATISTICAL NOISE LEVELS, L_n .

Noise which varies in level over a specific period of time 'T' (standard measurement times are 15 minute periods) may be quantified in terms of various statistical descriptors for example:-

- The noise level, in decibels, exceeded for 1 % of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as $L_{AF1, T}$. This may be used for describing short-term noise levels such as could cause sleep arousal during the night.
- The noise level, in decibels, exceeded for 10 % of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as $L_{AF10, T}$. In most countries the $L_{AF10, T}$ is measured over periods of 15 minutes, and is used to describe the average maximum noise level.
- The noise level, in decibels, exceeded for 90 % of the measurement time period, when 'A' frequency weighted and 'F' time weighted is reference to as $L_{AF90, T}$. In most countries the $L_{AF90, T}$ is measured over periods of 15 minutes, and is used to describe the average minimum or background noise level.

STEADY NOISE

Noise, which varies in level by 6 dB or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997).

WEIGHTED SOUND REDUCTION INDEX, R_w

This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 Hz to 3.150 kHz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999). Internal partition wall $R_w + C$ ratings are frequency weighted to simulate insulation from human voice noise. The $R_w + C$ is similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. The spectrum adaptation term C_{tr} adjustment factor takes account of low frequency noise. The weighted sound reduction index is normally similar or slightly lower number than the STC rating value.

WHITE NOISE

White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.

'Z' FREQUENCY WEIGHTING

The 'Z' (Zero) frequency weighting is 0 dB within the nominal 1/3 octave band frequency range centred on 10 Hz to 20 kHz. This is within the tolerance limits given in AS IEC 61672.1-2004: '*Electroacoustics - Sound level meters – Specifications*'.

Attachment 2: Fan, Silencer and Lagging/Sound Enclosure Acoustic Data

Fan speed	2,894 1/min	Flow rate	32,000 m ³ /h
Inlet density	1.200 kg/m ³	Rel.flow rate V/V _{opt}	0.79 -
Inlet pressure	101.360 kPa	Blade frequency	386 Hz
Inlet temperature	20 °C	Fan curve no.:	1

Basic sound	dB	115							
Correction V/V _{opt}	dB	1							
Octave-band	Hz	63	125	250	500	1K	2K	4K	8K
Blade freq.corr.	dB	0	0	0	3	0	0	0	0
Strouhal-number	dB	0.4	0.8	1.6	3.3	6.6	13	26	53
Rel. spectrum	dB	-16	-11	-9	-6	-7	-8	-10	-13
Octave-power-lev.	dB	100	105	107	113	109	108	106	103
A-weighting corr.	dB	-26	-16	-9	-3	0	1	1	-1
Octave-power-level in duct	dB(A)	74	89	98	110	109	109	107	102

with reference to the definitions in DIN 45 635 Part 38 :

Sound power level radiated into duct **115 dB(A) re 10⁻¹² W**
Motor sound power level **88 dB(A) re 10⁻¹² W**

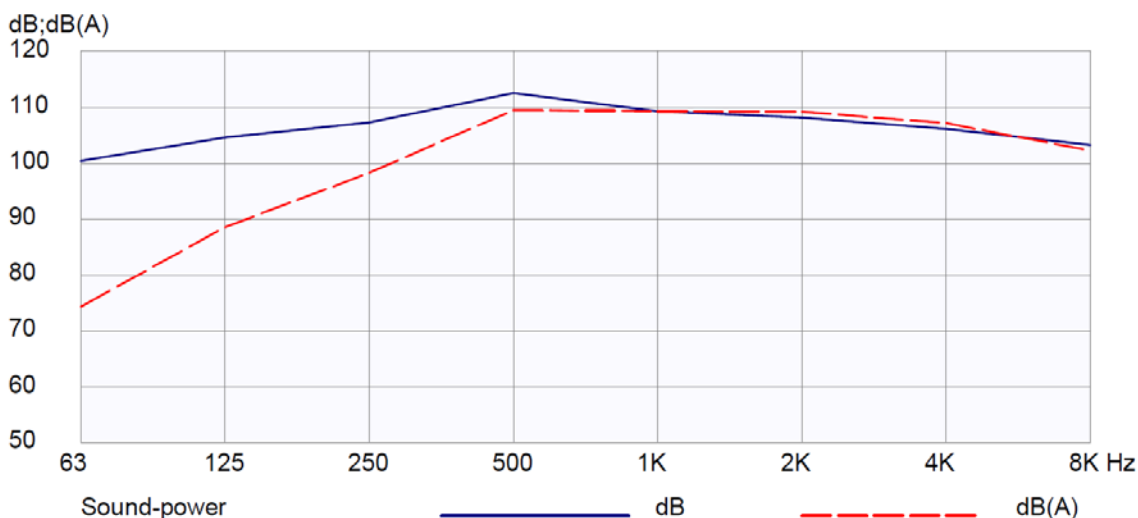
Free inlet/outlet sound power level **115 dB(A) re 10⁻¹² W**
Free inlet/outlet sound pressure level, free field 1m/45° **107 dB(A) re 20 µPa**
Free inlet/outlet sound pressure level, free field 3m/45° **98 dB(A) re 20 µPa**

Casing break-out noise, sound power level ¹⁾ **102(107) dB(A) re 10⁻¹² W**
Casing break-out noise, average sound pres. level, free field 1m **89(94) dB(A) re 20 µPa**
Casing break-out noise, average sound pres. level, free field 3m **82(87) dB(A) re 20 µPa**

△LP to casing breakout noise, free field, 1m owing to el. motor: **0 dB(A) re 20 µPa**

Uncertainty of total levels at undisturbed inlet flow: Standard deviation 4 dB

1) Without noise contribution from motor, ducts, flexible connections, shaft gap etc. which the customer must take responsibility for. Values in brackets for aluminium casing.



Fan type : S-RNN8B/630/800/1

Fan speed	2894 1/min	Flow rate	32000 m3/h
Inlet density	1.200342 kg/m3	Rel.flow rate V/Vopt	.79 -
Inlet pressure	101.36 kPa	Blade frequency	386 Hz
Inlet temperature	20 °C		

Fan	Octavband	Hz	63	125	250	500	1K	2K	4K	8K	Total
Fan-Sound power level radiated into duct			74	89	98	110	109	109	107	102	115 dB(A) re 10 ⁻¹² W
Fan-casing sound power level			70	82	88	97	95	96	94	88	102 dB(A) re 10 ⁻¹² W
Motor sound power level											88 dB(A) re 10 ⁻¹² W

Silencer (inlet) - Rectangular Attenuator 454 L=1200 W=325

Insertion losses silencer	-7	-11	-22	-35	-42	-38	-26	-21			dB(A)
Total Fan-Sound power level in duct	67	78	76	75	67	71	81	81			86 dB(A) re 10 ⁻¹² W
Free inlet sound power level											86 dB(A) re 10 ⁻¹² W
Free inlet sound pressure level, free field 1m/45°											78 dB(A) re 20 µPa
Free inlet sound pressure level, free field 3m/45°											69 dB(A) re 20 µPa
potential nozzle reflection										at diameter 630 mm	0 dB

Lagging/sound enclosures - Sound lagging/insulation SL2 - (100mm, 1.5 mm Steel)

Insertion losses lagging/sound enclosures	-3	-6	-10	-15	-15	-10	-10	-9			dB(A)
Casing break-out noise, sound power level	67	76	78	82	80	86	84	79			91 dB(A) re 10 ⁻¹² W
Casing break-out noise, average sound pressure level, free field 1m ¹⁾											77 dB(A) re 20 µPa
Casing break-out noise, average sound pressure level, free field 3m ¹⁾											70 dB(A) re 20 µPa
Increase of sound level, owing to electric motor											2 dB(A)

1) Without noise contribution from motor, ducts, flexible connections, shaft gap etc. which the customer must take responsibility for.