

2018 Annual Environmental Management Report

1 August 2017 - 31 July 2018

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1.0 Introduction

National Ceramic Industries Australia Pty Ltd (NCIA) operates a tile manufacturing facility located in Rutherford, New South Wales. This Annual Environmental Management Report (AEMR) describes and discusses NCIA's environmental performance for the period between 1 August 2017 and 31 July 2018 (hereafter referred to as the '2018 reporting period').

1.1 NCIA Background

1.1.1 Current Operations

NCIA manufactures ceramic wall and floor tiles for the Australian market from its facility located off Racecourse Road, Rutherford, within the Rutherford Industrial Estate, NSW. The facility has been operating since its commissioning in 2004. Prior to NCIA's operations, the majority of Australia's domestic ceramic tile consumption was imported from China, South East Asia, Italy, Spain and Brazil.

Tiles are manufactured from raw materials including a mixture of clay, white granite, rhyolite and glazes. Clay, granite and rhyolite are naturally occurring and are supplied by quarries within Australia, whilst glazes and other consumables are either supplied locally or imported. The tile manufacturing process involves mixing and preparing raw materials in specified proportions, pressing the prepared mix into the desired shape, and then drying prior to decorating and glazing. The tiles are then fired in the facility's kilns prior to sorting, packaging and dispatch. Finished tiles are stored and loaded for distribution outside of the building in the south western corner of the site. All transport to and from the site is via road, with semi-trailers and B-double trucks transporting the raw materials and finished product.

The operation currently comprises one spray drier, a clay mill, two tile production lines and two kilns, all housed within a single factory building approximately 488 m long and 80 m wide. The current operations represent the first two of eight approved stages of the facility. With these two operational stages the maximum production of the facility is approximately 6.4 million m² of ceramic tiles per annum. The facility operates 24 hours per day, 7 days per week, and currently employs 52 full time staff.

1.1.2 Future Planned Operations

NCIA currently holds approval for the development of Stages Three–Eight of the facility, none of which are yet constructed or commissioned. Stages Three–Four would see the commissioning of an additional two production lines within the existing factory building for an increased production of up to 12.8 million m² of tiles per annum. Stages Five–Eight would involve the construction and operation of a second factory building with four additional production lines on the adjacent parcel of land to the east of the existing facility. Once all eight development stages are operational, the facility's production capacity would increase to 25.6 million m² of tiles per annum.

The approval for the facility's expansion was sought by NCIA in response to the anticipated continuing increase in tile demand, both domestically and internationally. The timeline for construction of the remaining stages (i.e. Stages Three–Eight) is dependent upon market demand and remains uncertain at the time this AEMR has been prepared.

1.1.3 Historic and Current Production Volume

Tile production volume since commissioning and inclusive of the 2018 reporting period is presented in Figure 1. Production volume is reported (and presented here) annually in accordance with the Environmental Protection Licence (EPL) annual reporting period, that is 1 August to 31 July each year.

NCIA's Project Approval (MP 09_0006) provides a staged approach to production limit in m² per annum, while NCIA's EPL No. 11956 provides for production in tonnes per annum.

Between 1 August 2017 and 31 July 2018 the facility operated 330 days, for a total output of 81,161 tonnes of ceramic tiles (or approximately 5.41 million m²). These production levels are below the maximum production authorised under NCIA's current approvals (refer to Section 1.2) and are commensurate to the current stage of development of the facility (i.e. Stage Two).

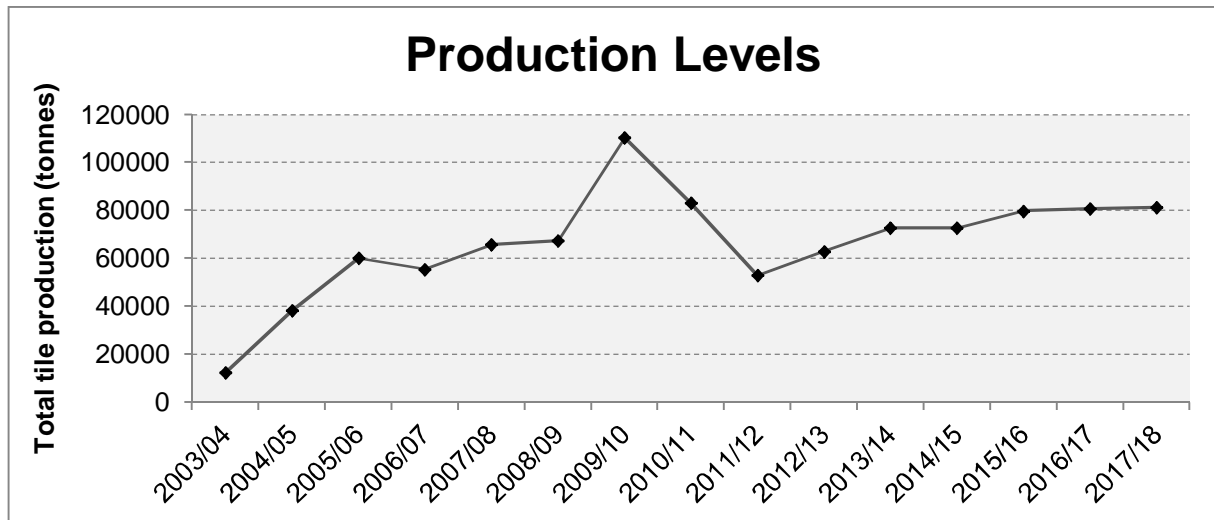


Figure 1 Production volume since 2004

1.2 Regulatory Context

1.2.1 Current Approvals

On 19 January 2012 NCIA was granted Project Approval (MP 09_0006), which rationalised and consolidated the development as approved under the previous Development Consent (DA 449-12-2002-i), and the proposed expansion of the facility. Subsequently, NCIA relinquished the previous Development Consent with effect from 19 January 2013.

The NCIA facility is therefore currently operating in accordance with the conditions of Project Approval (MP 09_0006), issued by the Department of Planning and Environment (DP&E).

The facility also operates in accordance with EPL No. 11956 issued by the NSW Environment Protection Authority (EPA), which authorises NCIA to produce 50,000 - 200,000 tonnes of ceramic tiles per annum.

It is noted that many of the requirements of the Project Approval are required prior to commencement of construction of the next stage of the approved operation (i.e. Stages Three–Eight). As commencement of construction of the next stage of the approved operation has not yet commenced, these conditions have not yet been activated.

Notably, an Operation Environmental Management Plan (OEMP) was prepared in accordance with the previous Development Consent to provide an environmental management framework for the facility. The current Project Approval does not require an OEMP, but instead requires the preparation of an Environmental Management Strategy (EMS) prior to commencement of construction works associated with development Stages Three–Eight. As this condition is not yet activated, NCIA continues to operate in accordance with the OEMP.

1.2.2 AEMR Requirement

This AEMR has been prepared in accordance with Schedule 4, Condition 60 of the Project Approval. The AEMR outlines the environmental compliance and performance of the NCIA facility in relation to the conditions of the Project Approval and NCIA's EPL No. 11956.

The requirements of Condition 60 of the Project Approval and the cross-reference to the AEMR section where the requirement is addressed are provided in Table 1-1.

Table 1-1 Schedule 4, Condition 60 of Project Approval (MP 09_0006)

Condition	Requirement	AEMR Section
60	Every year from the date of this approval ¹ , unless the Director-General agrees otherwise, the Proponent shall submit an AEMR to the Director-General and relevant agencies. The AEMR shall:	This AEMR
60 (a)	be conducted by suitably qualified team whose appointment has been endorsed by the Director-General;	Quality Information
60 (b)	be submitted within 3 months of the period being assessed by the AEMR;	See comment 1 below
60 (c)	identify the standards and performance measures that apply to the development;	Section 2.0
60 (d)	include a summary of the complaints received during the past year, and compare this to the complaints received in previous years;	Section 3.0
60 (e)	include a summary of the monitoring results for the development during the past year;	Section 4.0
60 (f)	include an analysis of these monitoring results against the relevant: <ul style="list-style-type: none"> • impact assessment criteria; • monitoring results from previous years; and • predictions in the EA. 	Section 5.0
60 (g)	identify any trends in the monitoring;	Section 5.0
60 (h)	identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies;	Section 5.0
60 (i)	identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance; and	Section 6.0
60 (j)	identify continuous improvement measures, outlining new developments in air quality and noise control, and detailing practices that have been implemented on the site during the previous year, to reduce air quality and noise impacts.	Section 7.0

Note on timeline

NCIA sought DP&E's approval (during a meeting with Leah Cook of DP&E held on 15 July 2015) to amend the AEMR reporting timeframes to align it with that of the EPL. The request was granted by DP&E on 17 July 2015. Therefore this AEMR and all subsequent AEMRs will cover the same reporting periods as the EPL, and report on NCIA's environmental performance between 1 August and 31 July each year.

¹ This condition is now superseded by DP&E's approval to amend the AEMR reporting period so that it is aligned with that of the EPL reporting timeline. The AEMR now covers the period between 1 August and 31 July.

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2.0 Standards and Performance Measures

The NCIA OEMP provides the environmental management framework to guide the operation and environmental performance of the facility. The OEMP defines the environmental management practices, procedures and personnel responsibilities to ensure compliance with conditions of statutory approvals and licences.

Specific environmental standards and performance measures used to assess the achievement of environmental objectives are drawn from requirements, obligations and initiatives listed within:

- Project Approval (MP 09_0006), granted by the Minister for Planning;
- EPL 11956, issued by the NSW EPA; and
- The *National Ceramic Industries Australia Expansion - Environmental Assessment* (AECOM, 5 July 2010) hereafter referred to as '2010 EA'.

Commitments made within the 2010 EA have been incorporated into the Project Approval and EPL for the facility as compliance criteria. These compliance criteria are used to assess the environmental performance of the facility and to monitor the environmental impact on the surrounding environment. Compliance criteria and the monitoring results for the current reporting period are presented in Section 4.0 of this AEMR.

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3.0 Complaints

Condition 60(d) of the Project Approval requires that the AEMR include a summary of complaints received during the current reporting period compared to complaints received in previous years.

The history of complaints received by NCIA is presented in Table 3-1. For the fifth consecutive reporting period, no complaints were received. Overall, the history of complaints shows that very few community complaints are received in relation to NCIA operations.

Table 3-1 Historical complaints received by NCIA

Year	Number of Complaints	Issue	Details
2018	Nil	Nil	None Required
2017	Nil	Nil	None Required.
2016	Nil	Nil	None Required.
2015 (partial)	Nil	Nil	None Required.
2014	Nil	Nil	None Required.
2013	1	Air Quality	Complaint made via email on 24 July 2013 regarding air quality in Rutherford area.
2012-13	1	1	Complaint made from neighbouring Heritage Green Residential Estate regarding storage of waste tiles causing visual nuisance. It is noted that this was previously considered to be a legal issue and therefore not previously recorded as a complaint.
2011-12	Nil	Nil	None Required.
2010-11	Nil	Nil	None Required.
2009-10	1	Air Quality	Complaint made from neighbouring Heritage Green Residential Estate regarding non-compliances identified in the Environment Audit.
2008-09	Nil	Nil	None Required.
2007-08	1	Air Quality	Anonymous complaint to EPA regarding visible black smoke. Report submitted to EPA on 25 March 2008. Visible black smoke unlikely to have originated from NCIA. No further action required.
2006-07	1	Odour	Anonymous complaint to EPA regarding odour. Discussed with EPA. Odour unlikely to have originated from NCIA. No further action required.
2005-06	2	Air Quality / Odour	Complaint made regarding visible plume. Complainant contacted and issue discussed. No further action required. Anonymous complaint to EPA regarding odour. Discussed with EPA. Odour unlikely to have originated from NCIA. No further action required.
2004-05	1	Air Quality	Complaint made regarding visible plume. Complainant contacted and issue discussed. No further action required.

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4.0 Environmental Monitoring Results

The following environmental parameters are monitored in accordance with the conditions of the Project Approval and / or the EPL and / or for internal due diligence requirements:

- Ambient air monitoring (northwest and southeast of the facility):
 - Fine Particulates (PM_{10}); and
 - Fluoride (particulate, gaseous and total).
- Fluoride Impact on Vegetation:
 - Quarterly visual assessment of vegetation; and
 - Quarterly fluoride content in vegetation.
- Meteorological monitoring:
 - Wind speed at 10 metres;
 - Wind direction at 10 metres;
 - Temperature at 5 metres; and
 - Rainfall.
- Stack emission testing (all stacks):
 - Total particulates; and
 - Fine particulates (PM_{10}).
- Additionally, for the kiln stacks:
 - Mercury (Hg);
 - Cadmium (Cd);
 - Nitrogen Oxides (NO_x);
 - Hazardous substances (metals);
 - Hydrogen Fluoride (HF);
 - Sulfuric acid mist (H₂SO₄); and
 - Sulfur trioxide (SO₃).
- Noise monitoring:
 - L_{Aeq} (15 minute); and
 - L_{A1} (1 minute).

In addition to the above-listed parameters, NCIA also keeps internal records of water usage and waste production. Water quality monitoring is also undertaken of the stormwater contained in the water retention basins.

A summary of the monitoring results for these parameters during the current reporting period is provided below.

4.1 Ambient Air Monitoring Results

The ambient air quality monitoring program commenced on 12 March 2004 to record background data prior to commencement of Stage One operations. The program was designed and implemented in accordance with the requirements of NCIA's EPL. The monitoring program also satisfies the requirements of the Project Approval.

In accordance with EPL condition M2.1, PM₁₀ (24-hour) and Fluoride (24-hour and weekly) are monitored at two locations: northwest and southeast of the facility (refer Figure 2).

For PM₁₀ monitoring, two sampling locations have been established to determine concentrations at the NCIA property boundary, along the dominant southeast-northwest wind axis. The monitors are sited in accordance with *AS/NZS 3580.1.1:2016 Guide to siting air monitoring equipment*. Sampling and analyses of PM₁₀ are undertaken as per *AS/NZS 3580.9.6:2015 Determination of suspended particulate matter*. Discrete 24-hour samples are collected every 6 days according to the NSW EPA schedule.

Two fluoride monitoring units (manual, double filter paper samplers) have been sited at each of the two locations identified for monitoring of PM₁₀, and are operated in accordance with *AS3580.13.2:2013 Determination of gaseous and acid-soluble particulate fluorides*. At each location, one monitor operates continuously over a 7-day period to provide weekly fluoride concentration averages. These units are designated 'Northwest HF7' and 'Southeast HF7'. The remaining unit at each site operates continuously for discrete 24-hour periods according to the NSW EPA 6-day cycle to provide 24-hour averages for sampler operation days. Units are designated 'Northwest HF' and 'Southeast HF'.



Figure 2 Ambient air monitoring locations

4.1.1 PM₁₀ – Monitoring Results

The EPL does not specify ambient air concentration limits, however Condition 15 of the Project Approval sets out criteria for PM₁₀.

A summary of PM₁₀ monitoring results from both monitoring locations for the current reporting period is provided in Table 4-1, alongside the relevant criteria. The PM₁₀ results for the NW and SE locations are also graphed in Figure 3 and Figure 4 respectively.

It is noted that on 22 August 2017, 24hr PM₁₀ was recorded to be 133 µg/m³ and is considered to be a contaminated record due to slashing of the paddock occurring around the monitor. This value was not used in the calculation of summary values as reported in Table 4-1.

Table 4-1 Summary of ambient air monitoring: PM₁₀ results

Parameter	Criteria	NW Location	SE Location
Annual Average Concentration (µg/m ³)	30.0	31.4	22.7
Standard Deviation (µg/m ³)	-	18.7	12.4
24-hour Minimum Concentration (µg/m ³)	-	9.3	6.2
24-hour Maximum Concentration (µg/m ³)	50.0	92.6	51.6

Note: **Bold** font indicates an exceedance of the criteria

4.1.2 PM₁₀ – Assessment against Annual Criteria

The South East location returned an average annual concentration of 22.7 µg/m³ which is below the 30 µg/m³ annual criteria. This annual average remained below this criteria for the duration of the 12 month monitoring period.

At the completion of this 12 month period the North West location returned an annual average of 31.4 µg/m³ which is above the criteria. It should be noted that this annual average remained below the criteria until 18 July where three elevated results caused the annual average to move above the criteria.

At the time of writing this report the annual average has since decreased from 31.4 µg/m³ indicating a likely return to values below the criteria.

4.1.3 PM₁₀ – Assessment against 24 Hour Criteria

This section details any exceedances of the PM₁₀ 24-hour maximum concentration. Each of these elevated PM₁₀ monitoring results were promptly notified to DP&E upon receipt of the validated laboratory results, in accordance with the reporting requirements specified in the Project Approval.

Apart from these isolated exceedances, the remainder of PM₁₀ monitoring results for the NW and SE monitoring locations during the reporting period were below the 24-hour guideline criteria.

There were eight exceedances of the PM₁₀ 24-hour maximum concentration at the NW monitoring location:

- 16 August 2017 – PM₁₀ concentration of 54.0 µg/m³;
- 14 December 2017 – PM₁₀ concentration of 52.0 µg/m³;
- 20 December 2017 – PM₁₀ concentration of 65.8 µg/m³;
- 20 March 2018 – PM₁₀ concentration of 59.8 µg/m³;
- 13 April 2018 – PM₁₀ concentration of 86.5 µg/m³;
- 6 July 2018 - PM₁₀ concentration of 78.8 µg/m³;
- 18 July 2018 - PM₁₀ concentration of 77.9 µg/m³; and
- 24 July 2018 - PM₁₀ concentration of 92.6 µg/m³.

There were four exceedances of the PM₁₀ 24-hour maximum concentration at the SE monitoring location:

- 22 August 2017 – PM₁₀ concentration of 133 µg/m³;
- 20 December 2017 – PM₁₀ concentration of 51.0 µg/m³;
- 12 February 2018 – PM₁₀ concentration of 50.9 µg/m³; and
- 18 July 2018 – PM₁₀ concentration of 51.6 µg/m³.

Ambient and meteorological conditions on these days were reviewed and discussed below.

16 and 22 August 2017

Meteorological data on the 16th August indicates strong north westerly winds gusting above 60 km/h. As the NCIA site is downwind of the North West sampling location, it is unlikely to be the dust source. Regional PM₁₀ data along with meteorology conditions, suggest that increased regional background PM₁₀ levels contributed significantly to the measured values on the 16th August at NCIA.

The result at the South East monitoring station on 22 August 2017 can be attributed to slashing of the back paddock which occurred around the HVAS unit while it was running. The slashing is likely to be responsible for considerable levels of dust generation, resulting in a contaminated sample which will not be included in the annual average calculation.

14 and 20 December 2017

The NCIA facility was not operational on 20 December as it was shut down for the Christmas period on 19 December. Meteorological data for both 14 and 20 December show temperatures in excess of 40 degrees with winds from the North West. The NCIA facility is downwind of the North West monitoring location under these wind conditions, so NCIA is unlikely to be the cause of the exceedances at the North West monitoring site.

Along with the facility being offline, regional PM₁₀ data for 20 December shows the highest PM₁₀ concentrations for December at both the Singleton and Beresfield EPA sites. These regional results are comparable to the monitoring results, suggesting that elevated regional PM₁₀ levels are the primary cause of the exceedances.

In summary, NCIA PM₁₀ results on 14 and 20 December are likely to be significantly influenced by elevated regional PM₁₀ levels and meteorology conditions.

12 February 2018

Meteorology data from the onsite station shows that the wind for 12 February was predominantly from the South East, with less than 20% of winds not blowing from the South East quadrant. This places the NCIA facility downwind of the South East monitoring station for a large majority of 12 February. Given the wind direction, it is highly unlikely the NCIA facility is the source of the PM₁₀ leading to this exceedance.

It had been observed that off-site earthworks are occurring to the South East of the facility with front end loaders observed filling tipper trucks with other heavy vehicles operating on unsealed roads. Given the wind conditions on 12 February it is probable that these off-site earthworks have resulted in the elevated PM₁₀ concentrations recorded at the South East sampler on 12 February.

In summary, the PM₁₀ result recorded at the South East monitoring location on 12 February is likely to be significantly influenced by off-site earth works to the South East of the NCIA site.

20 March 2018

Data sourced from the EPA Beresfield site and the NCIA South East monitoring site indicates that regional PM₁₀ concentrations were elevated on this day with both stations recording PM₁₀ concentrations above 40 µg/m³. For comparison, the South East rolling average at the time was 18 µg/m³ (Figure 4) indicating typical levels are well below 40 µg/m³.

Meteorology data from the onsite station shows that the wind for 20 March was predominantly from the South and South Southeast. This places the NCIA facility upwind of the North West monitoring station for the majority of the day. The Bureau of Meteorology Maitland Airport site recorded its maximum March wind gust (54km/hr) on this day with a maximum temperature of 30°C.

While the wind direction means the NCIA facility was upwind of the North West monitor, the background PM₁₀ concentrations were already in the vicinity of the 50 µg/m³. While it is possible that the facility may have made some contribution to this result, earthworks to the south east of the facility and localised sources such as vehicle traffic along Racecourse Road may have also contributed to the measured PM₁₀ concentration.

In summary, the PM₁₀ result recorded at the North West monitoring location on 20 March is likely to be significantly influenced by high regional PM₁₀ concentrations as a result of warm, dry and windy conditions.

13 April 2018

Data sourced from the EPA Beresfield and Singleton sites and the NCIA South East monitoring site indicates that regional PM₁₀ concentrations were elevated on this day, with other regional stations recording above average PM₁₀ concentrations. The Singleton and Beresfield sites recorded the 2nd and 3rd highest 24hr PM₁₀ results for April respectively.

Meteorology data from the onsite station shows that the wind for 13 April was predominantly from the North West with no southerly component. This places the North West sampler upwind of the facility for the entire day. The Bureau of Meteorology Maitland Airport site recorded a maximum wind gust of 54km/hr with a maximum temperature of 30.7°C and minimal rainfall in the fortnight prior confirming warm, dry and windy conditions.

In summary, the PM₁₀ result recorded at the North West monitoring location on 13 April is likely to be significantly influenced by high regional PM₁₀ concentrations as a result of warm, dry and windy north westerly conditions. The North West sampler was upwind of the NCIA facility on this day meaning the facility was not the source of the exceedance.

6 July, 18 July and 24 July 2018

The July 2018 monitoring results show exceedances of the PM₁₀ 24-hour maximum concentration on the following dates:

- 6 July 2018, North West monitoring station (78.8 µg/m³);
- 18 July 2018, North West monitoring station (77.9 µg/m³);
- 18 July 2018, South East monitoring station (51.6 µg/m³); and
- 24 July 2018, North West monitoring station (92.6 µg/m³).

For comparison, the EPA regional monitoring stations located at Beresfield and Singleton recorded the following PM₁₀ concentrations on these days as detailed in Table 4-2.

Table 4-2 Beresfield and Singleton EPA regional monitoring stations readings

Date	Beresfield 24hr Average PM ₁₀	Singleton 24hr Average PM ₁₀	South East NCIA site PM ₁₀	North West NCIA site PM ₁₀
06 July 2018	15.6 µg/m ³	27.9 µg/m ³	29.4 µg/m ³	78.8 µg/m ³
18 July 2018	55.7 µg/m ³ (2 nd highest in July)	59.4 µg/m ³ (Highest in July)	51.6 µg/m ³	77.9 µg/m ³
24 July 2018	38.4 µg/m ³ (4 th highest in July)	44.7 µg/m ³ (4 th highest in July)	47.6 µg/m ³	92.6 µg/m ³

The NCIA facility was predominantly downwind of the North West monitoring station on 6 July with strong north westerly winds recorded at the onsite meteorology station. Elevated PM₁₀ readings upwind of the facility and a significantly lower reading at the South East site (downwind of the facility) indicate that the NCIA facility was unlikely to be the primary source of the PM₁₀ emissions on this day with a localised upwind offsite source the likely cause of exceedances.

Data sourced from the EPA Beresfield and Singleton ambient monitoring sites indicates regional PM₁₀ concentrations were elevated on 18 July and 24 July. Meteorology data from the onsite station shows winds on both 18 July and 24 July were also strong north westerlies. This again places the NCIA facility downwind of the North West monitoring station for these sampling days. The wind roses attached in **Appendix B** show this data graphically and present the wind direction as 'blowing from'.

In addition, although the South East monitoring location on 18 July recorded a reading above the criteria, the South East result was significantly lower than the North West result (upwind of the facility) and as such it is likely that elevated regional conditions was the probable cause of exceedance.

Comparison to historical monitoring results and analysis of trends is discussed further in Section 5.1.

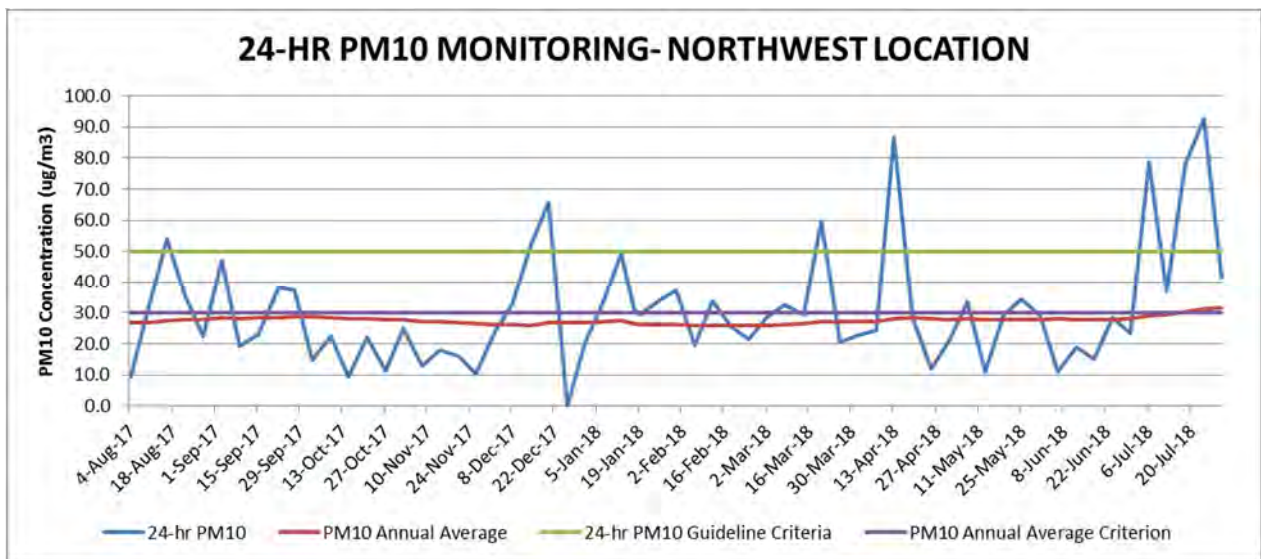


Figure 3 PM₁₀ monitoring – northwest location

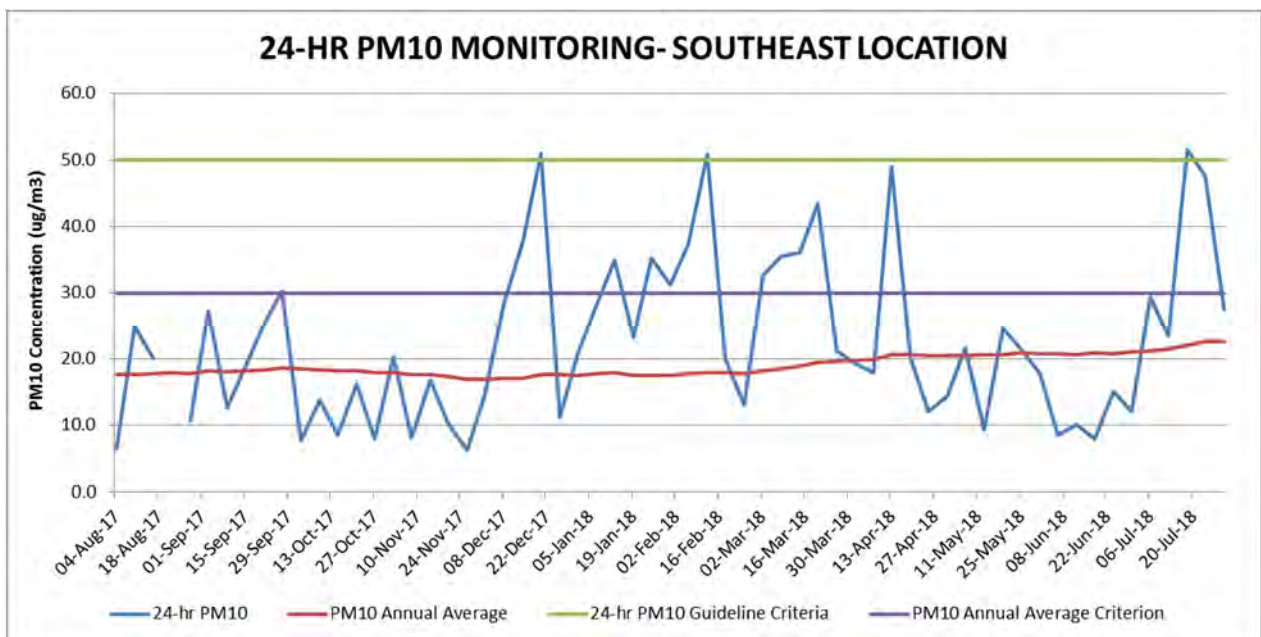


Figure 4 PM₁₀ monitoring – southeast location

4.1.4 Fluoride – 24 Hour Monitoring Results

There is no ambient air fluoride concentration limit specified in the EPL or Project Approval. To provide context for the ambient air monitoring results, guideline levels have been taken from the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016).

A summary of 24-hour fluoride monitoring results from both monitoring locations for the current reporting period is provided in Table 4-3. The 24-hour fluoride monitoring results for the NW and SE locations are also graphed in Figure 5 and Figure 6 respectively.

Table 4-3 Summary of ambient air monitoring: 24-hour fluoride results

Parameter	Guideline Criteria	NW Location	SE Location
Annual Average Concentration ($\mu\text{g}/\text{m}^3$)	-	0.31	0.34
Standard Deviation ($\mu\text{g}/\text{m}^3$)	-	0.48	0.37
24-hour Minimum Concentration ($\mu\text{g}/\text{m}^3$)	-	0.04	0.08
24-hour Maximum Concentration ($\mu\text{g}/\text{m}^3$)	2.9	3.21	2.59

Note: **Bold** font indicates an exceedance of the guideline criteria

The results in Table 4-3 indicate that the SE monitoring locations results for the 24-hour total fluoride emissions satisfied the EPA (2016) guideline criterion for the entire reporting period. The NW monitoring location had one exceedance of the guideline criterion over the course of the monitoring period.

The 24hr Hydrogen Fluoride sample for 31 January 2018 returned a concentration marginally above the NSW EPA 24hr criterion. The land use to the north (downwind) of the facility boundary is heavy industrial and it is not expected that this recorded concentration would have resulted in adverse environmental impacts on nearby sensitive receptors. Routine monitoring of the effects of Fluoride on vegetation indicated that despite the local vegetation displaying signs of emission-related foliage injury, the extent of fluoride impacts to foliage attributable to NCIA activities alone could not be confidently determined.

Comparison to historical monitoring results and analysis of trends is discussed further in Section 5.1.

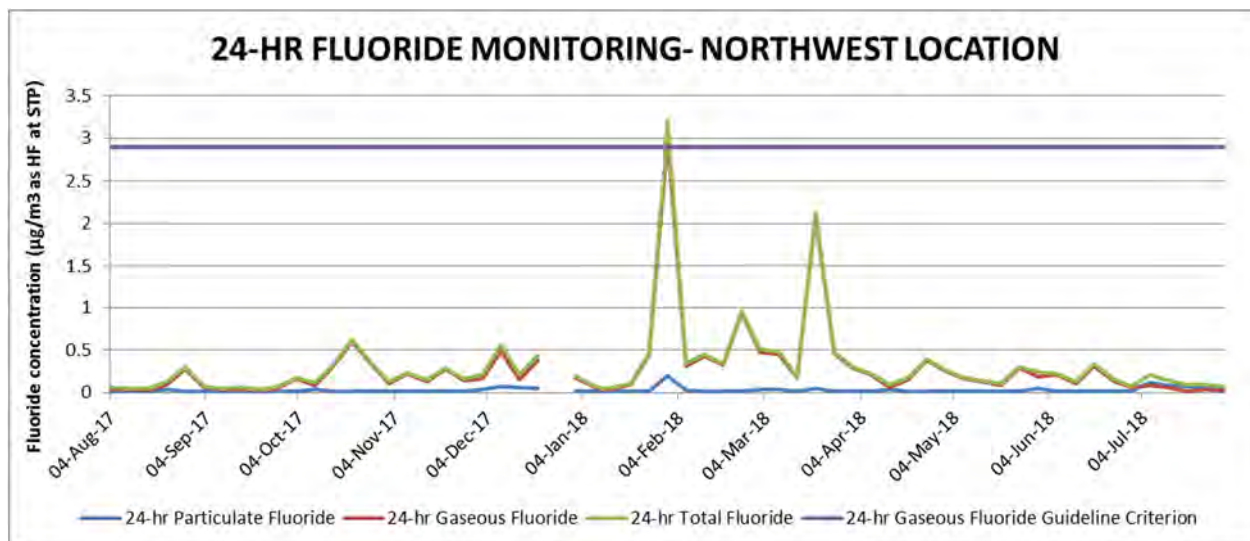


Figure 5 24-hour fluoride monitoring – northwest location

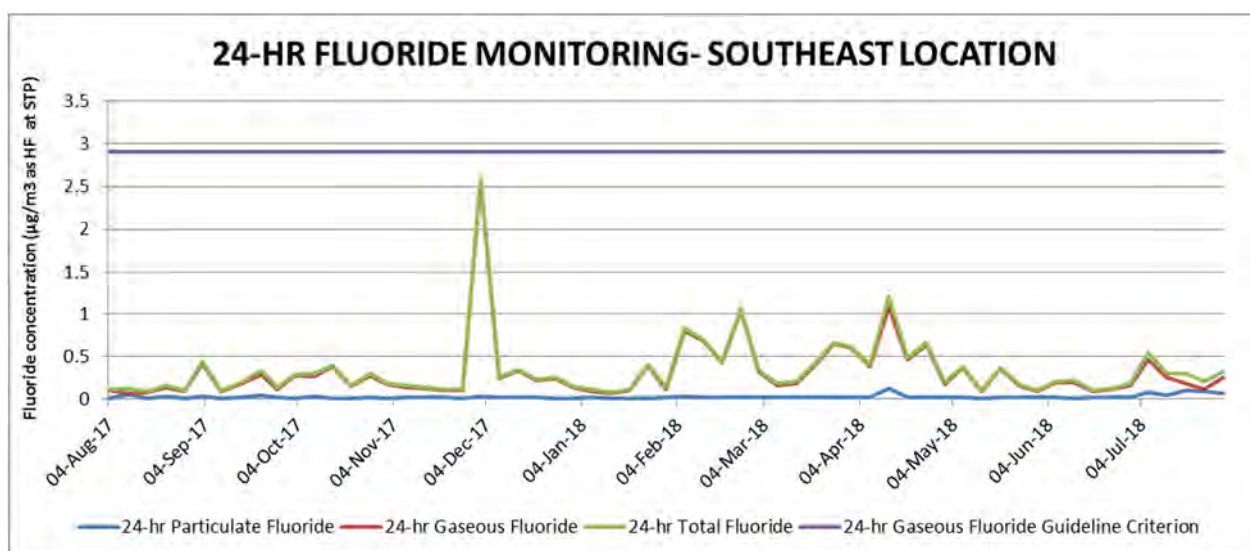


Figure 6 24 hour fluoride monitoring – southeast location

4.1.5 Fluoride – Weekly (7-Day) Monitoring Results

There is no ambient air fluoride concentration limit specified in the EPL or Project Approval. To provide context for the ambient air monitoring results, guideline levels have been taken from the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016).

A summary of weekly fluoride monitoring results from both monitoring locations for the current reporting period is provided in Table 4-4. The weekly Fluoride monitoring results for the NW and SE locations are also graphed in Figure 7 and Figure 8 respectively.

Table 4-4 Summary of ambient air monitoring: weekly fluoride results

Parameter	Guideline Criteria	NW Location	SE Location
Annual Average Concentration ($\mu\text{g}/\text{m}^3$)	-	0.14	0.25
Standard Deviation ($\mu\text{g}/\text{m}^3$)	-	0.12	0.16
Weekly Minimum Concentration ($\mu\text{g}/\text{m}^3$)	-	0.01	0.04
Weekly Maximum Concentration ($\mu\text{g}/\text{m}^3$)	1.7	0.54	0.65

The results in Table 4-4 indicate that for both the NW and SE monitoring locations the weekly Fluoride levels satisfied the EPA (2016) guideline criterion for the entire reporting period.

Comparison to historical monitoring results and analysis of trends is discussed further in Section 5.1.

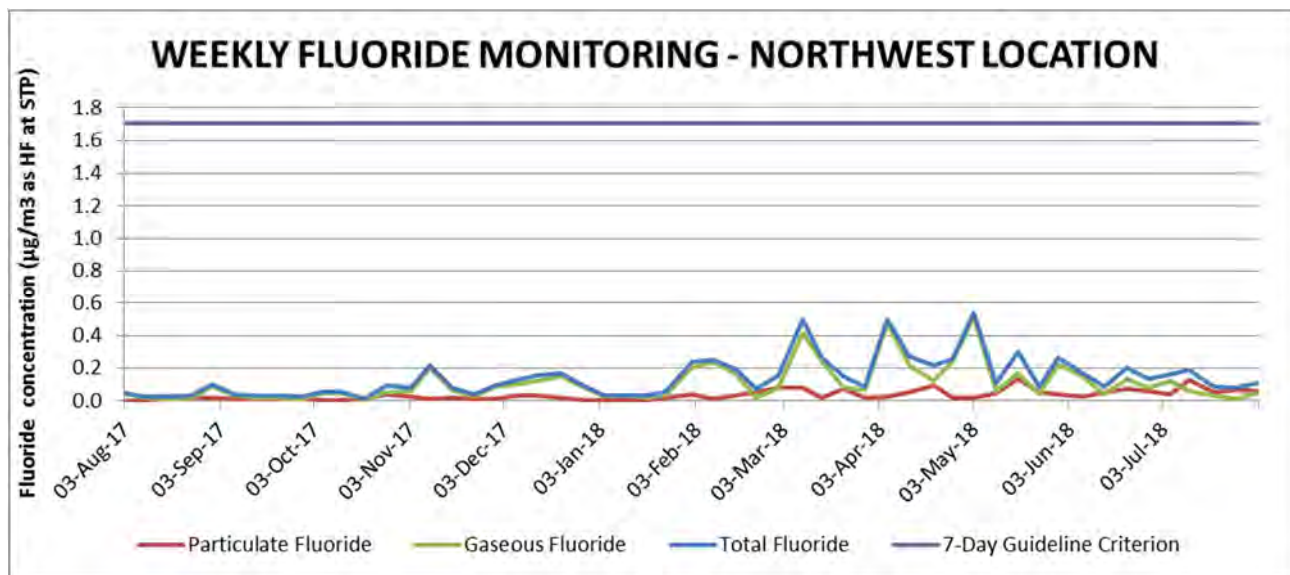


Figure 7 Weekly fluoride monitoring – northwest location

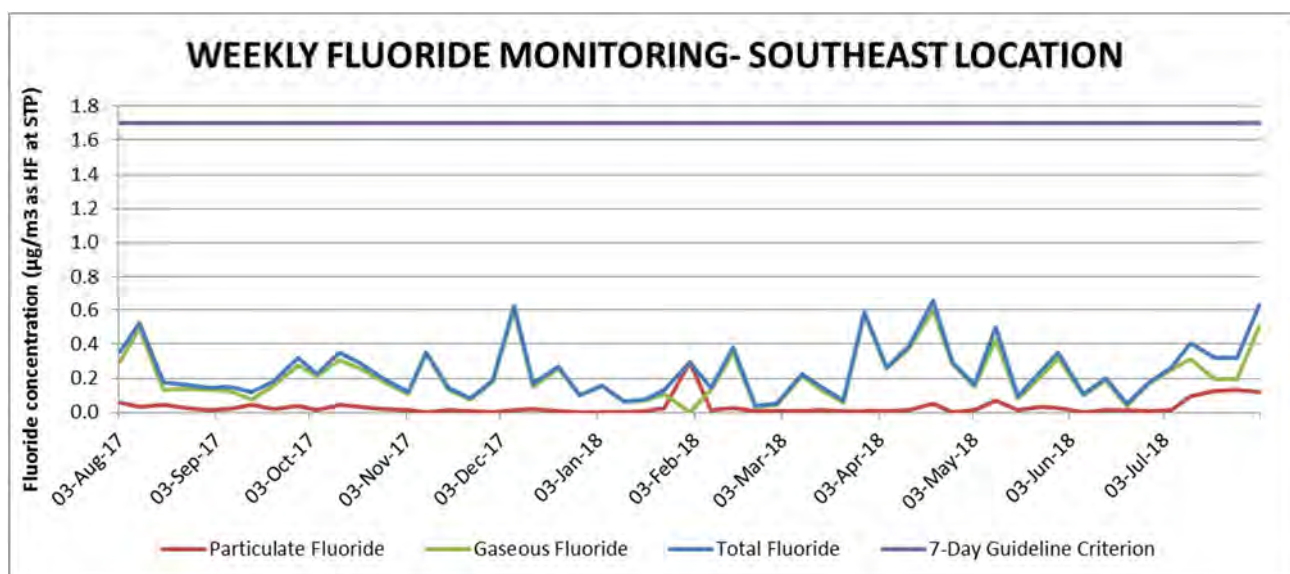


Figure 8 Weekly fluoride monitoring – southeast location

4.2 Fluoride Impact on Vegetation

Monitoring the impact of atmospheric fluoride on vegetation in the area surrounding the NCIA facility commenced in 2004. The monitoring program was designed by AECOM based on the assessment methods developed by Dr David Doley of the University of Queensland.

In accordance with condition M4.1 of the EPL, the impact of fluoride on vegetation was monitored by undertaking visual assessments of the condition of local vegetation surrounding the NCIA facility and by foliar sampling of selected flora species for laboratory analysis of fluoride content. Samples chosen for fluoride content analysis were selected on the basis of known species sensitivity toward fluoride, representation of certain species and vegetation type (over storey, cultivated vegetation and forage crops). Generally, the species assessed in the monitoring program were selected based on their known sensitivity to atmospheric fluoride impacts.

Quarterly vegetation assessments were conducted during the reporting period (Q3 September 2017, Q1 March 2018, and Q2 June 2018) as well as an Annual Vegetation Condition Assessment (Q4 December 2017). The results of these surveys are summarised below.

The sites monitored for vegetation condition assessments during the reporting period are shown in Figure 9. Details on the monitoring sites as well as a photograph of each monitoring site location (at the time of the annual Q4 2017 survey) are provided in Appendix A1. The monitoring locations included eighteen 'impact' sites (comprising eight sites monitored quarterly plus an additional ten sites monitored during the annual survey only) and one 'reference' site. All impact sites were selected to be generally within the areas of highest predicted ambient fluoride concentration – i.e. within the prevailing wind directions for the region (northwest-southeast axis), whilst the reference site location was selected to be outside the prevailing winds.

At each monitoring site and for each of the monitored flora species, the visible injury symptoms to leaves were classified in accordance with the scoring criteria and injury categories presented in Table 4-5.

Table 4-5 Symptom code for visible injury to vegetation with particular reference to fluoride

Injury Symptom	Emission injury			Insect attack injury
	Chlorosis / Marginal necrosis	Tip necrosis	Cupping	Leaf chewing / sap sucking
Category	% of leaf width / area	% of leaf length	Entire leaf or tree	% of leaf area
0	nil	Nil	nil	nil
1	very slight <2%	very slight <2%	very slight	very slight <2%
2	slight <5%	slight <5%	slight	slight <5%
3	distinct <10%	distinct <10%	distinct	distinct <10%
4	marked <25%	marked <25%	marked	marked <25%
5	severe <50%	severe <50%	severe	severe <50%
6	very severe <75%	very severe <75%	very severe	very severe <75%
7	extreme >75%	extreme >75%	extreme	extreme >75%

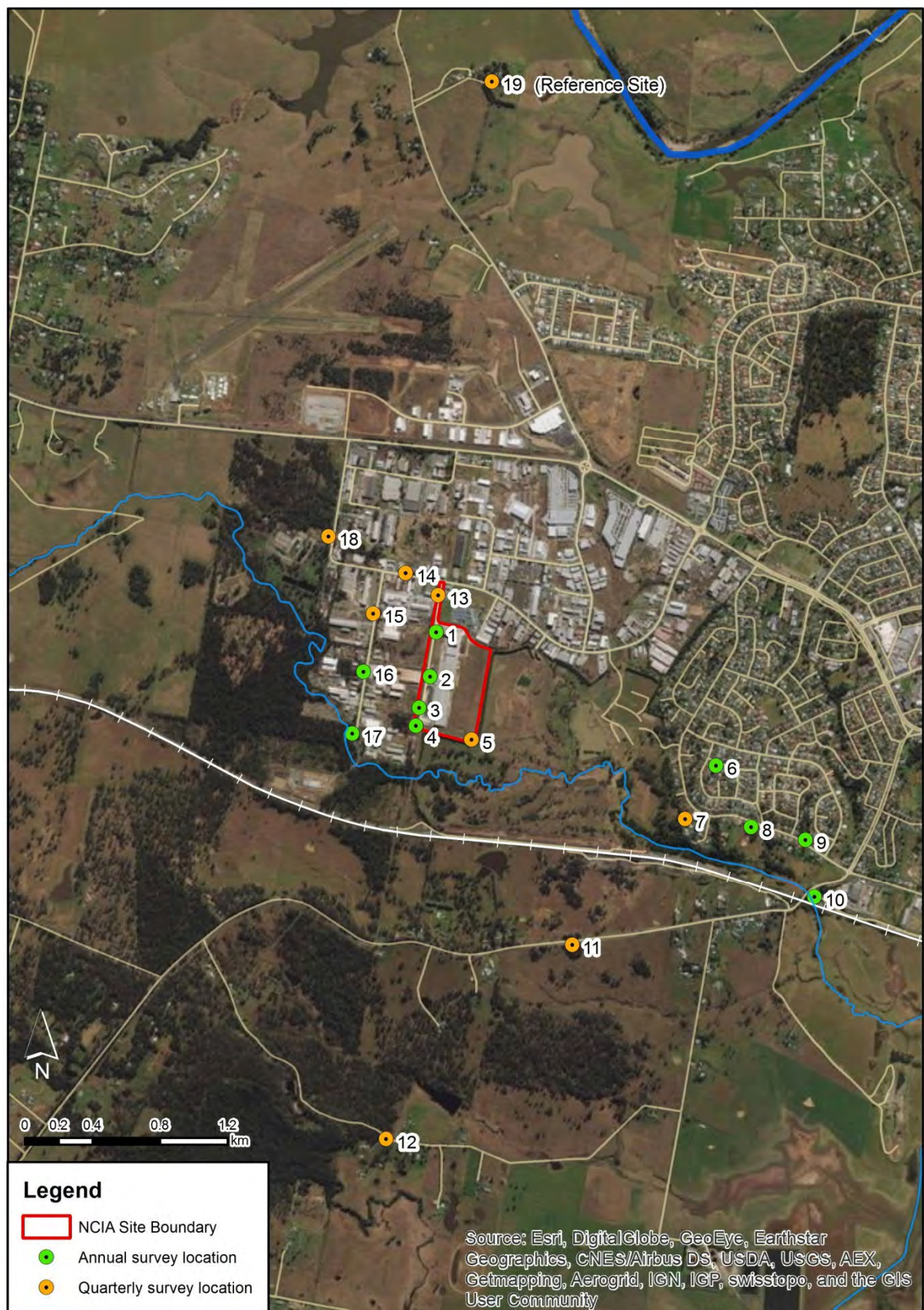


Figure 9 Vegetation survey monitoring location

4.2.1 Visual Condition Assessment Results – Impact Sites

The complete tabulated results of the visible injury assessments performed during the quarterly and annual surveys are provided in Appendix A2 and a selection of photographs of impacted foliage included in Appendix A3. The results have been summarised below and supported graphically in Figure 10 to Figure 12.

The visual assessments found that inclusive of all quarterly surveys during the reporting period, emission related injury symptoms (i.e. chlorosis, cupping, necrosis, anthocyanin accumulation) were present in the foliage of approximately 87% of all species assessed, whilst approximately 74% of all species assessed displayed some level of insect attack injury symptoms (refer to Table 4-6). The lower prevalence of emissions and insect attack injury symptoms recorded during the Q4 annual survey is largely due to the inclusion in this survey of several species that are known to be less sensitive to injury symptoms (e.g. *acacia*, *casuarina*, *pinus*, and *hakea* spp.), whereas quarterly surveys only include sensitive eucalypt species.

Table 4-6 Proportion of surveyed species showing injury symptoms

	Emission related injury symptoms					Insect injury symptoms				
	Q3 2017	Q4 2017	Q1 2018	Q2 2018	TOTAL	Q3 2017	Q4 2017	Q1 2018	Q2 2018	TOTAL
No. species assessed	17 (100%)	66 (100%)	17 (100%)	17 (100%)	117 (100%)	17 (100%)	66 (100%)	17 (100%)	17 (100%)	117 (100%)
Injury symptoms present	15 (88%)	55 (83%)	16 (94%)	16 (94%)	102 (87%)	16 (94%)	37 (56%)	17 (100%)	17 (100%)	87 (74%)
Injury symptoms absent	2 (12%)	11 (17%)	1 (6%)	1 (6%)	15 (13%)	1 (6%)	29 (44%)	0 (0%)	0 (0%)	30 (26%)

Figure 10 shows the prevalence of each visual foliage injury symptom observed in all species during the surveys. It indicates that tip necrosis, leaf undulation / cupping, and chlorosis were the most commonly occurring symptoms (with 19 - 36% of all observations), followed by marginal necrosis (6%), whilst symptoms of anthocyanin accumulation were generally uncommon (4% of all observations).

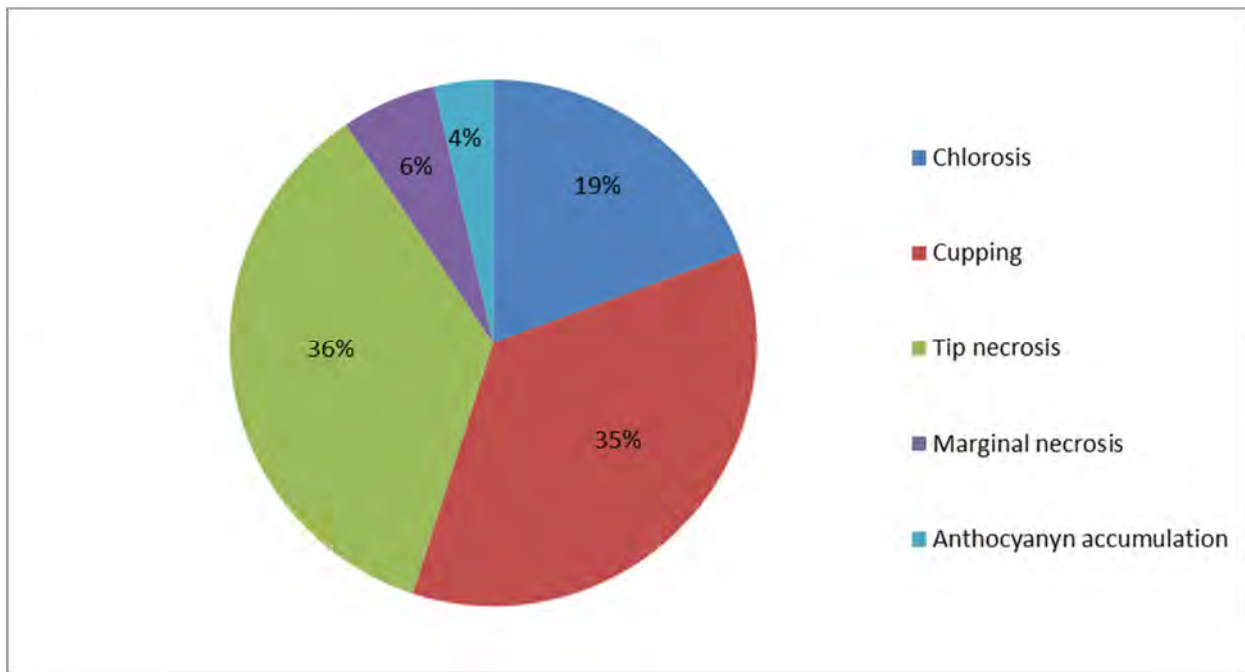


Figure 10 Relative prevalence of fluoride related symptoms

The severity of recorded emission related injury symptoms overall ranged from very slight to very severe (i.e. between 2% and 75% of leaf area affected – refer to Table 4-5). For each quarterly survey during the reporting period, Figure 11 depicts the distribution of injury severity classes recorded in all flora species surveyed. The results indicate the following:

- For each survey between 54% and 64% of plants surveyed were affected at worst by slight injury symptoms (i.e. injury class 2 and less, maximum of 5% leaf area impacted);
- For each survey between 30% and 47% of plants surveyed were affected by distinct or marked injury symptoms (i.e. injury class 3 or 4, 10-25% of leaf area impacted);
- During the annual Q4 2017 survey only, 2% of plants surveyed displayed severe to very severe visual injury symptoms (i.e. injury class 5 or 6, 50-75% of leaf area impacted); and
- No species displayed extreme injury symptoms (i.e. injury class 7, >75% of leaf area impacted) during any of the four surveys.

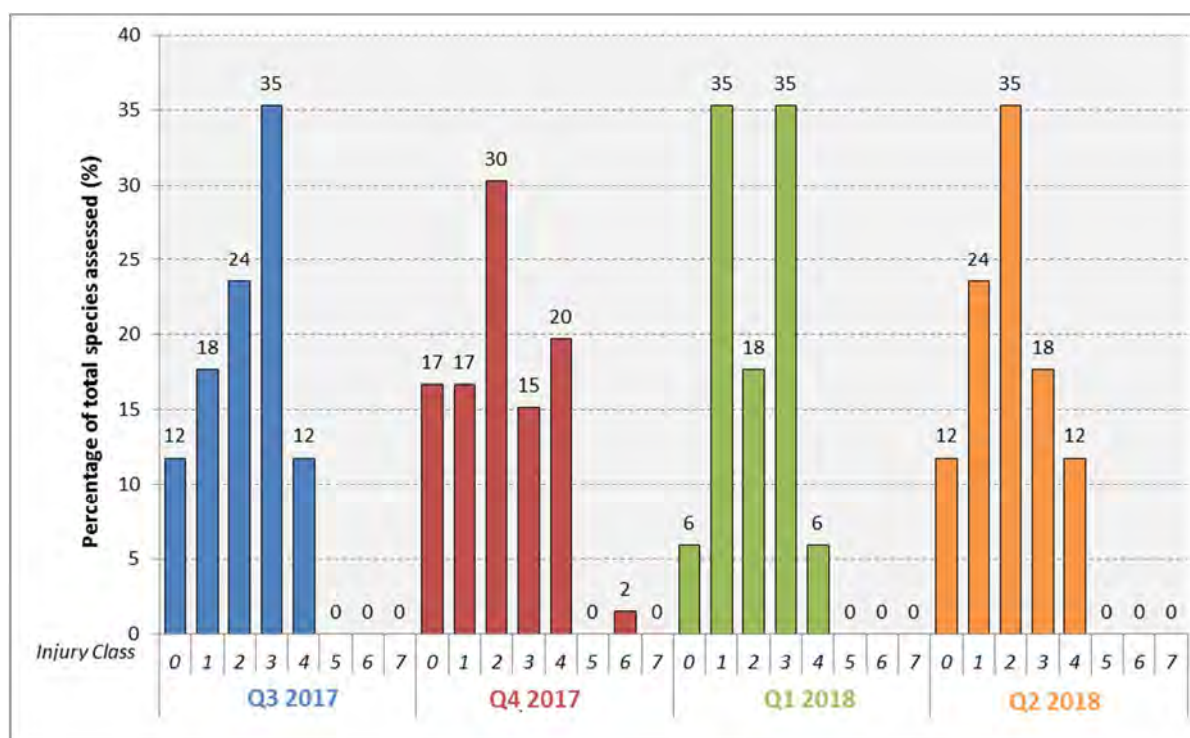


Figure 11 Proportion of flora species affected by emissions related visual injury symptoms during the surveys

In relation to insect attack injury, approximately 39% of all symptoms recorded were very slight (i.e. less than 2% leaf area affected), approximately 41% were slight (i.e. 2–5% leaf area affected), approximately 18% were distinct (i.e. 5–10% leaf area affected), and 1% (one instance) were marked (~10–25% leaf area affected). No severe (or higher) insect injury symptoms were recorded.

Figure 12 depicts the relationship between the maximum emission related visual injury score recorded for each species (inclusive of all surveys) and their distance from the kiln stacks at NCIA. The results showed little correlation between foliage injury and the distance to the emission source ($r^2 = 0.06$), indicating that emission impacts to foliage may spread further from the NCIA site than the furthest monitoring site. For instance, category 5 injury symptoms were observed up to ~1,400m away from the NCIA facility at Site 6 and Site 7, while category 3 symptoms occurred as far as Site 12 (~2,300m from the NCIA facility). This also suggests that within the current suite of monitoring sites, variables such as flora species type or the sensitivity of specific individuals are more relevant than the distance from emission source in determining atmospheric fluoride impacts on local vegetation. However and importantly, there are several other air pollution sources in the region which may impact vegetation and foliage condition. Therefore the geographical extent of fluoride impacts to foliage attributable to NCIA activities alone cannot be confidently determined.

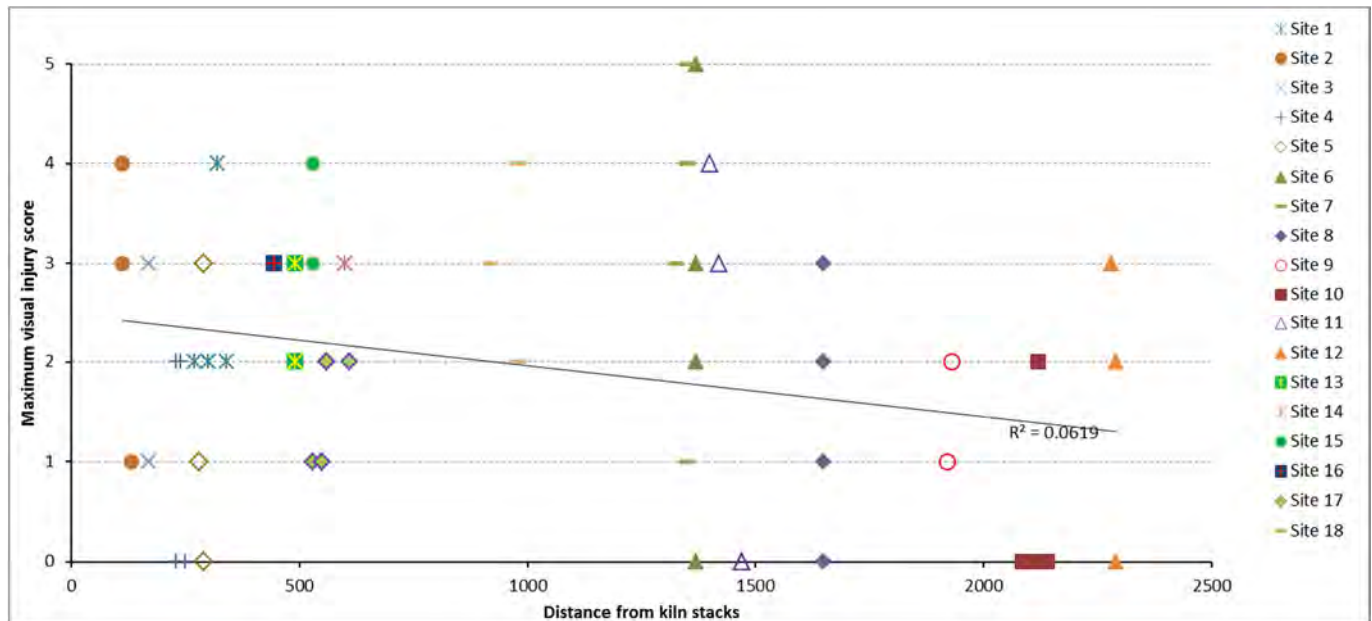


Figure 12 Relationship between distance from kiln stacks and maximum visual injury score in foliage of species assessed

4.2.2 Visual condition Assessment Results – Reference Site

A broad diversity of species was assessed at this site, which is located approximately 3km north of the kiln stacks at NCIA. Generally the surveyed vegetation was in a good and healthy condition with species not showing signs of chlorosis, marginal necrosis or anthocyanin accumulation. Some foliage injury symptoms were recorded including leaf cupping and tip necrosis, however those were only detected in a minority of the species surveyed and their severity was typically limited to class 1 (very slight) or class 2 (slight) injuries (with three exceptions in the *Corymbia maculata*, *Macadamia integrifolia* and *Eucalyptus tereticornis* individuals. *Corymbia maculata* which showed marked (class 4) cupping symptoms during the Q1 2018 and Q2 2018 surveys). *Macadamia integrifolia* individuals showed distinct (class 3) cupping and tip necrosis symptoms during Q4 2017 and Q1 2018 and *Eucalyptus tereticornis* individuals showed them in Q1 2018. Distinct cupping was seen in *Corymbia maculata* during Q4 2017.

Insect attack injury symptoms were recorded in 40% of all species assessed at the reference site (mostly in eucalypt species) with their severity ranging from very slight to marked (class 4 injury).

4.2.3 Fluoride Content Assessment Results

Foliage samples for fluoride content assessment were collected from various established locations during each of the surveys undertaken during the reporting period. Where possible both current and previous season leaves were collected for analysis and mixed to create a bulk sample for the site. Grasses at Wollombi Road (Site 11) were sampled in approximate proportion to their representation or percentage ground cover at the sampling site and were collected at a height judged to be that at which cattle would graze (thereby avoiding the inclusion of soil and roots).

Samples were sent to a NATA accredited laboratory for analysis and the results are provided in Table 4-7. Detailed results as provided by the laboratory (certificates of analysis) have been included in Appendix A4.

Foliar fluoride content results generally show that:

- Individual species and plants show varying degrees of resistance and/or sensitivity to impacts caused by atmospheric fluoride impacts with recorded foliar fluoride concentrations ranging from <10.0mg/kg to 91.9mg/kg; and

- For each individual species sampled, foliar fluoride concentrations show seasonal variations, reflecting the dominant wind patterns in the area – i.e. with concentrations increasing (or decreasing) as the dominant winds blow toward (or away from) the monitoring sites from the NCIA kiln stacks.

A comparison of these results to previous years and further discussion are provided in Section 5.2 of this AEMR.

Table 4-7 Sites and species within the survey area selected for foliage fluoride content assessment

Site #	Species	Foliage Season Sampled	Fluoride Content (µg/g, dry)			
			Q3 2017	Q4 2017	Q1 2018	Q2 2018
5	<i>Eucalyptus moluccana</i>	Mixed	33.5	27.7	38.3	39.7
11	Grasses	Current	<10.0	<10.0	16.6	<10.0
13	<i>Corymbia maculata</i>	Mixed	69.9	10.2	14.8	<10.0
13	<i>Eucalyptus amplifolia</i>	Mixed	<10.0	23.4	78.0	69.0
15	<i>Corymbia maculata</i>	Mixed	27.2	82.1	63.6	57.6
19	<i>Vitis vinifera</i>	Current	Not sampled	<10.0	12.2	Not sampled

[#] being a deciduous species, *vitis vinifera* had no foliage present at the time of the Q3 2017 and Q2 2018 surveys and hence could not be sampled for analysis.

4.3 Meteorological Monitoring

Meteorological data is recorded at the meteorological station established at the South East air monitoring location. The station is sited and operated in accordance with approved methodologies (EPA, 2016) for the continuous measurement of wind speed (10 m), wind direction (10 m), sigma theta (10 m) and temperature (5 m). A tipping bucket rain gauge is also deployed to record daily rainfall rates.

The monthly data for temperature and rainfall are provided in Figure 13. Monthly wind roses representing the wind speed and direction for the reporting period are provided in Appendix B. A summary of the dominant wind patterns throughout the reporting period is provided below.

Review of the monthly wind roses for the reporting period indicates the following:

- In August and September 2017 winds were blowing predominantly from the northwest;
- In October 2017 winds were blowing predominantly from the southeast with some winds from the northwest;
- Between November 2017 and March 2018 winds were predominantly from the southeast to south with some northwest components;
- In April 2018 winds were predominately from the northwest with some winds from the south; and
- During May to July 2018 winds were predominantly from the northwest with some winds from the west, southwest and south.

Wind speeds recorded over the year were generally low to medium with an average wind speed of 2.0 m/s during the reporting period. The maximum hourly average wind gust during the reporting period was recorded at 10.4 m/s on 15 April 2018.

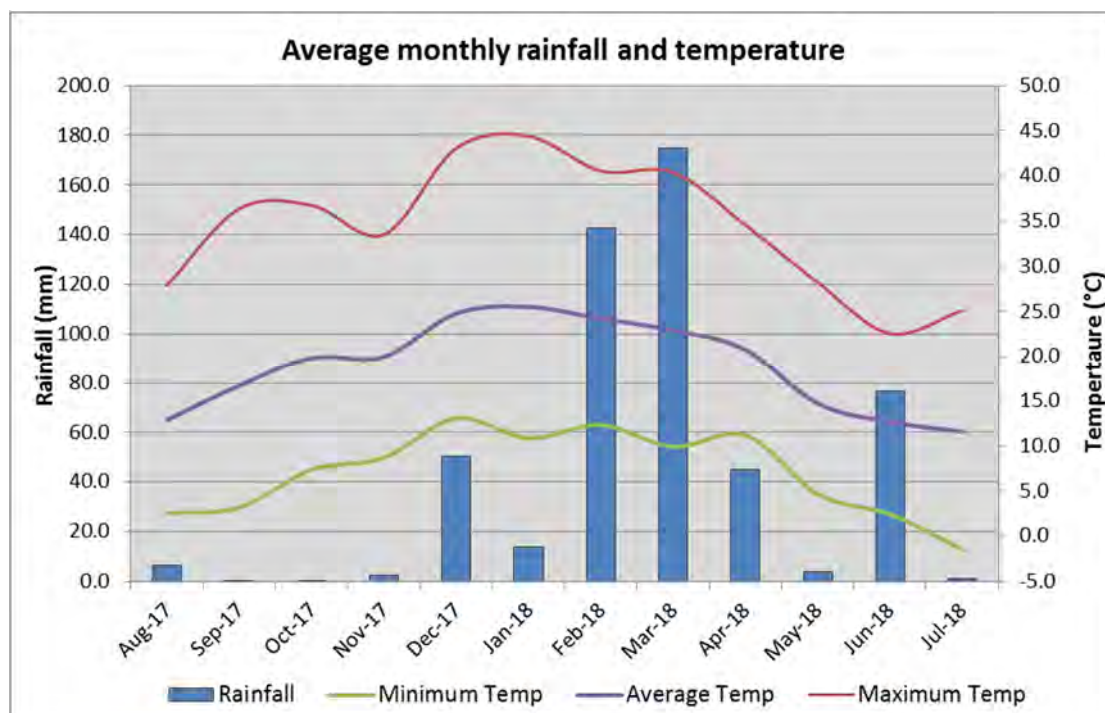


Figure 13 Average monthly rainfall and temperature range (1 August 2017 – 31 July 2018)

4.4 Stack Emissions Testing

Stack emissions testing is undertaken annually in accordance with the EPL requirements. Stack emissions testing was conducted during May - July 2018. Emission sources assessed during the testing period were those defined in the EPL and listed in Table 4-8.

Table 4-8 Emission source descriptions

EPL Identification Number	Emission Source Description
1	Clay Preparation (CP1)
3	Pressing and Drying (PD1)
5	Dryer (D1)
6	Dryer (D2)
9	Glaze Line
10	Selection Line (SL 1,2,3,4)
12	Spray Dryer (SD1)
14	Kiln 1 (KP1)
15	Kiln 2 (KP2)
18	Hot Air Cooler 1 (HAC1)
19	Hot Air Cooler 2 (HAC2)

Each source was tested for Total Particulates and Fine Particulates (PM₁₀). Testing conducted on the Kiln 1 and Kiln 2 stacks also measured concentrations of Total Fluoride (as HF), Sulfuric Acid Mist (H₂SO₄ as SO₃), Sulfur Dioxide (SO₂ as SO₃), Total Hazardous Substances (metals), Nitrogen Oxides (NO, NO₂, NO_x and Equivalent NO₂), Cadmium and Mercury. All sampling was conducted in accordance with the applicable EPA test methods with analyses conducted by a NATA-accredited laboratory.

The Project Approval does not specify pollutant concentration limits for the facility. Pollutant concentration limits are specified in Condition L3 of the EPL. Summaries of the emission testing results, along with the EPL pollutant discharge limits, are provided in Table 4-9 and Table 4-10.

All emission concentrations are converted to standard conditions of 0°C, dry gas and 1 atmosphere pressure for comparison with appropriate regulatory limits. The Nitrogen Oxides, Total Particulate and PM₁₀ emission concentrations from the Kiln stacks are corrected to 18% O₂.

During the reporting period there was an exceedance of the Total Fluoride discharge limit at EPL point 15 (Kiln 2). The July 2018 Kiln 2 fluoride emission concentration was recorded to be 14.3 mg/m³. For comparison purposes, production was running comparably with the other kiln (Kiln 1) which was being fed the same input material as Kiln 2, and the Kiln 1 total fluoride concentration was 0.55 mg/m³ on 25 July 2018. The reason for the difference between these results has not been ascertained.

There was also an exceedance recorded during the reporting period from Hot Air Cooler 1 (HAC 1) (EPL 18). The total particulate result of 5.8 mg/m³ was 0.8 mg/m³ higher than the regulatory parameter of 5 mg/m³. This minor exceedance was the only elevated particulate result recorded, as all other EPL monitoring points returned total particulate emission results well below their respective EPL limits.

Both of the elevated results were notified to DP&E in accordance with the requirements of the Project Approval.

Table 4-9 Summary of particulate emission monitoring results (May 2018 – July 2018)

Stack	Fine Particulate (PM ₁₀) (mg/m ³)	Total Particulate (mg/m ³)	Regulatory Limit (mg/m ³)*
Clay Preparation (CP1) (EPL 1)	3.2	4.3	20
Pressing and Drying (PD1) (EPL 3)	1.6	4.0	20
Dryer (D1) (EPL 5)	13	13	20
Dryer (D2) (EPL 6)	14	14	20
Glaze Line (EPL 9)	1.4	2.6	20
Selection Line (SL 1,2,3,4) (EPL 10)	2.6	5.4	20
Spray Dryer (SD1) (EPL 12)	2.7	2.0	20
Hot Air Cooler (HAC 1) (EPL 18)	2.9	5.8	5
Hot Air Cooler (HAC 2) (EPL 19)	1.2	1.7	5

* Note – Regulatory limit only applies to Total Particulate.

Table 4-10 Summary of emission monitoring results – Kiln 1 and Kiln 2 (May – July 2018)

Pollutant	Kiln 1 (EPL 14) (mg/m ³)	Kiln 2 (EPL 15) (mg/m ³)	Regulatory Limit (mg/m ³)
Fine Particulate (PM ₁₀) (at 18% O ₂)	7.8	9.1	N/A
Total Particulate (at 18% O ₂)	6.0	15	20
Gaseous Fluoride (as HF)	0.0053	13	N/A
Particulate Fluoride (as HF)	0.5	1.3	N/A
Total Fluoride (as HF)	0.55	14.3	5
Sulfuric Acid Mist (H ₂ SO ₄ as SO ₃)	10	27	100
Sulfur Dioxide (SO ₂ as SO ₃)	300	340	NA
Total Hazardous Substances (Metals)	0.16	0.17	1
Cadmium	0.0051	0.0053	0.1
Mercury	0.0052	0.0067	0.1

Note: **Bold** font indicates an exceedance of the criteria.

4.5 Noise Monitoring

Noise limits set out in NCIA's Project Approval are more stringent than those set out in the EPL and therefore the Project Approval limits are used to assess compliance with noise requirements. The Project Approval states that noise generated from NCIA should not exceed 35 dB(A), L_{eq(15 min)} during the day, evening or night periods at the Kenvil Close and Wollombi Road noise monitoring locations (as specified in Condition 26 of the Project Approval). The Project Approval also sets a night time sleep disturbance criteria of 45 dB(A) L_{max}.

Noise levels are measured in accordance with NCIA's Project Approval, EPL, and the procedures set out in the *NSW Industrial Noise Policy* (INP) (EPA, 2000). In accordance with the INP the noise criteria apply under all meteorological conditions except during rain, wind speeds greater than 3m/s (at 10 m above ground level) and intense temperature inversions (greater than +3°/100) between 6 pm and 7 am. Data obtained during these meteorological conditions were omitted.

The noise monitoring was undertaken by Spectrum Acoustics in April 2018. A series of attended noise measurements of 15 minutes duration were made in Kenvil Close and in Wollombi Road on Tuesday 23 April 2018 during the evening and night time periods and on Wednesday 24 April during the day period. Measurements were also made during the day time period on the NCIA site. Operator field notes allow for individual noise sources and events to be isolated and the contributions of the various noise sources can then be quantified. At the time of the monitoring, NCIA's operational activities at NCIA were being carried out under typical conditions.

The results of the attended noise measurements at each location and time are summarised in Table 4-11.

Table 4-11 Received noise levels during attended noise monitoring (23/24 April 2018)

Location	Time	dB(A), L _{eq} (15 min)	Wind speed / direction	Identified Noise Sources	dB(A), L _{max}
Kenvil Close	3:48 pm	47	1.7 / 142	Wind (45), planes (39), insects (38), NCIA inaudible	n/a
Kenvil Close	9:19 pm	46	0.1 / 187	Traffic (43), trains (40), Insects (38), NCIA inaudible	n/a
Kenvil Close	10:24 pm	42	0.1 / 251 / 2.9	Traffic (41), NCIA (32), insects (30)	38
Wollombi Rd	4:14 pm	70	1.7 / 142	Traffic (70), NCIA (24)	n/a
Wollombi Rd	9:43 pm	60	0.1 / 187	Traffic (60), industry (27), NCIA (27)	n/a
Wollombi Rd	10:00 pm	61	0.1 / 251 / 2.9	Traffic (61), trains (49), NCIA (28)	29

The results show that the received noise from the NCIA facility was inaudible during the day and evening periods at Kenvil Close. The NCIA facility was audible during the day at the Wollombi Road monitoring location and did not exceed the 35 dB(A), L_{eq}(15 min). Received noise from the NCIA site was audible and measureable at each of the monitoring locations during the night time period. On all occasions and at all times, the noise from NCIA did not exceed the relevant criterion, including the sleep disturbance criterion.

During each of the monitoring periods at the Kenvil Close location there was significant contribution from traffic noise on the New England Highway.

At the Wollombi Road monitoring location, noise from traffic on Wollombi Road was the most significant contributor to the measured noise. Analysis of data from those times when the traffic noise was low allowed for the determination of the contribution of other noise sources to the overall acoustic environment.

Generally, noise emissions from NCIA are relatively constant and steady with very few easily discernible L_{max} events. L_{max} noise levels measured on the NCIA site (during the day) did not vary by more than 4 dB(A) from the measured L_{eq} noise levels. Therefore the results shown in Table 4-11 indicate that sleep disturbance noise at the closest receivers in Kenvil Close and Wollombi Road would be significantly lower than the 45 dB(A) criterion.

4.6 Water

4.6.1 Water Usage

Water usage at NCIA is principally for use in the tile manufacturing process and wash down requirements. Water is also required for staff amenities, landscaping and firefighting if required.

Although there is no regulatory limit on water usage, Schedule 3 Condition 44 of the Project Approval stipulates that NCIA needs to seek approval from Hunter Water Corporation (HWC) before its water consumption is expected to exceed 92ML/year.

NCIA used a total of approximately 72 ML of process water during the current reporting period. This is well below the threshold value of 92ML/year for which HWC approval is required.

4.6.2 Stormwater Quality

Stormwater quality is monitored on a weekly basis within Pond 4, which is located in the South East corner of the site. The channel outlet connected to Pond 4 is the location of potential stormwater discharge from the site. Monitoring is therefore undertaken within Pond 4 in order to ascertain water quality data in the event of such discharge occurring. Monitoring started in 2009 and is ongoing with the following parameters monitored: pH value, Electrical Conductivity (EC) (as a measure of salinity) and water temperature, as well as visual observations of turbidity levels, odour and colour.

The results of the stormwater quality monitoring during the reporting period for pH and EC are presented in Figure 14 and Figure 15 respectively. For assessment purposes the monitoring results are compared against the *ANZG Guidelines for Fresh and Marine Water Quality* (ANZG 2018). The adopted ANZG 2018 guidelines for pH and conductivity are the default trigger values for slightly disturbed aquatic ecosystems in NSW lowland rivers. The data for the current monitoring period shows that:

- pH values oscillated between 7.0 and 8.5 with a decreasing trend throughout the reporting period, and were generally within the ANZG guidelines with the exception of 16 monitoring events:
 - 7 September 2017 – pH of 8.9;
 - 14 September 2017 – pH of 8.8;
 - 21 September 2017 – pH of 9.55;
 - 12 October 2017 – pH of 9.25;
 - 19 October 2017 – pH of 9.4;
 - 3 November 2017 – pH of 9.05;
 - 9 November 2017 – pH of 8.88;
 - 16 November 2017 – pH of 8.73;
 - 30 November 2017 – pH of 9.28;
 - 11 January 2018 – pH of 8.72;
 - 18 January 2018 – pH of 8.96;
 - 8 February 2018 – pH of 8.7;
 - 22 February 2018 – pH of 9.32;
 - 1 March 2018 – pH of 9.2;
 - 15 March 2018 – pH of 8.58; and
 - 5 April 2018 – pH of 8.6.
- EC values were low and show a very slight decreasing trend throughout the reporting period with levels generally around 500 $\mu\text{S}/\text{cm}$ indicating that the water is non-saline. The EC values were within the ANZG guidelines for the entire reporting period.

Pond 4 was noted to be discharging on one occasion throughout the reporting period, 21 June 2018. Pond 4 water parameters were all within relevant criteria on this date.

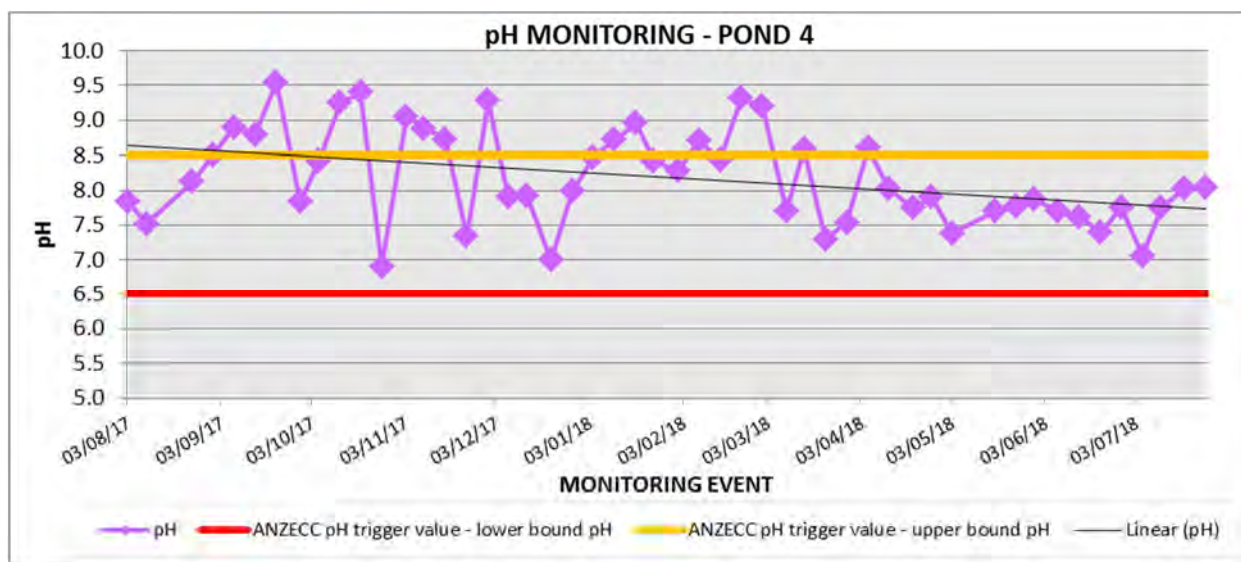


Figure 14 Stormwater quality monitoring – pH

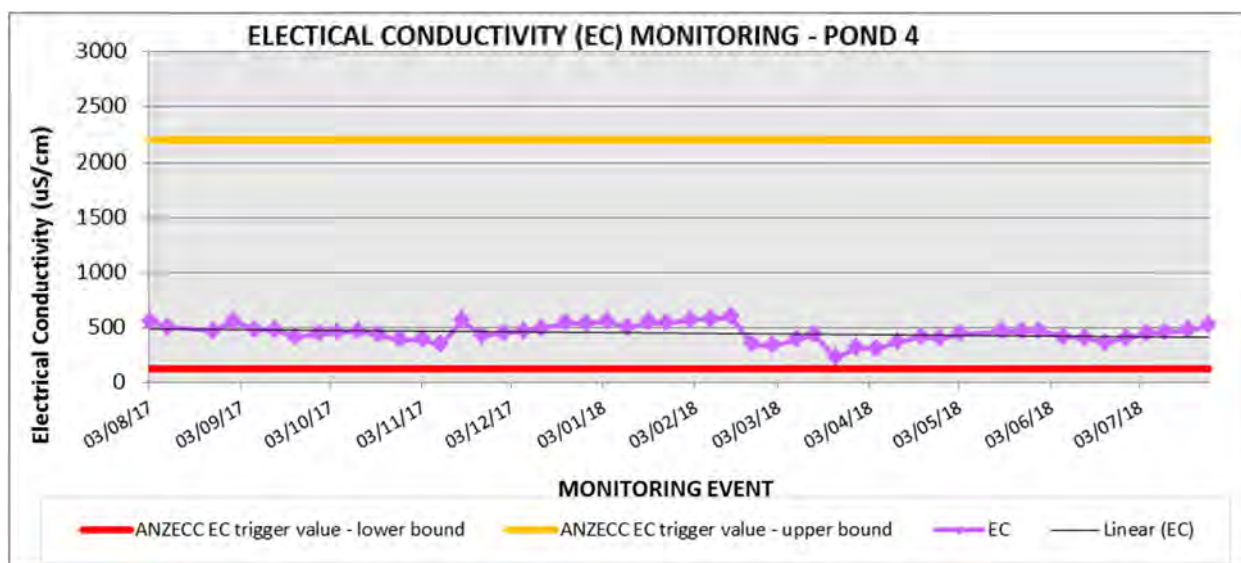


Figure 15 Stormwater quality monitoring – EC

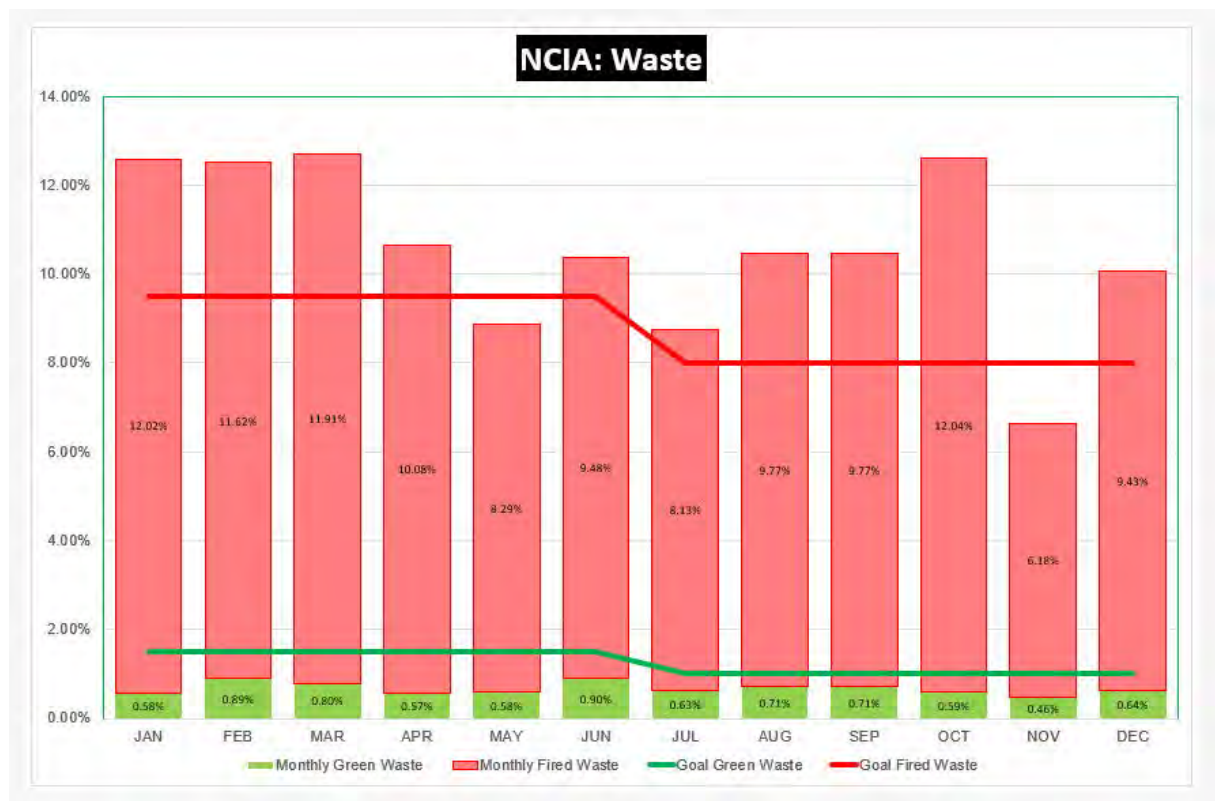
4.7 Waste Generation

There are no regulatory requirements in terms of waste generation quantities, types or production efficiency targets pertaining to NCIA's operations. The Project Approval simply stipulates that a designated area for the storage and collection of waste and recyclable material must be provided at the facility (Schedule 3 Condition 52). Designated areas are provided on site for the storage of fired waste and other wastes (e.g. general office and packaging wastes) in accordance with the requirements of the Project Approval.

The main waste generated from the operation is tile waste. Tile waste comprises both green tiles (i.e. raw material waste from unfired tiles) and broken fired tiles. Other types of waste generated from the facility include consumables, packaging waste and general domestic waste generated within the office and lunchroom; however these wastes represent an extremely minor part of the total waste stream.

The amounts of tile waste generated during the current reporting period (shown as a proportion of the total tile production) are presented in Figure 16.

NCIA's targets for tile wastes were lowered in July 2017 to not exceed 1% (for green tile waste) and 8% (for fired tile waste) of the total tile production, respectively. The green tile waste target was achieved every month throughout the reporting period. The amount of fired tile waste exceeded the target for ten months of the reporting period, with a monthly average of 9.85%. Management have programs in place to reduce fired waste to 5% by June 2018. Management are exploring potential on site processing options to turn this waste into reusable saleable product.



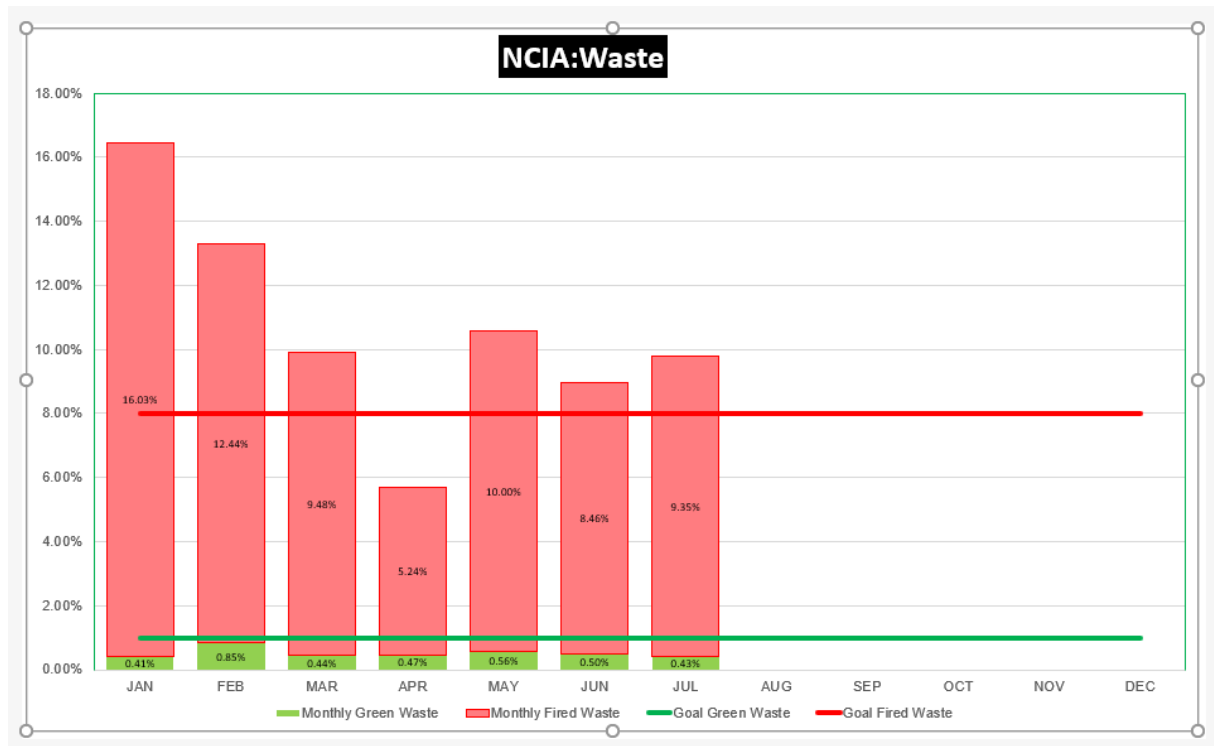


Figure 16 Tile waste (green and fired) generation during 2017-2018

5.0 Discussion of Environmental Performance

This section provides an assessment of the monitoring results for the reporting period against the criteria set out in the Project Approval and EPL, predictions made in the 2010 EA, and the monitoring results from previous years. Trends observed in the monitoring results or discrepancies between predicted and actual impacts are discussed.

5.1 Ambient Air Quality

The 2010 EA predicted that, with the exception of PM₁₀, emissions from NCIA would meet all of the ambient air criteria. The 2010 EA stated that existing background 24-hour PM₁₀ concentrations already exceeded the EPA criterion. While it was predicted that the annual average PM₁₀ criterion would be met, the 2010 EA indicated that the 24 hour average PM₁₀ concentrations may exceed the criteria under worst case dispersion conditions. Specifically, predictions made in the 2010 EA for the project included the following:

- The maximum cumulative 24 hour average PM₁₀ concentration at the closest existing private receptor was predicted to be 53.4 µg/m³ (compared to the criterion of 50 µg/m³);
- The maximum cumulative 24 hour average PM₁₀ concentration for residential receptors within the Heritage Parc subdivision (located at 99 Racecourse Road, Rutherford) was predicted to be 57.7 µg/m³ (compared to the criterion of 50 µg/m³);
 - The cumulative impact of predicted maximum PM₁₀ concentrations at all existing residential receptors was considered to be minor despite the predicted cumulative results being above the guidelines. It was not expected that the predicted PM₁₀ impacts would be beyond levels already experienced due to the minor contribution of the project when compared to the elevated background PM₁₀ levels;
 - No exceedances of 24 hour or weekly Fluoride concentrations at existing residential receptors were predicted;
 - The maximum cumulative 24 hour Fluoride concentration for future residential receptors within Heritage Parc was predicted to be 3.2 µg/m³ (compared to the criterion of 2.9 µg/m³); and
 - The above exceedance of the 24 hour Fluoride criterion was predicted during a worst case scenario with NCIA operating all eight Stages. Only two Stages of the development are currently operational.

Ambient air quality monitoring during the reporting period (presented in Section 4.1) indicated that the levels of 24 hour PM₁₀, annual average PM₁₀, 24 hour fluoride and weekly fluoride were generally compliant with the relevant guidelines criteria, with twelve exceedances of the 24 hour PM₁₀ criteria of 50 µg/m³ recorded. NCIA were not considered to be a major contributor to any of these exceedances (as discussed in Section 4.1.1). The monitoring results for the reporting period are considered to be consistent with the predictions made in the 2010 EA.

Historical ambient air monitoring results recorded since commencement of operations (15 March 2004 to current) are shown in Figure 17 to Figure 22. An analysis of historical trends in air pollutant concentrations (and where relevant comparisons against the current reporting period) reveals the following:

- Historical PM₁₀ concentrations are variable with results generally oscillating around a relatively stable annual average and isolated elevated concentrations occurring episodically. PM₁₀ concentrations during the 2018 reporting period were consistent with historical data and there is a decreasing linear trend in PM₁₀ concentrations, which is more apparent at the NW monitoring location compared to the SE monitoring location.
- Following seven years of relatively low and steady levels of fluoride emissions between 2004 and 2011 (despite isolated and episodic increases), gaseous fluoride levels have slightly increased since 2012 in both the 24-hour and weekly fluoride levels. Fluoride emissions during the 2018 reporting period were similar to the previous four years. Nonetheless, there is an overall increasing linear trend in 24 hour and weekly fluoride levels at both monitoring locations.

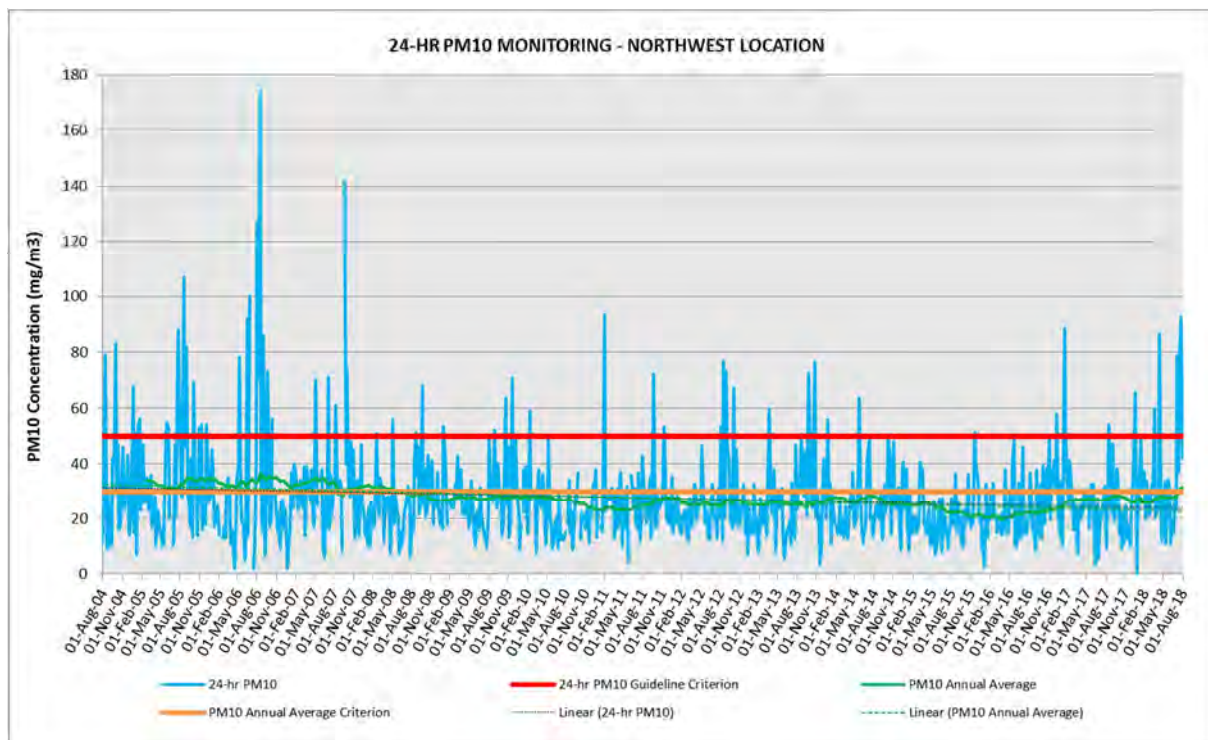


Figure 17 24-hour PM₁₀ monitoring – northwest location (2004 – 2018)

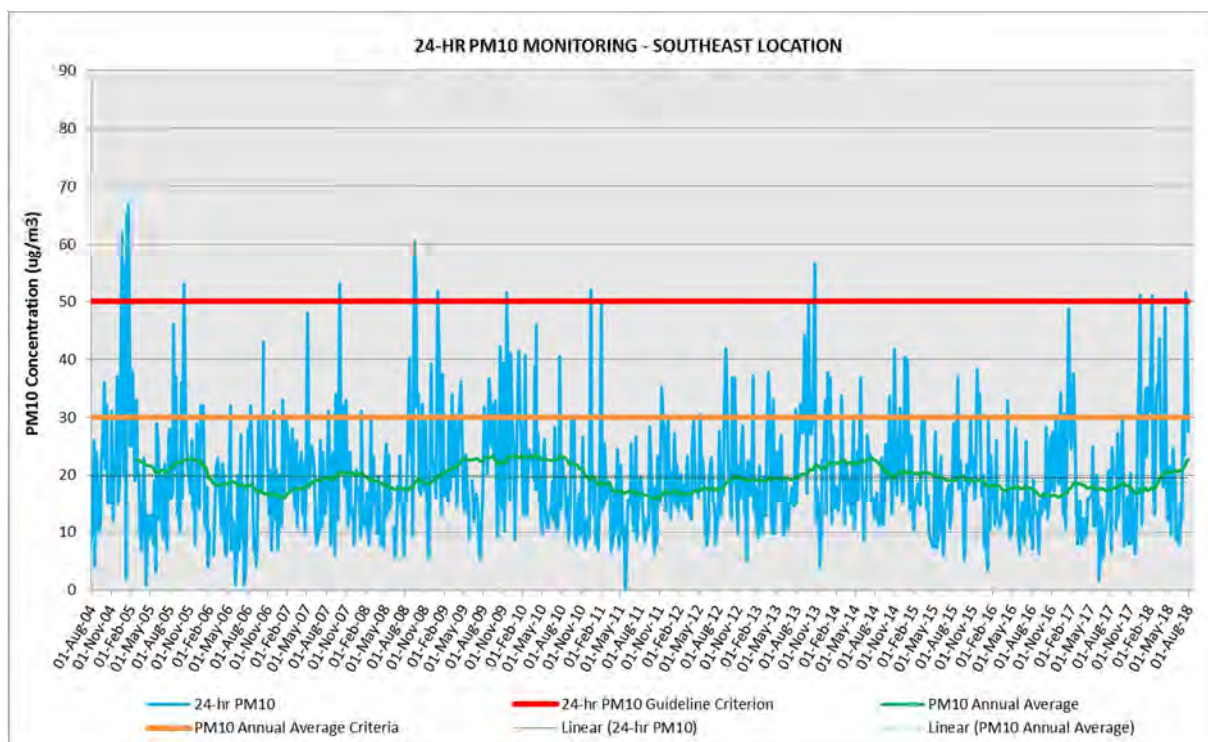


Figure 18 24-hour PM₁₀ monitoring – southeast location (2004 – 2018)

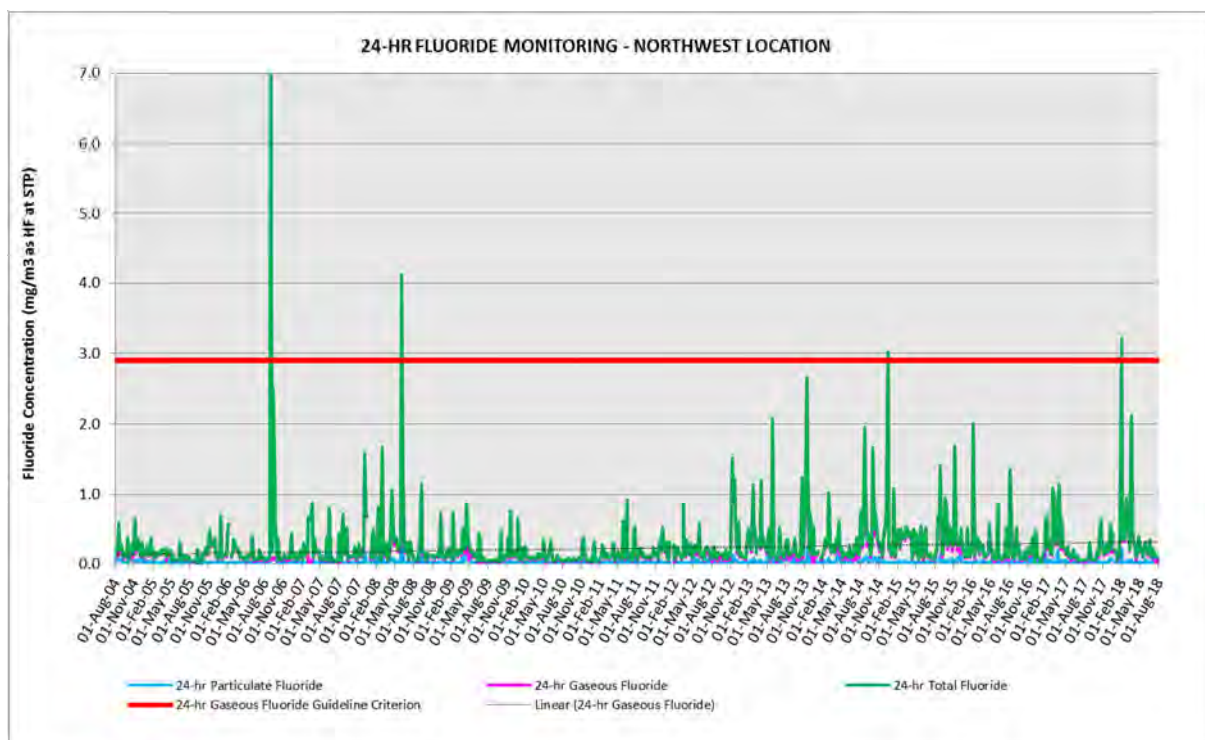


Figure 19 24-hour fluoride monitoring – northwest location (2004 – 2018)

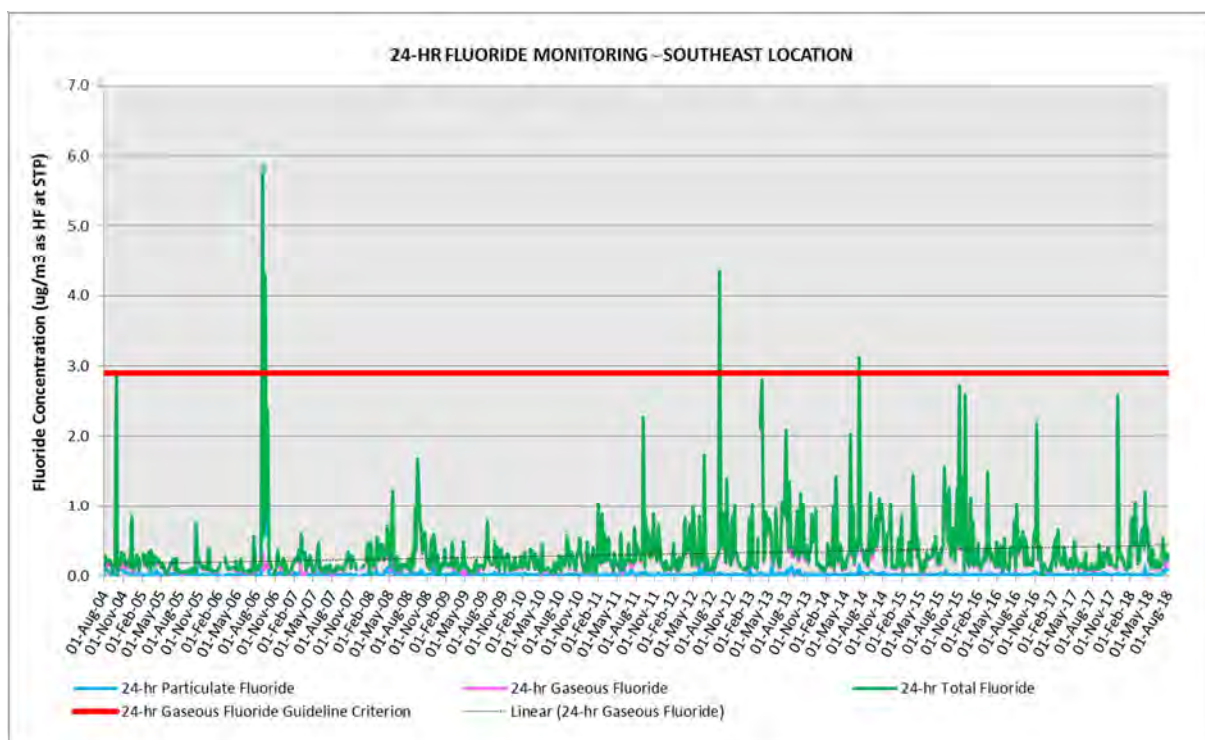


Figure 20 24-hour fluoride monitoring – southeast location (2004 – 2018)

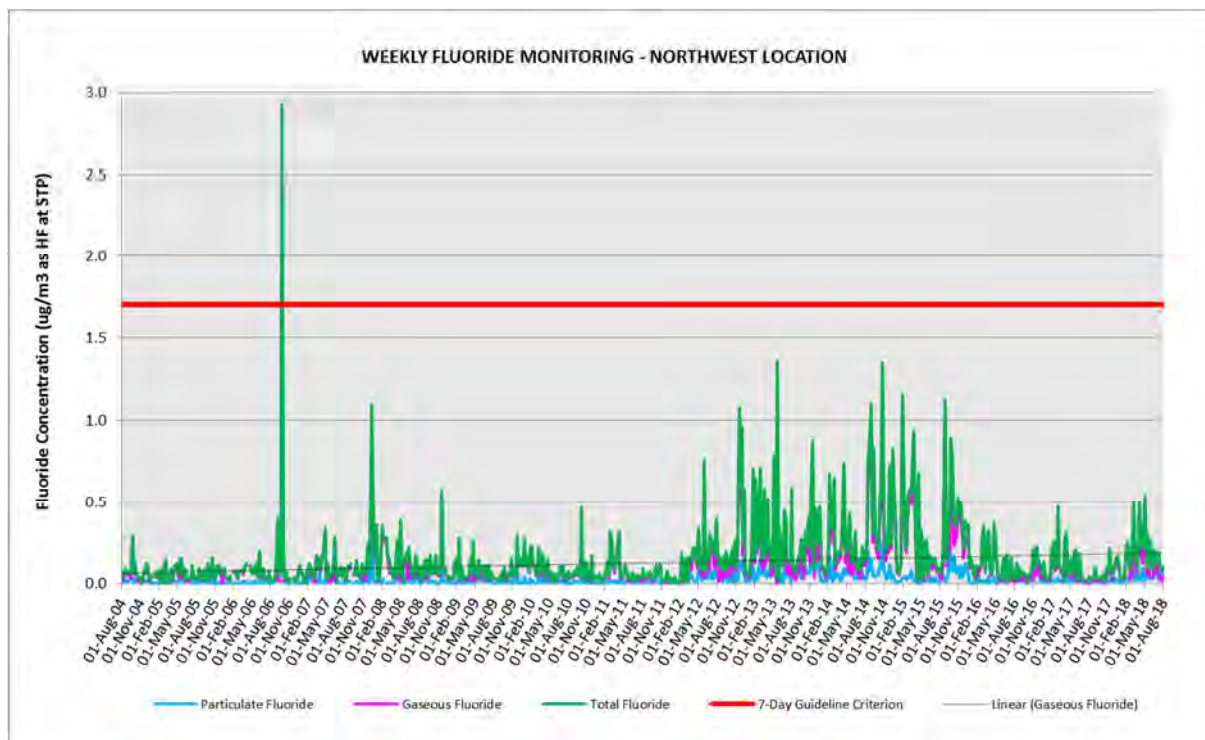


Figure 21 Weekly fluoride monitoring – northwest location (2004 – 2018)

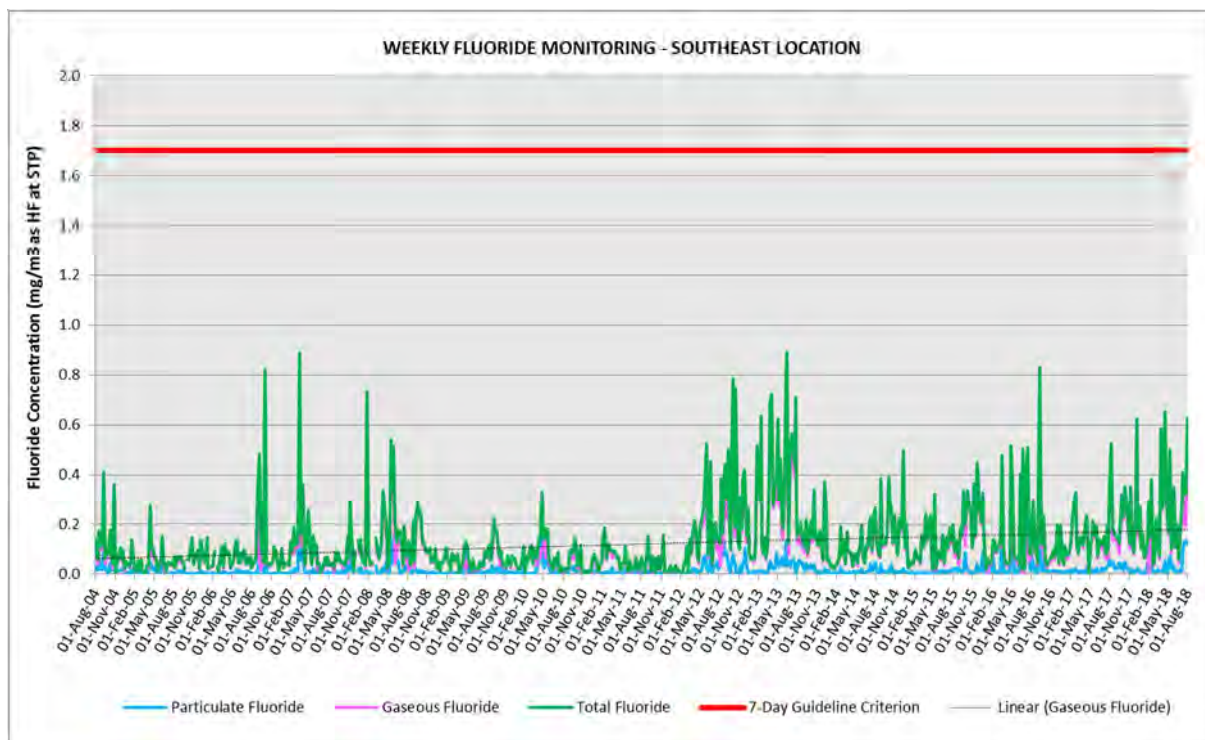


Figure 22 Weekly fluoride monitoring – southeast location (2004 – 2018)

5.2 Fluoride Impact on Vegetation

As required by the EPL the potential impact of NCIA's operations on vegetation surrounding the facility is monitored through assessment of fluoride impacts on local vegetation, including visual assessments of injury symptoms to leaves and foliar fluoride content. There are no limits or criteria set out in the EPL or Project Approval by which to assess compliance. Likewise, the 2010 EA did not specifically discuss fluoride impact on vegetation and therefore no predictions are available for comparison. Instead, the assessments are used to provide an indication of trends in fluoride injury and concentrations at set locations surrounding the facility and for a suite of particular species.

5.2.1 Trends in Visual Impact on Vegetation

Historical results for vegetation visual assessments since the start of the monitoring program are presented in Figure 23. For each quarterly survey the data has been presented to show the proportion of total species assessed that were impacted by fluoride related injury symptoms of varying severity. The results were grouped into the following four categories (also refer to Table 4-5 in Section 4.2 for definitions of injury classes):

- Species showing no visible fluoride injury symptoms;
- Species displaying at worst class 1 (very slight) or class 2 (slight) injury symptoms;
- Species displaying at worst class 3 (distinct) or class 4 (marked) injury symptoms; and
- Species displaying class 5 injury symptoms and above (severe to extreme).

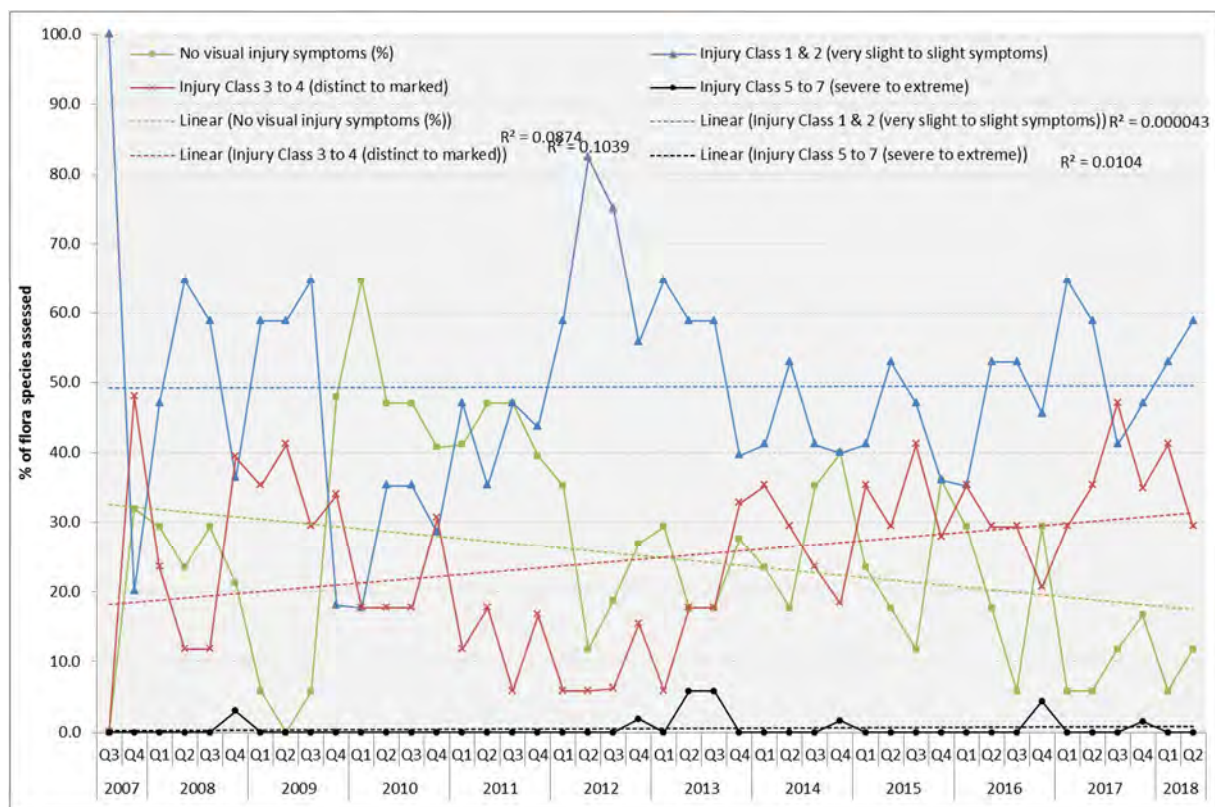


Figure 23 Proportion of flora species affected by emission related visual injury symptoms (2007-2017)

Despite clear seasonal variations, historical data show little long-term variability in the severity of fluoride impacts to vegetation surrounding the NCIA facility. The data supports no statistically significant increase or decrease in the severity of injury symptoms since the start of the monitoring program (as justified by the correlation r^2 values for all severity classes being <0.076).

Interrogation of the long term monitoring data indicates the following:

- The majority of flora species assessed since the start of the monitoring program have commonly displayed at least some level of fluoride related injury symptom (75% on average during each quarterly survey). Of all plants showing emission related impacts to foliage:
 - On average 49% displayed very slight or slight visual injury symptoms (i.e. less than 5% of leaf area affected) and 24% displayed distinct or marked fluoride injuries (i.e. between 10% and 25% of leaf area affected);
 - Severe injury symptoms (i.e. 25–50% of leaf area impacted) have rarely been recorded during the monitoring program (seven instances in a total of 1123 observations since 2007) and where this has been the case, injury symptoms did not persist; and
 - Only two instances of very severe injury symptoms (i.e. 50-75% of leaf area impacted) have been recorded throughout the monitoring program and extreme injury symptoms (i.e. greater than 75% of leaf area impacted) have never been recorded.
- The majority of flora species assessed since the start of the monitoring program have commonly displayed at least some level of insect attack injury symptoms (approximately 74% of all species affected on average). Of all plants showing impacts from insect attack: injury severity was very slight in 25% of cases, slight in 24% of cases, distinct in 18% of cases, marked in 7% of cases and severe in less than 1% of cases.

The monitoring data obtained during the current reporting period (as presented in Section 4.2) are generally well aligned with these long term trends. As is commonly observed, this year's results have shown some minor variations in foliage condition against previous year's results, with some specimens showing either slight deteriorations or slight improvements in foliage condition (whilst most showed relatively consistent symptoms). None of this year's survey results could be flagged as exceptional in the context of the long-term monitoring program and associated historical data.

5.2.2 Trends in Fluoride Content in Vegetation

Historical fluoride concentrations in vegetation sampled during each of the quarterly and annual surveys are presented in Figure 24 to Figure 27.

Overall foliar fluoride concentrations for the samples collected during this monitoring period's surveys were consistent with the long-term range of data for all species at all locations. The following comments apply to this year's results when compared against previous year's data:

- Historic data for *E. moluccana* at Site 5 indicates that there is typically a seasonal increase in foliar fluoride concentrations during spring (Q3) or summer (Q4) before levels settle down during autumn (Q1) and winter (Q2), which reflects changing dominant wind patterns occurring with the change of season. Overall this year's foliar fluoride concentrations values in this species were within the lower range of historical values.
- Samples of grasses collected at Site 11 consistently returned low fluoride contents (i.e. $\leq 10.0 \mu\text{g/g}$) during the current reporting period, which is consistent with the long term results (Figure 25). Seasonal increases in fluoride concentration are commonly observed in grasses at this location in response to changing wind patterns. Historical records show that fluoride concentrations often peak during Q2 or Q3 (i.e. in late spring or winter when winds have been dominated by north-westerlies blowing towards the monitoring site from the NCIA kiln stacks).
- Sampling results of *E. amplifolia* at Site 13 during the current reporting period were within the medium to low range of historical values for this species (Figure 26). The long term trend in this specimen emphasises the high seasonal / annual variability and relative unpredictability in foliar fluoride concentrations in individual species.
- Consistent with long term data, fluoride concentrations in the foliage of *C. maculata* at Site 13 have been relatively low throughout the current reporting period (i.e. generally below $12.0 \mu\text{g/g}$). One seasonal increase was experienced in Q3 2017 ($69.9 \mu\text{g/g}$), which historical data show is common occurrence in this species (Figure 26).

- Foliar fluoride concentrations in *C. maculata* at Site 15 were within the medium to low range of historical values for this species. Historical records indicate a very high variability in fluoride content for this species since 2007, with a seemingly stochastic and unpredictable pattern that appears independent from seasonal wind changes. Despite episodic fluoride concentration peaks being common in this species, none occurred during the current reporting period (Figure 27).

Historical data show wide fluctuations in foliar fluoride content between quarterly surveys, and it is common for fluoride concentrations to experience and display episodic increases on a seasonal basis, usually reflecting the changing dominant wind patterns occurring with the change of season. On the longer term however, there seems to be a distinguishable annual pattern in fluctuating fluoride concentrations and historical data shows that for each species fluoride concentrations tend to oscillate within a set range of values.

The long-term data shows that there is an obvious variability in the sensitivity of tree species and individuals to the impacts of atmospheric fluoride with different individuals' clearly absorbing varying levels of atmospheric fluoride through their leaf tissue.

It is also possible that environmental and climatic conditions play a role in foliar fluoride concentration levels – for instance higher rainfall may lead to emission particulates deposited on leaves being quickly washed from the leaf surface, and therefore not able to be absorbed and accumulated in the leaf tissue.

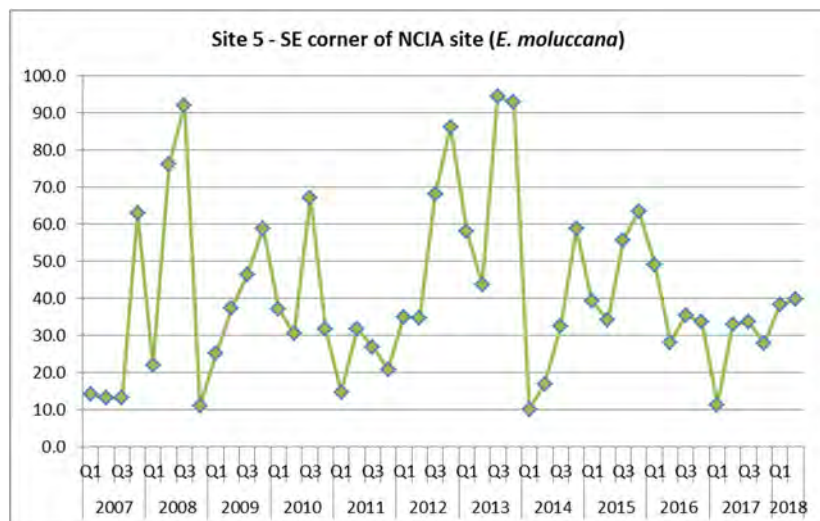
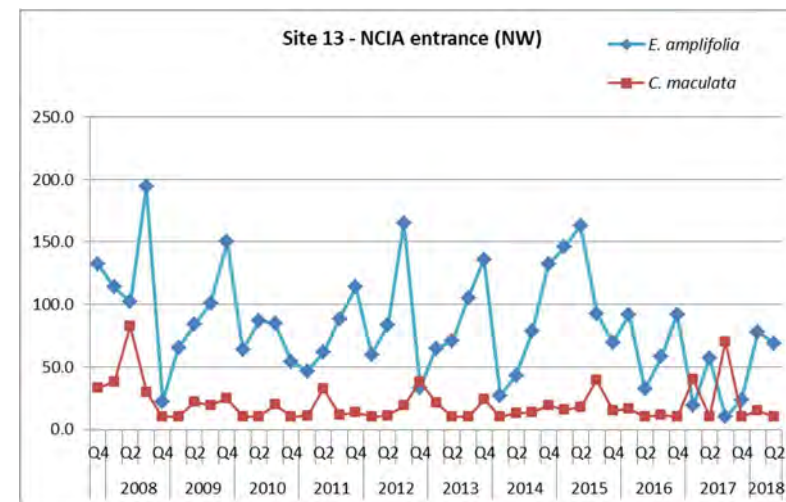
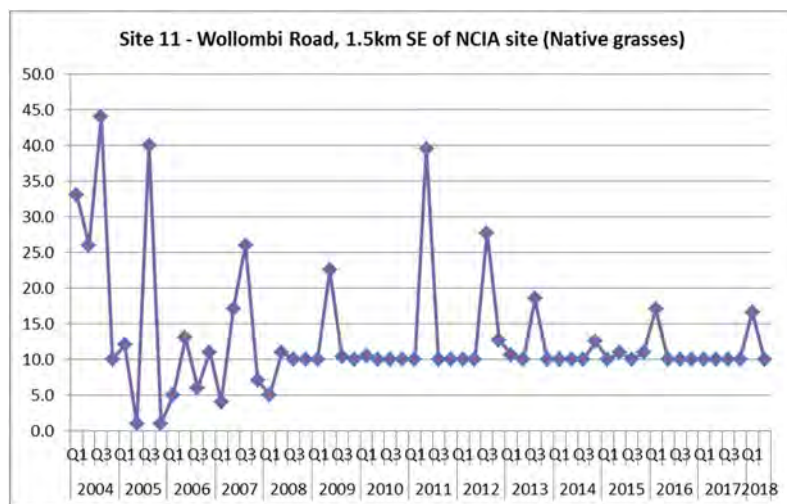
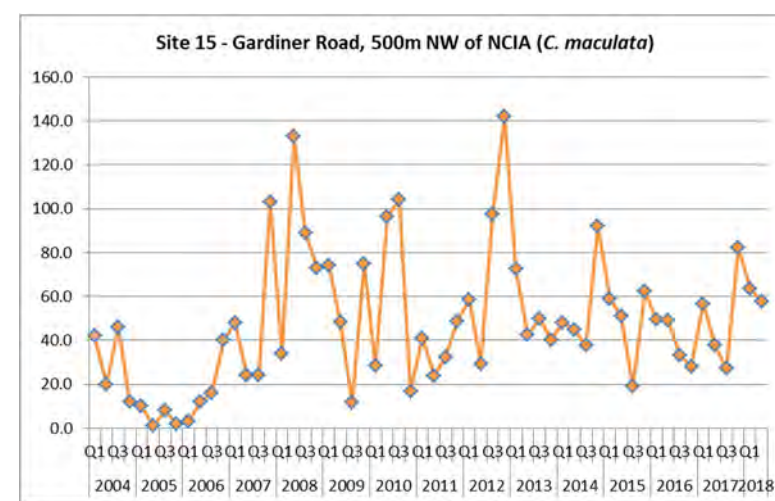
Figure 24 Fluoride content in *E. moluccana* foliage at Site 5 (Q1 2007 – Q2 2018)Figure 26 Fluoride content in *E. amplifolia* and *C. maculata* foliage at Site 13 (Q4 2007 – Q2 2018)

Figure 25 Fluoride content in grasses at Site 11 (Q1 2004 – Q2 2018)

Figure 27 Fluoride content in *C. maculata* foliage at Site 15 (Q1 2004 – Q2 2018)

5.2.3 Reference Site

The reference site is located approximately 3 km to the north of the NCIA facility thus outside the prevailing wind direction. Given its location, it is expected that there should be no impacts to the vegetation as a result of fluoride emissions.

Long term results of the visual assessments of foliage injury symptoms undertaken at this location show that vegetation has historically been in good and healthy condition. However, some injury symptoms have commonly been recorded over the years, particularly symptoms of cupping and tip necrosis, albeit of very slight severity, as well as insect attack injuries. The link to fluoride emission as a cause for these symptoms cannot be confidently determined for this monitoring location. It is possible that some species will exhibit foliar injury symptoms under 'natural' conditions. Other factors may play a role in the expression of injury, which may include environmental conditions, stress (e.g. drought, wind, diseases, etc.), and pollutants from other sources or impacts from insects.

Given the social and economic importance of the viticultural industry in the Hunter Valley the potential impact of atmospheric pollutant emissions from industrial sources on the health of the grape vine *Vitis vinifera* (a known sensitive species) has traditionally been a concern for the industry. Consequently, foliar sampling and analysis of *Vitis vinifera* foliage from the reference site has historically been included as part of this vegetation monitoring program. Historical concentrations since the commencement of the monitoring programme are presented in Figure 28.

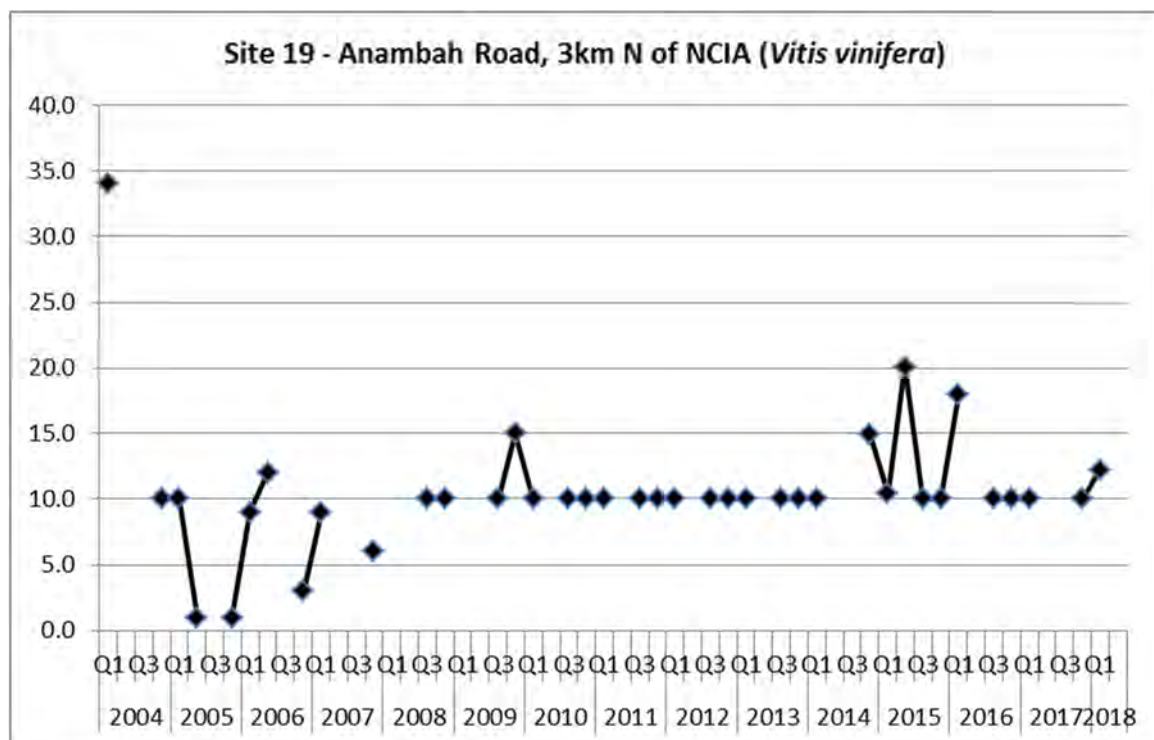


Figure 28 Fluoride content in *Vitis vinifera* foliage at Site 19 (Q1 2004 – Q2 2018)²

Long term data show that foliar fluoride has consistently returned very low concentrations for this species (<10.0 µg/g).

Recurrent elevated fluoride levels were recorded in the species between Q4 2014 and Q1 2016 (Figure 28). As noted in last year's AEMR, the property at the reference site underwent significant maintenance during that period, including the re-instatement of a functional irrigation system. Some scientific literature suggests that the use of municipal water injected with fluoride (which is the case in Australia) used for irrigation can result in toxicity symptoms on sensitive plants such as grape vines (Pscheidt, 2015). In this regard the elevated fluoride levels returned during that period may have been

² Note that the breaks in the line result from leaf samples not being collected and analysed for a particular quarter due to the absence of foliage on the vine (i.e. the species is deciduous).

linked to the maintenance activities (and irrigation) undertaken on site. However, fluoride concentrations levels recorded in the grape vine appear to have stabilised during the current reporting period. This indicates that the species may have adjusted to the new irrigation water.

5.2.4 Relationship between Visual Symptoms and Foliar Fluoride Content

The results of the vegetation surveys undertaken during the reporting period together with historical data seem to indicate a poor correlation between foliar fluoride content and the visible expression of injury symptoms in foliage. For instance, although the *E. amplifolia* at Site 13 commonly returns the highest fluoride concentrations its foliage only shows very slight visible injury symptoms (and notably no chlorosis symptoms). Conversely, the foliage of *C. maculata* at the same location consistently exhibits distinct fluoride visual injury symptoms while the laboratory results show that its foliar fluoride concentrations are the lowest of all tree species sampled. The discrepancy between visual injury symptoms and foliar fluoride concentrations may be due to:

- A lag in the visible expression injury symptoms following exposure to atmospheric fluoride emissions;
- Varying sensitivity of individual specimens in exhibiting visible injury symptoms; and/or
- Emissions related visual injury symptoms being 'mimicked' by natural environmental impacts such as climatic conditions and insect attack.

Overall, there is an inherent level of unpredictability in the expression of visual symptoms between monitoring events as well as an obvious variability in sensitivity to fluoride impacts both inter and intra-species, with different individuals clearly being more resistant or sensitive to emission related impacts than others.

5.3 Meteorological Monitoring

NCIA have been monitoring the local meteorological conditions in accordance with Condition M5 – Weather Monitoring of the EPL. Table 5-1 demonstrates the percentage uptime of monitoring equipment achieved throughout the reporting period. The meteorological monitoring equipment achieved continuous monitoring of 100% of the reporting period.

Table 5-1 Meteorological station up-time

Meteorological Parameter	Frequency	Percentage up-time during reporting period
Wind speed @ 10m (m/s)	Continuously	100%
Wind direction @ 10m (degrees)	Continuously	100%
Sigma theta @ 10m (degrees)	Continuously	100%
Ambient temperature @ 5m (degrees Celsius)	Continuously	100%
Rainfall (mm)	Continuously	100%

5.4 Air Pollutant Load Limits

The 2010 EA included dispersion modelling to predict ground level pollutant concentrations. The source emission concentrations used in the modelling (Table 17 of the 2010 EA) were based on the results of stack emission testing conducted between 2007 and 2009. A comparison of the measured in stack emission concentrations for the reporting period and the emission concentrations used in the 2010 EA modelling is provided in Table 5-2. The results are variable - some of the measured emission concentrations during the reporting period are lower than the emission concentrations used in the 2010 EA modelling, and some are higher than those used in the 2010 EA modelling. However, where measured stack concentrations were higher than those used in the 2010 EA, these did not result in an exceedance of the EPL criteria (refer to Section 4.4) with the exception of total fluoride for Kiln 2 and total particulate for HAC 1.

Trends in the air quality pollutants discharged to air as a result of NCIA operations over time can be established using the assessable pollutant loads reported to the EPA in the Annual Returns since 2003. The actual load of assessable pollutants reported in the Annual Returns is calculated in accordance with the relevant Load Calculation Protocol for ceramics production. Table 5-3 provides the assessable pollutant loads discharged by NCIA during the reporting period. The maximum load limits set out in both the EPL and Project Approval and the historical pollutant loads discharged (2004-present) have also been included for comparison purposes and are presented graphically in Figure 29 to Figure 33.

The load limits specified in the Project Approval and EPL differ. Condition 16 of the Project Approval states:

Unless the OEH specifies otherwise, the Proponent shall ensure that the annual total load discharged from the site does not exceed the load limit specified for that pollutant in Table 3.

As the EPA has 'specified otherwise' by specifying different load limits in the EPL (that are equivalent to Stage Two operations), the load limits in the EPL prevail over those in the Project Approval.

For the current reporting period, fine particulates (PM₁₀), coarse particulates, sulfur oxides and nitrogen oxides were all within the pollutant load limits. However fluoride discharged to air exceeded the EPL load limit during the reporting period. This is likely to be due to the normal variability in process and annual stack testing results. It is noted that all weekly and 24 hour fluoride ambient monitoring to the North West and South East of the facility returned results below the relevant EPA guideline criteria except for one 24-hour result on 31 January 2018 which was slightly above the criteria. This exceedance of the EPL load limit (along with the elevated stack emission monitoring result for fluoride) was notified to DP&E in accordance with the requirements of the Project Approval.

Historical data show that there is a high level of variability in pollutant emissions between reporting years with no clear trend or consistency in results. These fluctuations are likely due to the normal variation in stack emission testing results. This renders difficulty in any comparison of this year's emission results against the long term data. The following points are made in relation to the current load limit results:

- PM₁₀ emissions recorded a decrease in levels from the previous 2016-17 period, with levels remaining well below the permitted EPL load limit;
- Coarse particulate emissions were lower than those reported last year and were consistent with previous reporting years with levels less than a quarter the permitted EPL load limits;
- The total amount of fluoride discharged during reporting period exceeded the EPL load limit. However fluoride emission levels were much lower than the previous fluoride load levels reported in the last two years (2015-2016 and 2016-2017);
- The sulfur oxides pollutant load was similar to or lower than previous reporting periods and was less than a quarter that permitted under the EPL; and
- The nitrogen oxides pollutant load was similar to previous reporting periods and well below the permitted load limits.

Table 5-2 Comparison of emission concentrations used in 2010 EA modelling and measured in stack emission concentrations for the current reporting period

Source	Emission Concentration (mg/m ³)							
	Fine particulate (PM ₁₀)	Total Particulate	Total Fluoride (as HF)	Sulfuric acid mist (H ₂ SO ₄ as SO ₃)	Total Hazardous substances (Metals)	Total Oxides of Nitrogen	Cadmium	Mercury
Kiln 1 (EPL 14)	7.8 (5.3)	6.0 (5.3)	0.55 (5.0)	10 (9.6)	0.16 (0.2)	29 (50.0)	0.0051 (0.003)	0.0052 (0.01)
Kiln 2 (EPL 15)	9.1 (5.3)	15 (5.3)	14.3 (5.0)	27 (9.6)	0.17 (0.2)	28 (50.0)	0.0053 (0.003)	0.0067 (0.01)
Clay preparation (CP1) (EPL 1)	3.2 (2.0)	4.3 (2.3)	-	-	-	-	-	-
Pressing and Drying (PD1) (EPL 2)	1.6 (2.5)	4.0 (4.8)	-	-	-	-	-	-
Dryer (D1) (EPL 5)	13 (8.4)	13 (12.8)	-	-	-	-	-	-
Dryer (D2) (EPL 6)	14 (8.4)	14 (12.8)	-	-	-	-	-	-
Glaze Line (EPL 9)	1.4 (1.9)	2.6 (4.3)	-	-	-	-	-	-
Selection Line (SL 1,2,3,4) (EPL 10)	2.6 (6.3)	5.4 (6.3)	-	-	-	-	-	-
Spray Dryer (SD1) (EPL 12)	2.7 (13.1)	2.0 (13.1)	-	-	-	-	-	-
Hot Air Cooler 1 (HAC1) (EPL 18)	2.9 (0.3)	5.8 (2.3)	-	-	-	-	-	-
Hot Air Cooler 2 (HAC2) (EPL 19)	1.2 (0.3)	1.7 (2.3)	-	-	-	-	-	-

Note – Emissions concentrations used in 2010 EA modelling are shown in parentheses.

Bold text identifies where measured in stack emission concentrations during the reporting period are greater than emission concentrations used in 2010 EA modelling.

Table 5-3 Maximum pollutant load limits and assessable pollutant loads

Pollutants loads		Pollutant				
		Fine particulates (PM10)	Coarse particulates	Fluoride	Sulfur oxides ³	Nitrogen oxides
Current Maximum Load Limit (kg)	EPL	26,629	14,338	1,850	36,828	36,828
Actual Load (kg) in reporting period	2017-2018	10,145	2,878	2,239	6,059	25,165
	2016-2017	13,028	5,800	2,411	14,835	19,023
	2015-2016	5,816	11,310	4,146	16,835	21,360
	2014-2015	4,963	2,302	1,400	15,240	24,016
	2013-2014	5,369	3,289	928	4,280 ⁴	25,059
	2012-2013 ¹	1,249	1,640	1,109	1,235 ⁴	4,704
	2011-2012	997	5,550	91	26,946	20,306
	2010-2011	2,902	1,774	295	7,699	18,322
	2009-2010 ²	6,524	475	621	86,704	79,375
	2008-2009	5,476	2,564	1,529	70,565	62,426
	2007-2008	4,449	3,881	336	16,633	18,073
	2006-2007	7,289	12,657	1,989	15,850	12,423
	2005-2006	21,751	11,986	4,085	13,239	13,887
	2004-2005	4,034	2,100	2,154	21,335	6,721
	2003-2004	1,028	1,089	150	5,813	1,151

Bold represents an exceedance

¹ The Project Approval came into effect on January 2013 and the previous Consent was relinquished.

² 2009-2010 marked the commencement of stage 2 of the development.

³ Sulfur oxides (as sulphuric acid mist and sulfur trioxide (as SO₃)).

⁴ Sulfur oxide loads for the 2012-13 and 2013-14 reporting years have been corrected to only include sulfuric acid mist and sulfur trioxide, as agreed with regulatory authorities, and not sulfur dioxide as previously calculated and reported.

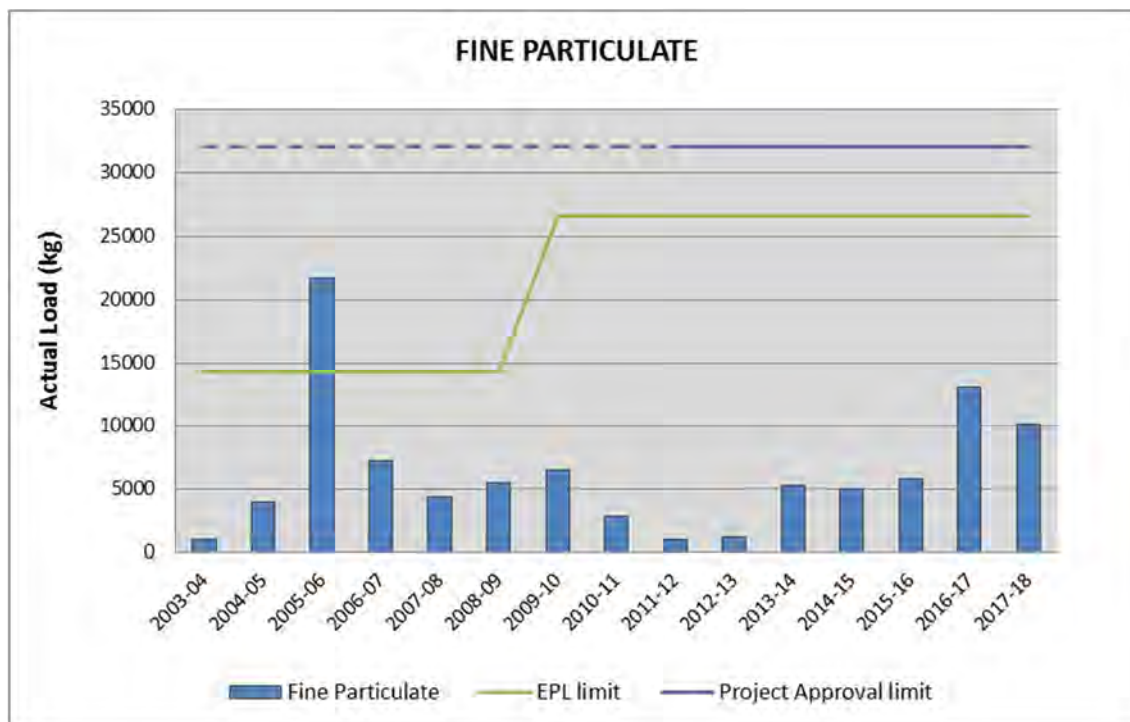


Figure 29 Fine particulate annual load (2004 – 2018)

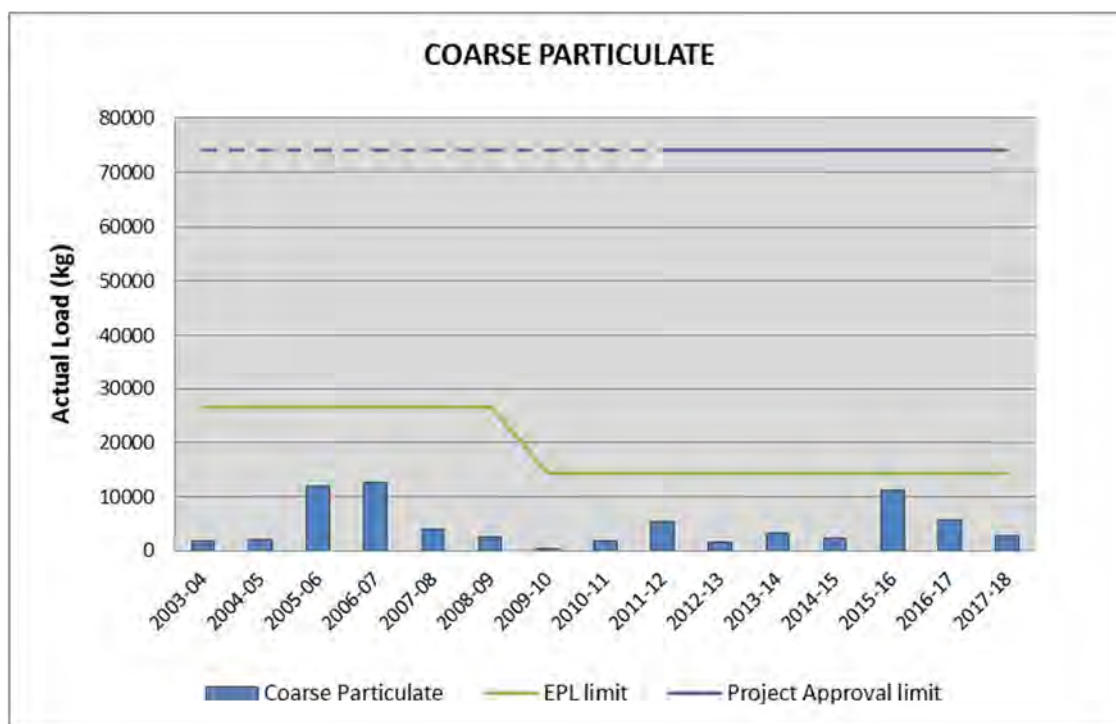


Figure 30 Coarse particulate annual load (2004 – 2018)

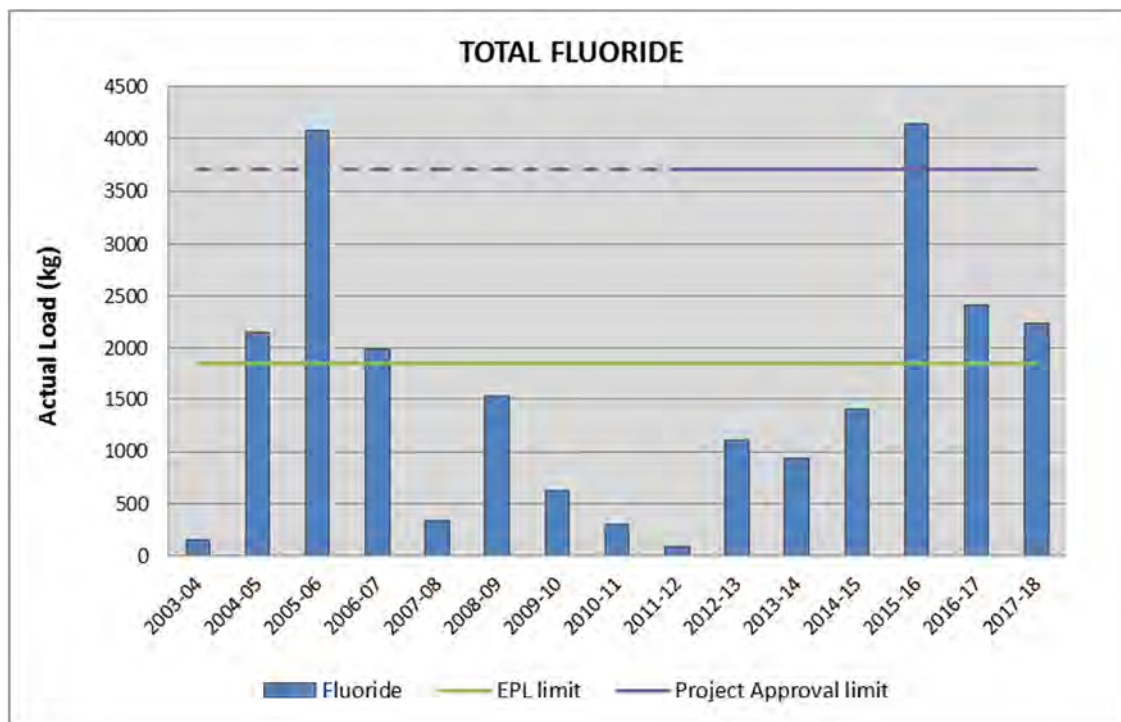


Figure 31 Fluoride annual load (2004 – 2018)

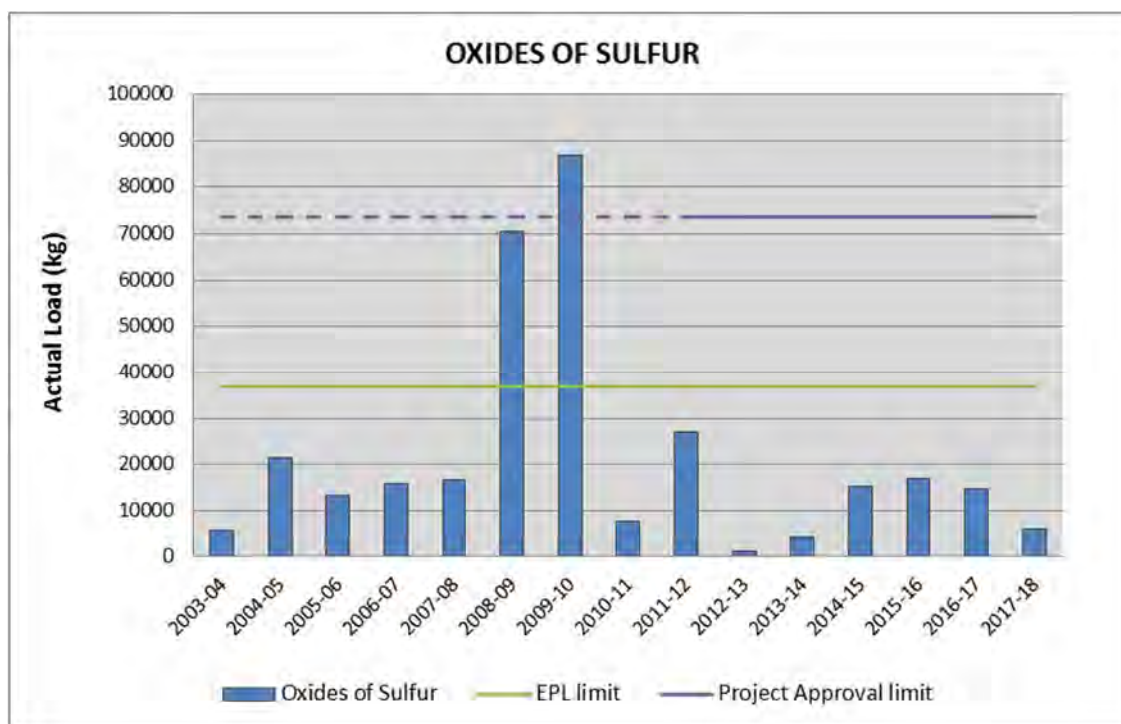


Figure 32 Sulfur oxides (as sulphuric acid mist and sulfur trioxide (as SO₃)) annual load (2004 – 2018)

Note: Sulfur oxide loads for the 2012-13 and 2013-14 reporting years have been corrected to only include sulfuric acid mist and sulfur trioxide, as agreed with regulatory authorities in 2012, and not sulfur dioxide as previously calculated.

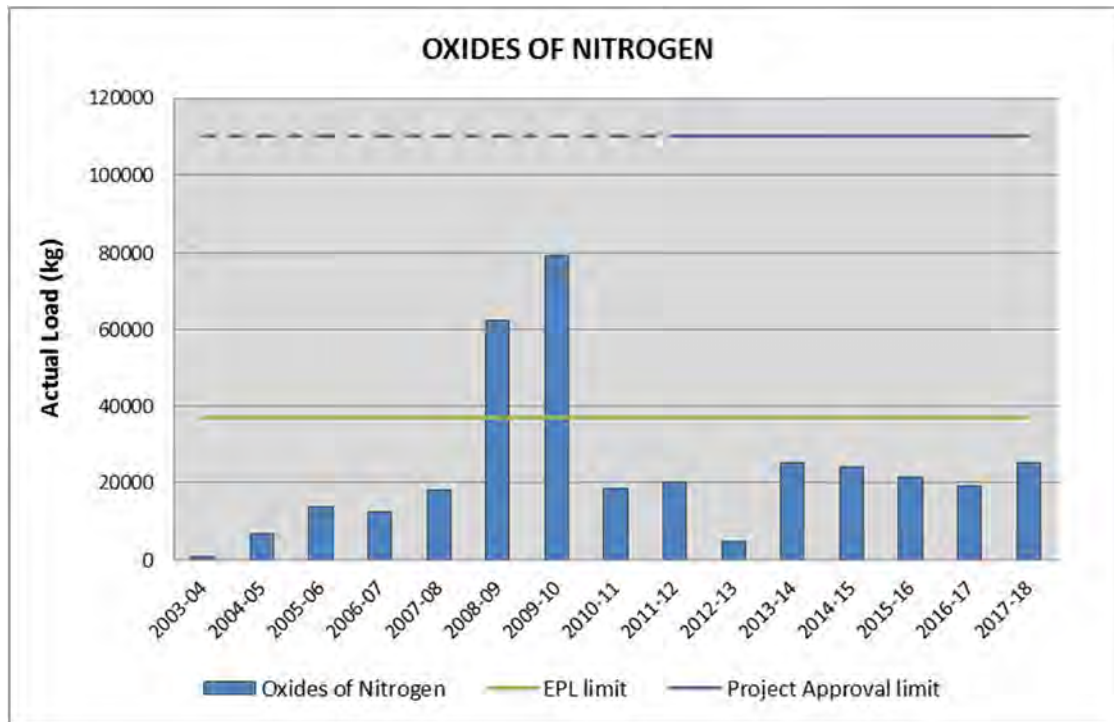


Figure 33 Nitrogen oxides annual load (2004 – 2018)

5.5 Noise

The 2010 EA indicated that the increase in background levels in the Rutherford region was likely to be due to the development of new industrial facilities in the Rutherford Industrial Estate. The 2010 EA predicted that the operational noise levels from the expanded facility would not change considerably from that already approved and would be below the project specific noise criteria at all existing receptors under calm and prevailing weather conditions.

The Project Approval specifies more stringent noise limits than those set out in the EPL. Under the Project Approval noise generated from NCIA must not exceed 35 dB(A) for the day, evening and night periods.

Monitoring results for the reporting period indicate that noise emissions from NCIA were in compliance with the Project Approval noise criteria for all time periods, including the sleep disturbance criteria.

Historical noise monitoring results at the Kenvil Close monitoring location are provided in Figure 34 – Figure 36 for the day, evening and night periods respectively. On many occasions NCIA was not clearly audible over other dominant nearby industrial and traffic noise sources.

No trends in the noise monitoring are clearly discernible with historical noise emissions generally complying with noise limits. No exceedance of the day, evening or night criteria has been recorded since 2009.

During the daytime for the past ten years the NCIA noise contribution was either inaudible or audible but not measurable. The current noise monitoring report noted that traffic noise from the New England Highway contributed significantly to the background noise levels at Kenvil Close.

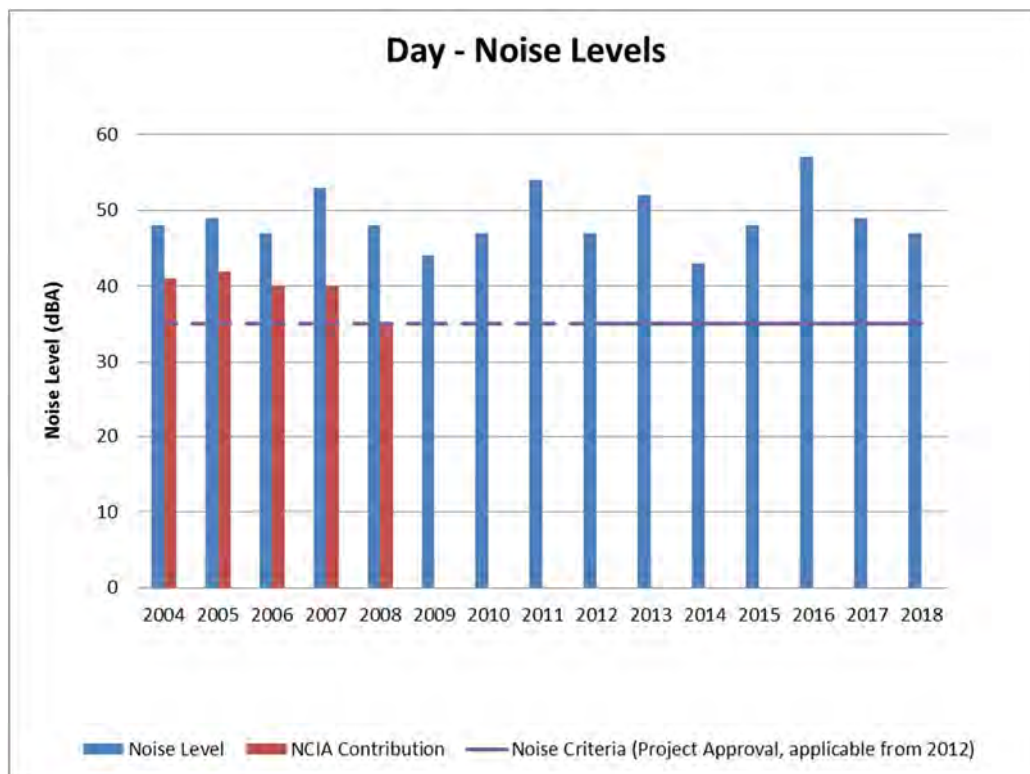


Figure 34 Day noise levels 2004 – 2018

Note 1: 2009 - 2017: NCIA contribution was either inaudible or not measurable.

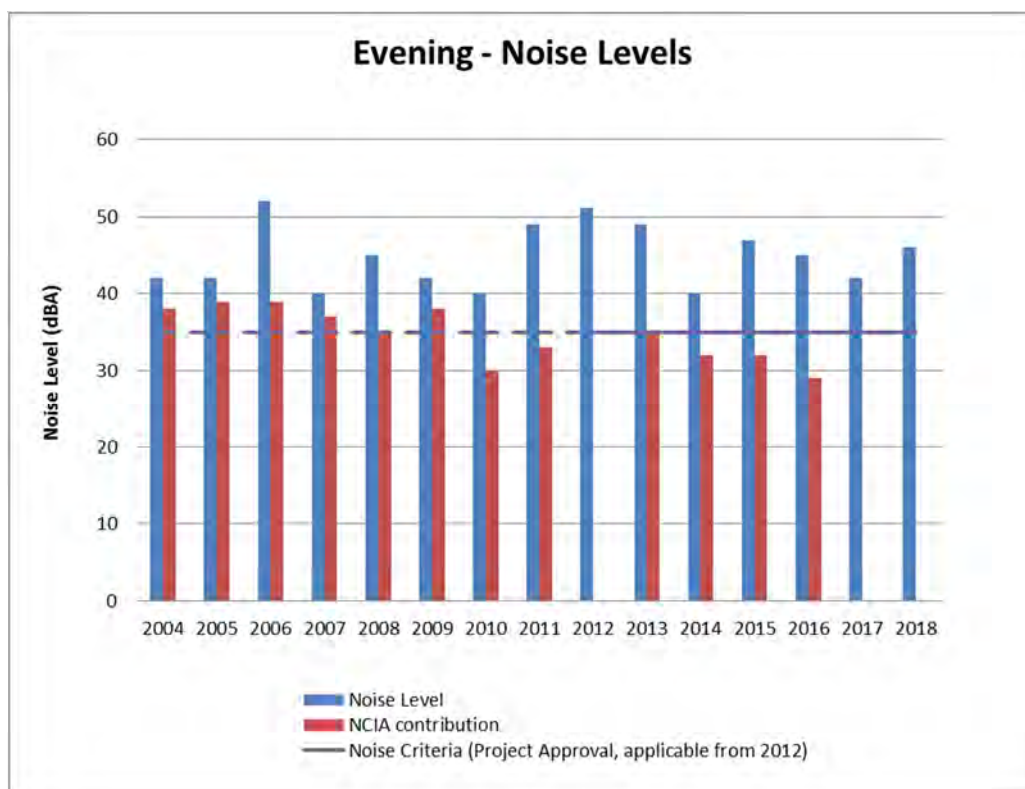


Figure 35 Evening noise levels 2004 – 2017

Note: 2012 and 2017: NCIA contribution was either inaudible or not measurable.

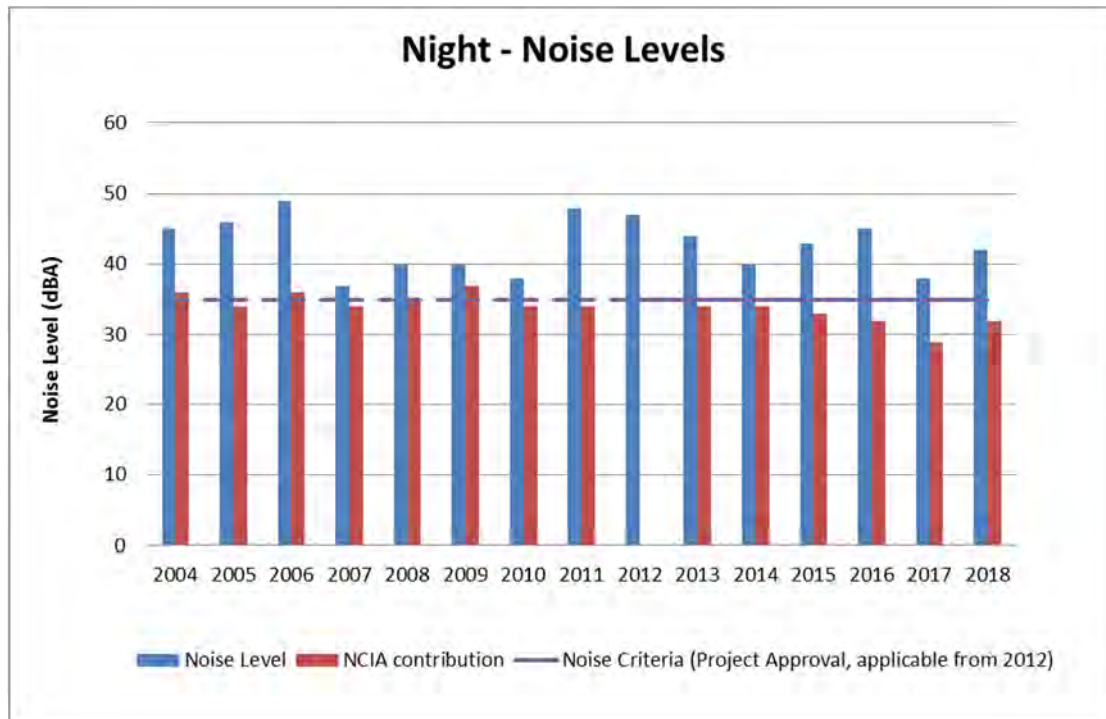


Figure 36 Night noise levels 2004 – 2018

Note: 2012: NCIA contribution audible but not measurable.

5.6 Water

5.6.1 Water Usage

The 2010 EA indicated that water consumption for the facility during Stages One–Four of the development would be approximately 1,772kL per week (approximately 92ML per annum). Stages Five–Eight of the development would be expected to use an equivalent volume of potable water as Stage One–Four for a cumulative expected consumption of up to 3,544kL per week (approximately 184ML per annum).

Consumption of potable water during the reporting period was approximately 63 ML noting that 42ML was invoiced for the period August 2017 to July 2018 and a further 28ML was invoiced for the period June 2017 to Feb 2018. The second invoice includes June and July 2017 usages which are outside the reporting period and not included in the total.

The consumption of approximately 63ML of potable water is proportionally within the predictions of the EA given that only Stages One–Two were operational. NCIA have held preliminary discussions on site with Hunter Water representatives regarding potential Water Saving Initiatives.

It is anticipated that the 92ML/year threshold usage over which NCIA will require HWC approval will not be reached until further stages of development are constructed and commissioned. Regardless, consultation with HWC was started during the 2010 EA process in provision of future developments. NCIA will resume the consultation process as required when further development stages are planned.

5.6.2 Process Water Management

As the requirement for water from NCIA has the potential to place stress on the town-water reticulation system (particularly during periods of drought), NCIA has endeavoured to minimise its reliance and demand for town water. Particularly, all process and wash-down water is recycled within the operation of the facility.

The NCIA facility does not discharge process or washdown water to the storm water system. Water used for process requirements is only discharged in the form of steam to the atmosphere.

Approximately 95% of all washdown water is captured within an internal reticulation system and recirculated for reuse as process water. The remaining 5% of washdown water evaporates.

Apart from discharges to the sewer from staff amenities there is no discharge of process or washdown water from the site other than as steam. Materials stored for the manufacturing process are housed within the building to ensure that there are no spills from the site.

Plant equipment operated at NCIA is maintained regularly and in accordance with manufacturer's specifications to ensure that water use, reuse and recycling efficiencies are optimised. The consumption of water is continually monitored via metering systems associated with plant equipment.

5.6.3 Stormwater Quality

Historical trends (2009-present) in water quality for pH and EC are presented in Figure 37 and Figure 38, respectively. The 2010 EA made no provision of stormwater quality performance measures or indicators.

Long term data shows that pH levels in pond 4 have generally been on a slowly increasing trend since 2009, with the exception of the past two reporting periods. On occasion since 2009 recorded pH values occurred beyond the ANZG pH trigger values, with the upper threshold limit exceeded more often than the lower limit (refer to Figure 37), highlighting a trend towards alkalinity. This trend has continued during the current reporting period with four monitoring (8%) events showing pH results higher than the ANZG trigger values (refer to Section 4.6.2). The previous two reporting periods showed a decreasing trend in pH levels however this trend has not continued in the current reporting period.

EC results during 2018 are comparable to previous years with a stable average and no exceedances of the criteria (refer to Figure 38). A review of historical EC values indicates an overall decreasing trend. EC values are generally within the ANZG guidelines trigger values and indicate that the stormwater is non-saline.

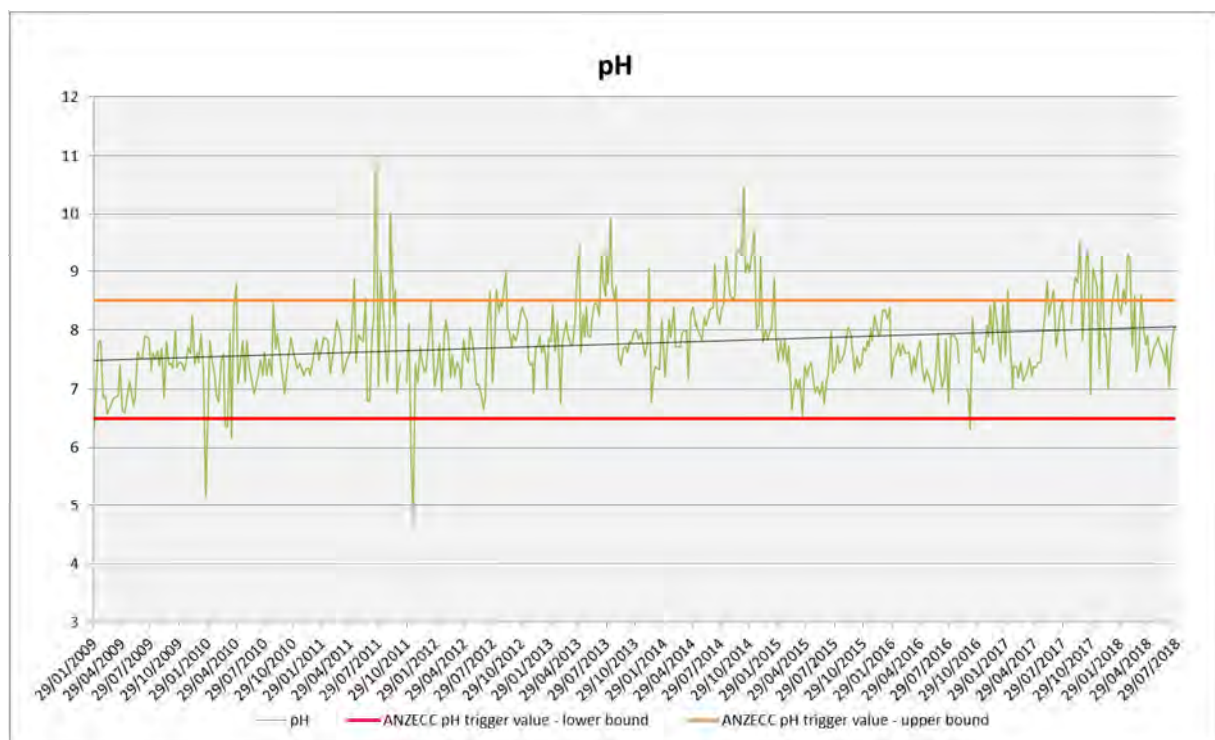


Figure 37 Stormwater quality, pH – Pond 4 (2009-2018)

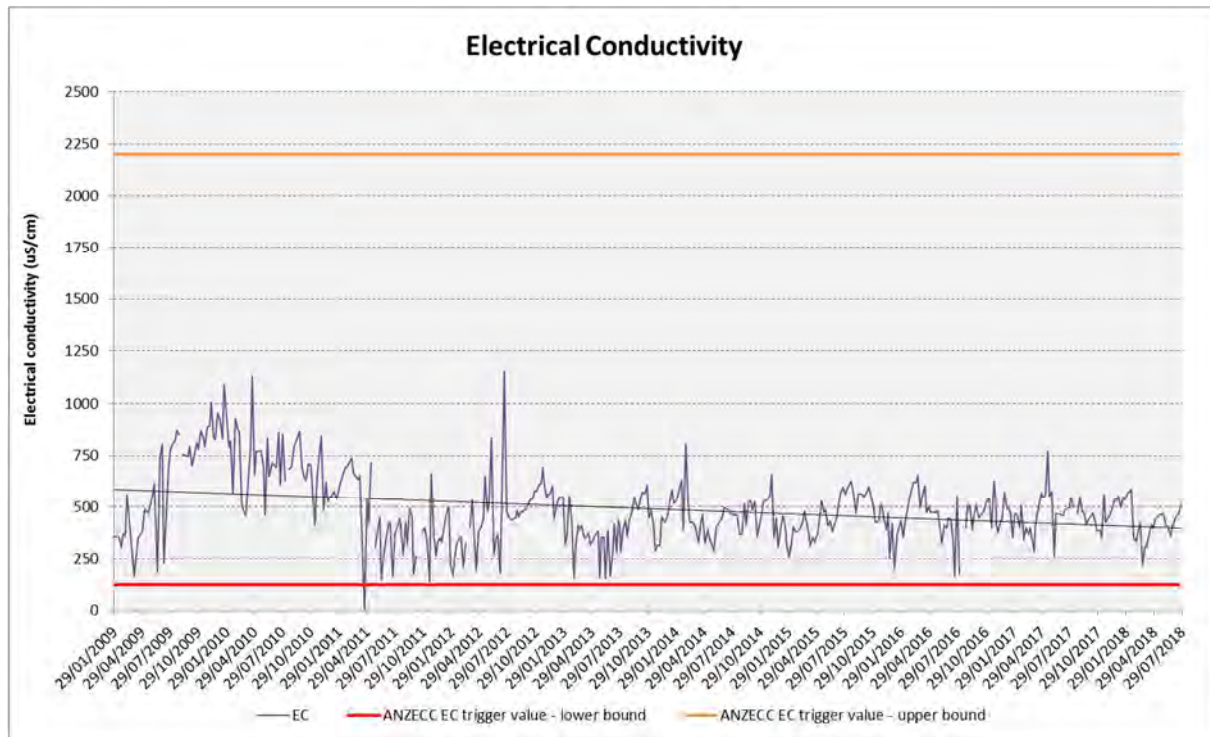


Figure 38 Stormwater quality, EC – Pond 4 (2009-2018)

5.6.4 Stormwater Management

The stormwater management system was designed to minimise the changes to the flow regime from Stages One–Four of the project. The management of stormwater at NCIA is achieved via four water detention basins which are connected by grass swales (managing surface water flows from roof, roadway and landscaped areas) and a series of pits and pipe work (servicing the car park and hardstand areas).

The grass swales have been designed to control surface flow velocities from runoff areas to no greater than 2 m/s. Final low flow stormwater discharges from the site occur at the channel outlet, located at the south eastern corner of the site (connected to Pond 4). Discharged storm water then connects directly to the existing neighbouring artificial wetland. To date there has been only one observed discharge of stormwater from Pond 4 observed on 21 June 2018. All water quality parameters were within the relevant criteria on this date.

The detention basins have been designed with sufficient retention to reduce peak stormwater flows and improve the quality of water ultimately discharged from the site. The combined surface area of the four water detention basins is approximately 6,600 m², which represents approximately 6.6% of the total catchment area. This exceeds the minimum requirement of 2% permanent water area defined in the *Constructed Wetlands Manual* (DLWC, 1998). As such, the level of water treatment offered by the wet detention system surpasses the guideline requirements.

As detailed in the 2010 EA, the existing stormwater management system will be modified and expanded if and when development Stages Five–Eight are constructed and commissioned.

5.7 Waste

5.7.1 Waste Generation

The 2010 EA stated that based on production levels at the time, approximately 1% of all fired tiles were not eligible for sale (either as broken tiles or not passing NCIA's strict quality assurance process). That figure was used to estimate the total amount of fired waste tile at maximum production rate (i.e. with Stages One – Eight operational), and predicted that approximately 2,720 tonnes of fired tiles waste would be generated per annum. The 2010 EA did not predict or specify the amount of green tile waste to be generated by the project.

The amount of fired tile waste during the reporting period (monthly average of 9.85% of total production) was higher than the predictions made in the EA, however close to NCIA's current operation target of 8%. Overall, monthly fired tile waste levels were lower than the previous reporting periods monthly average of 10.93% total tile production in 2017.

Monthly green tile waste levels have consistently been low and are below the 1% target throughout the reporting period, consistent with previous reporting years. NCIA continues to focus on reducing waste and increasing operational efficiency.

5.7.2 Waste Management

One hundred percent of green tile waste generated during production is reused in the manufacturing process and as such does not enter the overall waste stream leaving the site. Fired waste is stored in a bunker on site ensuring that it is free of cardboard and other debris. It is ultimately reused in the construction industry for road base material and other developments which greatly minimises the total amount of waste NCIA sends to landfill.

All other waste (i.e. packaging waste, general office waste and lunch room waste) is collected by a licenced recycling or waste contractor. Incoming packaging waste such as pallets are reused wherever possible.

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6.0 Non-Compliances

6.1 2017 Non-Compliances Record

Fifteen non-compliances were recorded during the 2018 reporting period. Details relating to the non-compliances and the actions taken to investigate or to prevent a recurrence are summarised in Table 6-1.

Table 6-1 Details of non-compliance with EPL or Project Approval conditions during the 2018 reporting period

Condition No / Reference	Details of Non-compliance	Action taken
Non-compliances recorded during the reporting period		
EPL Condition L2.2	The assessable pollutant load for fluoride discharged to air (2,239 kg) exceeded the pollutant load limit (1,850 kg) specified in this condition.	<p>DP&E were notified of the non-compliance by telephone on receipt of the laboratory analytical results.</p> <p>The pollutant fee was calculated in accordance with the Load Calculation Protocol for ceramics production, as set out in the Annual Return worksheets.</p> <p>The cause of the non-compliance is considered to be variability in process and annual stack testing results. As a comparison, the fluoride emission result for Kiln 1 (EPL Point 14) using the same source material was 0.55 mg/m³.</p> <p>All weekly and 24 hour ambient fluoride monitoring to the north west and south east of the facility except one 24 hour at the northwest returned results below relevant EPA guideline values.</p>
EPL Condition L3.4	<p>Annual stack emissions testing identified one exceedance of the Fluoride concentration limit of 5 mg/m³:</p> <ul style="list-style-type: none"> 14.3 mg/m³ at EPL Point 15 (Kiln 2); 	As per EPL Condition L2.2 above.
EPL Condition L3.4	<p>Annual stack emissions testing identified one exceedance of the Solid Particles concentration limit of 5 mg/m³: 5.8 mg/m³ at EPL Point 18 (HAC 1)</p>	<p>DP&E were notified of the non-compliance by telephone on receipt of the laboratory analytical results.</p> <p>The non-compliance is a minor exceedance of the criteria and is the only solid particles non-compliance NCIA has had.</p>
Project Approval Condition 15	<p>There were eight exceedances of the 24 hour PM₁₀ criterion (50 µg/m³) at the NW monitoring station:</p> <p>There were four exceedances of the 24 hour PM₁₀ criterion (50 µg/m³) at the SE monitoring station:</p>	<p>DP&E were notified of the non-compliances upon receipt of the laboratory analytical results.</p> <p>A review of the exceedances and external contributing factors to these exceedances is undertaken in Section 4.1.1).</p> <p>NCIA were found to not be the main contributing factor in each of these exceedances.</p>

6.2 Incident Notification

As required by DP&E, NCIA duly notifies any incident occurring on site or exceedance of regulatory criteria that causes, or may cause, harm to the environment. Wherever possible notification to DP&E is required within 24 hours of the incident / exceedance occurring (or being aware of the exceedance), detailing the nature of the incident and the response applied.

There were no reportable incidents during the 2018 reporting period, other than the exceedances of the EPL or Project Approval criteria (refer to Table 6-1) that were reported to DP&E upon receipt of laboratory analysis.

6.2.1 NSW EPA Show Cause Notice

NCIA received a Show Cause notice via email on 8 June 2018 from the NSW EPA regarding alleged breaches of the *Protection of the Environment Operations Act 1997* (POEO Act). The Show Cause notice identified three matters that required a response from NCIA:

1. The EPA is of the opinion that NCIA has allegedly breached Section 66(6) of the POEO Act for not publishing monitoring data on its website, as well as potentially breaching Section 66(4) for providing potential false and/or misleading information in the Annual Return, when indicating in the 2016-2017 Annual Return that monitoring data was published online as required.
2. NCIA has indicated that it has not complied with condition L2.1 of the licence by exceeding the Fluoride load limit of 1850kg by 561kg at EPA Point 15. The EPA is of the opinion that NCIA has allegedly breached Section 64(1) of the POEO Act which states:
If any condition of a licence is contravened by any person, each holder of the licence is guilty of an offence.
3. NCIA has indicated that it has not complied with condition L3.1/L3.4 of the licence by exceeding the Hydrogen Fluoride concentration limit of 5 mg/m³ by 4.7mg/m³ at EPA Point 15. The EPA is of the opinion that NCIA has allegedly breached Section 64(1) of the POEO Act.

NCIA responded on 28 June 2018. The response outlined NCIA's prior knowledge of the issues and awareness of their reporting criteria and addressed each of the three matters. Improvements and management measures to prevent further issues occurring were also identified.

On the 2 August 2018, NCIA received a Penalty Notice Advice from the EPA in regards to the Show Cause notice. The EPA issued NCIA with two Penalty Notices and two Official Cautions for allegedly failing to comply with various provisions of the POEO Act and the conditions of the Licence, which is an alleged breach of Section 64(1) of the POEO Act.

The EPA Show Cause letter, NCIA's response and the EPA's Penalty Notice Advice are attached in Appendix C.

6.2.2 DP&E review of previous AEMR

DP&E reviewed the 2016-17 reporting period AEMR. DP&E noted in their response letter (dated 17 Jan 2018) that the document generally satisfied the requirements of the approval in relation to reporting.

6.2.3 Audit Recommendations and Action Plan

In 2015, an Independent Environmental Compliance Audit of the NCIA facility was undertaken by Graham A Brown and Associates (Final Report dated October 2015 – revised March 2016). The audit found that NCIA is generally in compliance with the conditions of its regulatory documents. A total of 138 compliance requirements were audited, of which NCIA achieved an overall compliance rate of 72%.

The audit identified 19 non-compliances and five administrative non-compliances. The auditors made recommendations against each non-compliance, as well as recommendations where compliance was achieved but an improvement in performance could be made. A full summary of the non-compliances identified, recommendations made by the auditors, and the action taken by NCIA to address each of the recommendations is provided in the 2016 AEMR. Recommendations which were considered to be completed in the 2016 and 2017 AEMR (that is, the status was listed as 'action completed' in Table 17 of the 2016 and 2017 AEMR) have not been reproduced within this 2018 AEMR.

Table 6-2 lists the outstanding audit recommendations and provides an update of the actions taken by NCIA to address the recommendation.

Table 6-2 Audit recommendations and NCIA action plan

Audit Reference	Requirement	Audit Recommendation	Action Required / Undertaken	Responsibility	Status
Project Approval 09_0006					
S3.17	The Proponent shall: a. design, construct, operate and maintain the project in a manner that minimises or prevents the emission of dust from the site; b. take all practicable measures to ensure that all vehicles entering or leaving the site and carrying a load that may generate dust are covered at all times, except during loading and unloading. Any such vehicles shall be covered or enclosed in a manner that will prevent emissions of dust from the vehicle at all times; c. maintain all trafficable areas and vehicle manoeuvring areas on the site in a condition that will minimise the generation or emission of wind-blown or traffic generated dust from the site; and d. ensure each kiln is fitted with a dust collection system to capture emissions, to the satisfaction of the Secretary	Complies 3.17.1. It is recommended that when the OEMP is replaced by an Environmental Management Strategy (prior to the commencement of any construction works) as required by Schedule 4 Condition 57 of this Approval, wording in a "Transport Code of Conduct" or similar section includes a requirement for all loads of bulk granular material delivered to the site to be covered in accordance with the "Load Restraint Guide".	Apply recommendation when OEMP is replaced by an Environmental Management Strategy.	NCIA	<i>Not yet required.</i> Implement recommendation prior to commencement of construction works associated with the next phase of the development.
S3.55	The Proponent shall ensure that the fuel storage tank is surrounded by a bund with a capacity to contain 110% of the largest tank within the bund. The bund(s) must be designed and installed in accordance with the requirements of the relevant Australian Standards and/or	Complies 3.55.1 The Emergency Plan should be revised if necessary to incorporate the use of any spill prevention measures established for the diesel tank.	NCIA maintains a bund that is well in excess of the 110% diesel tank storage that is required in condition 3.55. Consideration will be given to amending the Emergency Plan	NCIA	<i>Completed as part of the 2018 OEMP revision.</i>

Audit Reference	Requirement	Audit Recommendation	Action Required / Undertaken	Responsibility	Status
	the OEH's Environmental Protection Manual Technical Bulletin Bunding and Spill Management.		the next time an update is performed.		
S4.58	Within 24 hours of the occurrence of an incident that causes (or may cause) harm to the environment, the Proponent shall notify the Department and any other relevant agencies of the incident.	Not Triggered 4.58.1 It is recommended that the Draft Emergency Plan be finalised and its requirements (e.g. for training) be implemented. The Emergency Plan should reference the PIRMP which could be included as an Appendix. The Notifications in the Emergency Plan should include, or make reference to, Table 2 in the PIRMP.	There have been no instances requiring notification and management believe they have appropriate systems in place for notifying the Department should an incident occur. The recommended amendments to the Emergency Plan will be actioned.	NCIA	<i>Completed as part of the 2018 OEMP revision.</i>
EPL 11956					
L5.2	Noise from the premises is to be measured at the most affected point on or within the receptor site boundary to determine compliance with this condition.	Administrative Non-compliance L5.2.1 NCIA should request a variation of Condition L5.2 to obtain approval for the current noise monitoring to be conducted in the reserve at the western end of Kenvil Close and in a clearing adjacent to a residence in Wollombi Road, instead of on or within the receptor site boundary.	Request submitted to the NSW EPA on 25 October 2016.	NCIA	<i>Ongoing</i> Request submitted to the EPA 25/10/2016. No response received from the EPA.
L5.3	Noise from the premises shall not exceed the L A1(1 minute) noise level of 45 dB(A) at the nearest residential receiver most affected by noise from activities at the premises. The noise limit applies 1 metre from the dwelling façade and shall apply during the night period only.	Non-compliance L5.3.1 NCIA should request a variation of Condition L5.3 to obtain approval for the noise monitoring to be conducted at a more accessible location, e.g. at the receptor site boundary as required in L5.2, or for a calculation method to be	Request submitted to the NSW EPA on 25 October 2016.	NCIA	<i>Ongoing</i> Request submitted to the EPA 25/10/2016. No response received from the

Audit Reference	Requirement	Audit Recommendation	Action Required / Undertaken	Responsibility	Status
		approved.			EPA.
L5.4	The noise emission limits specified above apply under all meteorological conditions except: a) during rain and wind speeds greater than 3 m/s; and b) from 6pm to 7am during intense inversions, which are indicated by cloud cover less than 40 per cent and wind speeds less than 1.0 m/s. Note: Wind data should be collected at 10m height.	Complies L5.4.1 It is recommended that the validity of meteorological conditions applicable to compliance monitoring be investigated by interrogating the onsite weather station and not from the Bureau of Meteorology weather station at Cessnock.	This issue has been discussed with the noise consultants and data from the on-site meteorological monitoring station will be used during the next round of noise monitoring (2017-2018).	NCIA	<i>Complete.</i> Meteorological data now provided to the noise consultants as of 2017.
R1.5	Annual return documents 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').	Administrative Non-compliance R1.5.1. NCIA should review the requirements set out in the box in Section G of the Annual Return Form to determine if an alternative form of signature can be provided.	Management emailed the 2015 Annual Return to the EPA and followed later with the hard copy document with two directors having signed at the NCIA board meeting. Management have requested to the EPA that only one Director's signature be appropriate for future annual returns (request submitted to the NSW EPA on 25 October 2016).	NCIA	<i>Ongoing.</i> Request submitted to the EPA 25/10/16. No response received from the EPA.

7.0 Continuous Improvement Measures

Condition 60(j) of the Project Approval requires the AEMR to identify continuous improvement measures, outlining new developments in air quality and noise control, and detailing practices that have been implemented on site during the previous year to reduce air quality and noise impacts.

Emission concentrations of pollutants were generally in accordance with EPL and Project Approval limits throughout the 2018 reporting period. There were twelve exceedances of the PM₁₀ 24 hour criterion however a review of processing and meteorological conditions on those days indicate that NCIA was not a major contributor to the exceedances.

Stack emissions testing identified one exceedance of the Total Fluoride discharge limit at one emission source location (Kiln 2). Consequently the air pollutant load limit for fluoride was exceeded during the current reporting period. However it is noted that ambient air quality monitoring showed that fluoride levels were within the EPA (2016) guideline criteria for the entire reporting period except for one 24-hour fluoride result on 31 January 2018.

Stack emissions testing identified a minor exceedance of total particulate at one emission source location (HAC 1). The exceedance is considered to be minor and is NCIA's only stack emissions total particulate exceedance to date.

Noise monitoring results for the current reporting period indicated that noise emissions from NCIA were in compliance with the EPL and Project Approval noise criteria for all time periods, including the sleep disturbance criteria. Noise monitoring confirmed that background noise levels during the day in the Rutherford industrial area remain high, and the NCIA contribution was inaudible.

Environmental improvement measures recently implemented by NCIA are summarised in the following sections.

7.1 General Environmental Management

General environmental management actions undertaken by NCIA are outlined in Table 7-1.

Table 7-1 Timetable for environmental improvement actions

Area of Concern	Identified Action	Completion Date
Solar Electricity	NCIA are currently installing a solar panel array that will generate 1MW of electricity during daylight hours. During operation all of this energy will be used by NCIA reducing electricity consumption by 10-15%. Feasibility works have been done on installing a further 2MW on the roof of the factory and ground mounted options are also being assessed.	Ongoing
Waste Heat Recovery	Through NCIA's manufacturing process a significant amount of hot air is exhausted into the atmosphere. NCIA are investigating piping the hot air currently exhausted through Hot Air Cooler 1 and 2 (HAC 1 and 2 / EPL 18 and EPL 19) back through insulated stainless steel piping to the spray dryer. The spray dryer uses ambient air and a gas burner to dry water from a liquid slip into a powder which is then press to form the tiles. Once operational this is expected to reduce gas consumption by 10-15%.	Ongoing
New Kiln Baghouse	NCIA have engaged Pox Environmental Engineering Pty Ltd to completely refurbish	Ongoing

Area of Concern	Identified Action	Completion Date
	the original kiln baghouse. This new purpose built baghouse together with the expertise of Porex, and a continued focus on raw materials will ensure compliance with regulatory requirements.	
Compliance Committee	NCIA have formalised a compliance committee meeting once per month. The committee consists of a company director, factory manager, assistant factory manager, office manager and compliance manager.	Completed
University of NSW	Raw materials and finished products are now sent to the University of NSW for testing on a routine basis. NCIA is leveraging off the University of NSW for assistance from time to time. Samples have previously been sent to Italy for testing but sending locally expedites the process and also generates local capacity building.	Completed
Hong Lu	Hong Lu joined the NCIA team in early 2018 with a focus on internal and external compliance. Hong Lu has a PHD in Materials Science and Engineering from the University of NSW. Whilst still developing in her role at NCIA, when settled it is hoped Hong Lu will provide benefits in the environmental and compliance space.	Ongoing
Gas Monitoring	A project has been undertaken to monitor gas consumption on individual pieces of equipment. Information is now available in real time. From this information NCIA has been able to focus on reducing consumption while maintaining production efficiency.	Completed
Continuous Gas Emission Monitoring	NCIA remains committed to establishing continuous gas emission monitors within the kilns. NCIA has trialled different monitors over the past 12-24 months but have not yet committed to purchase and install.	Ongoing

7.2 Energy Efficiencies

As noted in previous AEMRs, a lot of NCIA's focus in recent times has been on achieving greater efficiencies. The objective is to achieve a greater tile production output for the same amount of power consumption and raw material input. For example, NCIA currently endeavours to improve the gas efficiency of the manufacturing process. Figure 39 shows the evolution since 2011 of the amount of gas required (in gigajoules GJ) to produce one square metre of tiles, with data showing an overall improving trend in gas efficiency.

NCIA is currently in the process of reducing the size and weight of tiles with a view to reduce the amount of raw material inputs, energy and transport components whilst still achieving the same amount of saleable product output (m^2 of tiles).

NCIA has installed a Quality Assurance (QA) machine before the kiln on each of its production lines. This effectively reduces waste tiles going through the kiln and being fired, creating both a reduction in waste and a saving in energy consumption.

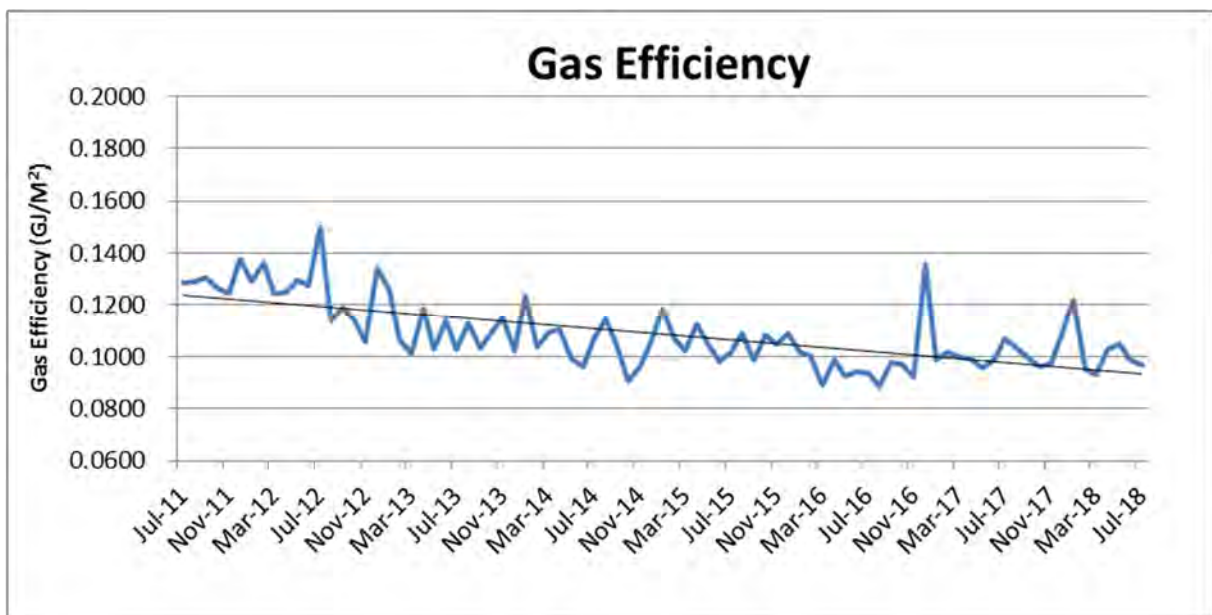


Figure 39 Gas efficiency in tile manufacturing process

In early 2015 NCIA engaged with the NSW EPA to identify potential opportunities in relation to energy efficiency and research. A summary of identified opportunities and associated potential savings are provided in Table 7-2. A number of these projects have been implemented or are in the process of being completed (as discussed in Table 7-1), including the solar PV project and the heat recovery project.

Other identified opportunities are being evaluated with some initiatives currently being trialled or rolled out in some of the National Ceramic Industries group's other facilities. NCIA will closely monitor the progress of these initiatives being implemented and will consider adopting measures accordingly and where consistent with business objectives.

Table 7-2 Efficiency reviews – summary of opportunities

Description of Opportunity	Potential Electricity Savings (MWh per annum)	Potential Gas Savings (GJ per annum)	Potential GHG Savings (tonnes CO ₂ per annum)
Notched V belts	151	-	160
Avoid leaving glazing line equipment running	155	-	164
Turn off second air wipe after press and install blower wipes	44	-	47
Install timer and switch to turn off warehouse induction lights at night	24	-	25
Install cooling chamber for tile cooling prior to inkjet	43	-	46
VSD on Comb air fan	234	-	248
Stop running scrap line v belt conveyor after kiln 1 (programming)	4	-	4
Install switches to allow switching off of T8 fluorescent lights	54	-	57
Purchasing policy for High Efficiency (E3) Motors	113	-	120
High efficiency burners (half replaced)	0	9,933	651
Poppi heat recovery option	-474	50,473	2,804
Stop bucket elevator when not required, resolve mechanical issues first	11	-	12
OEM Kiln heat recovery	76	26,488	1,816
Alternative combustion air preheat	0	8,500	557
Solar PV	139		147
TOTAL	498	68,906	5,041

8.0 References

AECOM (2017) 2017 Annual Environmental Management Report 1 August 2016 – 31 July 2017, prepared for NCIA by AECOM Australia Pty Ltd, Newcastle, 27 October 2017.

AECOM (2016) 2016 Annual Environmental Management Report 1 August 2015 – 31 July 2016, prepared for NCIA by AECOM Australia Pty Ltd, Newcastle, 28 October 2016.

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AECOM (2014) *Operational Environmental Management Plan*, prepared for NCIA by AECOM Australia Pty Ltd, Newcastle, 18 September 2014.

ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* – October 2000.

Australian Standard (2015) *AS/NZS 3580.9.6:2015 Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM₁₀ high volume sampler with size-selective inlet - Gravimetric method*. Retrieved from Australian Standards Online.

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Appendix A

Fluoride Impact on Vegetation Data

Appendix A1 – Vegetation Monitoring Sites

Area	Site #	Site location	Monitoring frequency	Location from the kiln stack
NCIA premises	1	Access road north of office	Annual	280m NW
	2	Office car park	Annual	120m W
	3	Access road south of office	Annual	160m W
	4	South-west corner of site	Annual	220m SW
	5	South-east corner of site	Quarterly	300m SE
Rutherford and Farley residential areas	6	3 Palisade Street	Annual	1.4km E
	7	3 Gillette Close	Quarterly	1.4km SE
	8	Regiment Road east of Dumont Court	Annual	1.5km SE
	9	Regiment Road south-east of Squadron Crescent	Annual	1.8km SE
	10	Wollombi Road between sewage works and creek	Annual	2km SE
	11	Hill top on Wollombi Road, Farley	Quarterly	1.5km SE
	12	Western end of Quarry Road, Farley	Quarterly	2.3km S
Rutherford industrial estate	13	NCIA entrance, Racecourse Road	Quarterly	480m N
	14	99 Kyle Street	Quarterly	570m NW
	15	20 Gardiner Road	Quarterly	500m NW
	16	56 Gardiner Road	Annual	450m W
	17	Gardiner Road, southern end	Annual	550 SW
	18	Maitland Saleyards, Kyle Street	Quarterly	920m NW
Anambah homestead	19	200 Anambah Road – Reference site	Quarterly	3km N

Site 1 – Access road north of office**Site 4 – South-west corner of site****Site 2 – Office car park****Site 5 – South-east corner of site****Site 3 – Access road south of office****Site 6 – 3 Palisade Street**

Site 7 – 3 Gillette Close**Site 8 – Regiment Road east of Dumont Court****Site 9 – Regiment Road south-east of Squadron Crescent****Site 10 – Wollombi Road between sewage works and creek****Site 11 – Hill top on Wollombi Road, Farley****Site 12 – Western end of Quarry Road, Farley**

Site 13 – NCIA entrance, Racecourse Road**Site 16 – 56 Gardiner Road****Site 14 – 99 Kyle Street****Site 17 – Gardiner Road, southern end****Site 15 – 20 Gardiner Road****Site 18 – Maitland Saleyards, Kyle Street**

Site 19 – 200 Anambah Road (Reference site)

Appendix A2 – Visual Injury Expression Survey Results

Site/Species	Assessment period	Emissions injury	Total injury	Foliar age years *	Chlorosis index	Cupping index	Tip Necrosis index	Marginal Necrosis index	Anthocyanin index	Leaf chewing index	Sap sucking index	Branch dieback	Crown density	Reproduction # – buds or flowers	Reproduction # – fruits
Site 1 – Access road north of office															
Acacia filicifolia	Q4 2017			1	1	0	0	0	0	3	0	0	0	✓	0
Acacia longifolia	Q4 2017			1	0	2	0	0	0	0	0				
Corymbia citriodora	Q4 2017			0	5	3	4	0	0	0	1	0	0	0	0
				1	6	2	3	0	0	0	2				
Eucalyptus moluccana	Q4 2017			0	0	1	0	0	0	0	1	0	0	0	ü
				1	0	0	1	0	0	0	0				
Eucalyptus robusta 1	Q4 2017			0	0	0	0	0	0	2	0	0	0	0	0
				1	4	1	2	0	0	0	1				
Eucalyptus robusta 2	Q4 2017			0	0	2	0	0	0	1	1	0	0	0	0
				1	0	2	0	0	0	1	2				
Site 2 – Office car park															
Corymbia maculata	Q4 2017			0	4	3	1	0	0	0	0	4	1	0	0
				1	4	4	4	3	0	0	2				
Eucalyptus robusta	Q4 2017			0	2	2	0	0	0	0	0	0	0	0	0
				1	4	1	2	0	0	1	1				
Fraxinus pennsylvanica	Q4 2017			0	0	0	0	0	0	0	0	0	0	0	0
				1	0	2	0	0	0	0	0				
Site 3 – Access road south of office															
Acacia parramattensis	Q4 2017			1	2	0	0	0	0	0	0	0	0	✓	0
Hakea salicifolia	Q4 2017			1	2	2	1	0	0	0	0	0	n/a	0	✓
Eucalyptus sp.	Q4 2017			0	3	4	2	0	0	1	0	0	0	0	0
				1	2	3	3	3	0	0	0				
Site 4 – South-west corner of site															
Acacia longifolia	Q4 2017			1	0	0	4	0	0	0	2	0	0	0	0
Bursaria spinosa	Q4 2017			1	0	0	0	0	0	0	0	0	0	✓	0
Typha sp.	Q4 2017			1	0	0	2	0	0	0	0	0	0	0	✓
Eucalyptus amplifolia	Q4 2017			0	0	1	0	0	0	3	0	0	0	0	✓
				1	0	1	2	0	0	3	1				
Site 5 – South-east corner of site															
Eucalyptus moluccana	Q3 2017			0	0	1	2	0	0	2	0	0	0	0	0
				1	0	2	0	0	3	1	2				
	Q4 2017			0	0	2	0	0	0	3	0				
				1	2	2	2	0	0	1	1	0	0	0	0
	Q1 2018			0	0	0	0	0	0	3	1				
				1	1	1	1	0	0	1	1				
Q2 2018			0	0	1	0	0	0	3	0	0	0	✓	0	
			1	0	1	0	0	3	1	1					
Bursaria spinosa	Q4 2017			1	1	0	0	0	0	0	0	0	0	0	0
Acacia longifolia	Q4 2017			1	0	0	2	0	0	0	0	0	0	0	✓
Site 6 – 3 Palisade Street															
Corymbia maculata 1	Q4 2017			0	0	2	0	0	0	2	3	0	0	0	0
				1	0	4	1	0	0	1	2				
Corymbia maculata 2	Q4 2017														
Bursaria spinosa	Q4 2017			1	1	0	0	0	0	0	0	0	0	0	0

Site/Species	Assessment period	Emissions injury	Total injury	Foliar age years *	Chlorosis index	Cupping index	Tip Necrosis index	Marginal Necrosis index	Anthocyanin index	Leaf chewing index	Sap sucking index	Branch dieback	Crown density	Reproduction # – buds or flowers	Reproduction # – fruits
<i>Olea europaea</i>	Q4 2017			1	0	2	0	0	0	0	0	0	0	✓	0
Site 7 – 3 Gillette Close															
<i>Eucalyptus acmenoides</i>	Q3 2017			0	2	0	0	0	0	1	1	0	0	✓	✓
				1	3	0	2	0	0	1	1				
	Q4 2017			0	1	0	0	0	0	2	1	0	0	0	✓
				1	4	2	3	0	0	1	2				
	Q1 2018			0	0	0	0	0	0	0	0	0	0	✓	✓
				1	3	0	1	0	0	1	1				
<i>Corymbia maculata</i>	Q2 2018			0	0	0	0	0	0	2	1	0	0	✓	✓
				1	2	0	1	0	0	1	1				
	Q3 2017			0	0	1	1	0	0	1	1	2	0	0	0
				1	3	3	2	0	2	1	1				
	Q4 2017			0	0	3	2	1	1	1	2	2	2	0	0
				1	1	3	3	1	0	2	3				
<i>Corymbia maculata</i>	Q1 2018			0	-	-	-	-	-	-	-	2	0	0	0
				1	0	3	1	2	0	1	2				
	Q2 2018			0	2	4	2	0	0	0	2	0	0	0	0
				1	1	3	0	0	0	0	0				
Site 8 – Regiment Road east of Dumont Court															
<i>Acacia baileyana</i>	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
<i>Corymbia maculata</i>	Q4 2017			0	2	3	2	0	0	0	1	0	0	0	0
				1	2	4	4	3	0	0	1				
<i>Eucalyptus resinifera</i>	Q4 2017			0	-	-	-	-	-	-	-	0	0	0	✓
				1	2	1	2	0	0	2	1				□
<i>Bursaria spinosa</i>	Q4 2017			1	2	0	0	0	0	0	0	0	0	0	0
<i>Eucalyptus acmenoides</i>	Q4 2017			0	-	-	-	-	-	-	-	0	0	Y	✓
				1	4	1	3	0	0	2	1				□
<i>Lophostemon confertus</i>	Q4 2017			1	0	2	0	0	0	0	0	0	0	0	0
<i>Grevillea robusta</i>	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
Site 9 – Regiment Road south-east of Squadron Crescent															
<i>Bursaria spinosa</i>	Q4 2017			1	2	0	0	0	0	0	0	2	0	Y	0
<i>Eucalyptus resinifera</i>	Q4 2017			0	0	1	0	0	0	1	0	0	0	0	0
				1	0	1	1	0	0	1	1				□
Site 10 – Wollombi Road between sewage works and creek															
<i>Casuarina glauca</i>	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
<i>Fraxinus excelsior</i>	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
<i>Grevillea robusta</i>	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
<i>Populus nigra</i>	Q4 2017			0	0	2	0	0	0	0	0	0	0	0	0
<i>Acacia podalyriifolia</i>	Q4 2017			0	0	2	0	0	0	0	0	0	0	0	0
				1	2	3	0	0	0	0	0				
<i>Bursaria spinosa</i>	Q4 2017			1	0	0	0	0	0	0	0	1	0	0	0
Site 11 – Hill top on Wollombi Road, Farley															
<i>Corymbia maculata</i>	Q3 2017			0	0	2	0	0	0	1	0	0	0	0	✓
				1	0	2	2	0	0	1	2				
	Q4 2017			0	0	1	0	0	0	3	0	0	0	0	0
				1	0	2	0	0	0	1	1				
	Q1 2018			0	0	1	3	0	0	1	2	0	0	0	✓

Site/Species	Assessment period	Emissions injury	Total injury	Foliar age years *	Chlorosis index	Cupping index	Tip Necrosis index	Marginal Necrosis index	Anthocyanin index	Leaf chewing index	Sap sucking index	Branch dieback	Crown density	Reproduction # – buds or flowers	Reproduction # – fruits
	2018			1	0	2	3	0	0	1	1				
	Q2 2018			0	0	0	0	0	0	2	0	0	0	0	0
<i>Eucalyptus paniculata</i>	Q3 2017			1	0	2	1	0	0	2	1	0	0	0	0
				0	0	0	0	0	0	0	0	0	0	0	0
	Q4 2017			1	0	0	0	0	0	3	0	0	0	0	0
				1	0	1	0	0	0	2	1			□	
	Q1 2018			0	0	0	0	0	0	3	1	0	0	✓	0
				1	0	1	0	0	0	4	1	0	0	✓	0
	Q2 2018			0	-	-	-	-	-	-	-	0	0	✓	0
<i>Bursaria spinosa</i>	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
<i>Hakea gibbosa</i>	Q4 2017			1	0	0	1	0	0	0	0	0	n/a		□
Site 12 – Western end of Quarry Road, Farley															
<i>Corymbia maculata</i>	Q3 2017			0	0	0	0	0	0	0	0	0	0	0	0
				1	0	0	0	0	0	3	1	0	0	0	0
	Q4 2017			0	0	1	0	0	0	2	0	0	0	0	0
				1	0	3	1	0	0	2	2	0	0	0	0
	Q1 2018			0	0	0	0	0	0	1	0	0	0	0	0
				1	0	1	1	0	0	2	1	0	0	0	0
<i>Eucalyptus paniculata</i>	Q2 2018			0	0	0	0	0	0	0	1	0	0	0	0
				1	0	1	1	0	0	1	2	0	0	0	0
	Q3 2017			0	0	0	0	0	0	2	0	0	0	0	0
				1	0	1	1	0	0	2	2	0	0	0	0
	Q4 2017			0	0	1	0	0	0	3	0	0	0	0	0
				1	0	1	1	0	0	2	1	0	0	0	0
<i>Pinus radiata</i>	Q1 2018			0	0	0	0	0	0	1	0	0	0	0	0
				1	0	0	0	0	0	2	0	0	0	0	0
	Q2 2018			0	0	0	0	0	0	1	1	0	0	0	0
				1	0	0	0	0	0	1	1	0	0	0	0
Site 13 – NCIA entrance, Racecourse Road															
<i>Corymbia maculata</i>	Q3 2017			0	0	1	0	0	0	0	0	2	2	0	0
				1	2	2	1	0	0	1	1	2	2	0	0
	Q4 2017			0	3	2	3	0	0	1	1	2	2	0	0
				1	0	2	2	0	0	0	1	2	2	0	0
	Q1 2018			0	-	-	-	-	-	-	-	0	0	0	0
				1	1	2	2	0	0	1	1	0	0	0	0
<i>Eucalyptus amplifolia</i>	Q2 2018			0	3	1	1	0	0	0	1	0	2	0	0
				1	2	1	2	0	0	0	2	0	2	0	0
	Q3 2017			0	-	-	-	-	-	-	-	2	2	✓	0
				1	0	1	1	0	0	0	2	2	2	0	0
	Q4 2017			0	0	0	0	0	0	1	0	2	2	0	0
				1	0	1	2	0	0	1	3	2	2	0	0
<i>Olea Europea</i>	Q1 2018			0	0	0	1	0	0	0	0	0	0	0	0
				1	0	1	2	0	0	1	1	0	0	0	0
	Q2 2018			0	-	-	-	-	-	-	-	1	2	0	0
				1	0	1	2	0	0	1	1	1	2	0	0
Site 14 – 99 Kyle Street															
<i>Angophora floribunda</i>	Q3 2017			0	2	3	0	0	0	0	0	0	3	0	0
				1	2	2	1	1	1	0	1	0	3	0	0

Site/Species	Assessment period	Emissions injury	Total injury	Foliar age years *	Chlorosis index	Cupping index	Tip Necrosis index	Marginal Necrosis index	Anthocyanin index	Leaf chewing index	Sap sucking index	Branch dieback	Crown density	Reproduction # – buds or flowers	Reproduction # – fruits
	Q4 2017			0	2	2	2	0	0	0	0	0	3	✓	0
				1	2	2	2	1	1	1	1			□	
	Q1 2018			0	2	2	1	0	0	0	1	0	3	0	✓
				1	2	2	1	1	0	0	1				
	Q2 2018			0	2	4	2	0	0	0	1	0	3	0	✓
				1	1	3	2	0	0	0	1				
<i>Eucalyptus amplifolia</i>	Q3 2017			0	-	-	-	-	-	-	-	0	0	✓	0
				1	0	2	2	0	0	1	2				
	Q4 2017			0	-	-	-	-	-	-	-	2	2	✓	0
				1	0	0	2	0	0	1	2			□	
	Q1 2018			0	0	0	3	0	0	0	1	0	0	✓	0
				1	0	2	3	0	0	1	2				
	Q2 2018			0	-	-	-	-	-	-	-	0	0	✓	0
				1	0	0	2	0	0	0	2				
Site 15 – 20 Gardiner Road															
<i>Corymbia maculata</i>	Q3 2017			0	2	2	2	0	0	0	1	0	0	✓	0
				1	3	2	4	0	0	0	1				
	Q4 2017			0	3	4	3	0	0	0	1	0	0	0	0
				1	2	3	4	2	0	0	1				
	Q1 2018			0	2	4	1	0	0	1	2	0	0	0	0
				1	3	3	3	1	0	0	1				
<i>Eucalyptus paniculata</i>	Q2 2018			0	3	3	1	0	0	1	1	0	0	0	0
				1	3	3	3	0	0	1	1				
	Q3 2017			0	0	0	0	0	0	1	1	0	0	✓	0
				1	0	0	3	0	0	1	1				
	Q4 2017			0	0	2	0	0	0	0	0	0	0	0	Y
				1	1	1	3	0	0	1	0			□	
	Q1 2018			0	0	1	2	0	0	0	1	0	0	✓	✓
				1	0	0	3	0	0	1	1				
	Q2 2018			0	1	0	2	0	0	0	1	0	0	✓	✓
				1	0	0	2	0	0	2	1				
Site 16 - 56 Gardiner Road															
<i>Corymbia maculata</i>	Q4 2017			0	3	2	3	0	0	0	1	0	0	0	0
				1	2	2	4	1	0	0	2			□	
Site 17 – Gardiner Road, Southern end															
<i>Bursaria spinosa</i>	Q4 2017			1	0	0	0	0	0	0	0	1	0	0	0
<i>Olea europaea</i>	Q4 2017			1	0	1	0	0	0	0	0	0	0	0	0
<i>Corymbia maculata</i> 1	Q4 2017			0	0	4	1	0	0	1	1	0	0	0	0
				1	0	3	2	0	0	1	1				
<i>Corymbia maculata</i> 2	Q4 2017			0	2	2	2	0	0	1	2	0	0	0	0
				1	3	2	1	0	0	1	3				
<i>Eucalyptus fibrosa</i>	Q4 2017			0	0	0	0	0	0	2	0	0	0	0	0
				1	0	1	3	0	0	1	2				
<i>Eucalyptus punctata</i>	Q4 2017			0	0	0	2	0	1	1	0	0	0	0	☆
				1	0	0	3	0	0	0	1			□	□
Site 18 – Maitland Saleyards, Kyle Street															
<i>Corymbia maculata</i>	Q3 2017			0	0	0	0	0	0	0	0	0	0	✓	0
				1	0	2	3	0	0	0	0				
	Q4 2017			0	0	0	2	0	0	0	2	0	0	0	0
				1	1	2	4	0	0	0	3				
	Q1 2018			0	-	-	-	-	-	-	-	0	0	✓	0
				1	0	2	3	0	0	0	2				
	Q2 2018			0	0	0	0	0	0	0	0	0	0	0	0

Site/Species	Assessment period	Emissions injury	Total injury	Foliar age years *	Chlorosis index	Cupping index	Tip Necrosis index	Marginal Necrosis index	Anthocyanin index	Leaf chewing index	Sap sucking index	Branch dieback	Crown density	Reproduction # – buds or flowers	Reproduction # – fruits
	2018			1	0	1	1	0	0	0	1				
<i>Eucalyptus amplifolia</i>	Q3 2017			0	0	0	1	0	0	1	0	0	0	0	0
				1	0	1	2	0	0	2	2	0	0	0	0
	Q4 2017			0	–	–	–	–	–	–	–	0	0	0	0
				1	0	3	0	1	0	3	2				
	Q1 2018			0	0	0	0	0	0	0	0	0	0	0	0
				1	0	1	1	1	0	1	2				
<i>Eucalyptus moluccana</i>	Q2 2018			0	0	0	2	0	0	0	1	0	0	0	0
				1	0	0	2	0	0	1	2	0	0	0	0
	Q3 2017			0	0	0	1	0	0	1	0	0	0	0	0
				1	0	0	1	0	1	1	1				
	Q4 2017			0	0	2	0	0	0	0	0	0	0	0	0
				1	0	1	1	0	0	2	1				
<i>Eucalyptus resinifera</i>	Q1 2018			0	1	0	1	0	0	0	1	0	0	0	0
				1	0	0	1	0	0	1	1	0	0	0	0
	Q2 2018			0	0	0	0	0	0	1	1	0	0	✓	0
				1	0	0	0	0	2	1	1				
	Q3 2017			0	0	2	0	0	0	1	0	0	0	✓	✓
				1	0	0	4	0	0	1	1				
<i>Araucaria cunninghamii</i>	Q4 2017			0	0	3	1	0	0	1	0	0	0	✓	✓
				1	0	1	4	0	0	2	1				
	Q1 2018			0	0	0	0	0	0	1	0	0	0	0	✓
				1	0	1	0	0	0	0	0	0	0	0	0
<i>Casuarina torulosa</i>	Q2 2018			0	-	-	-	-	-	-	-	0	0	✓	0
				1	0	2	1	0	0	0	1				
Site 19 – 200 Anambah Road – Reference site															
<i>Angophora costata</i>	Q4 2017														
<i>Araucaria cunninghamii</i>	Q3 2017			1	0	0	0	0	0	0	0	0	0	0	0
				1	0	0	0	0	0	0	0	0	0	0	✓
	Q4 2017			1	0	0	0	0	0	0	0	0	0	0	0
				1	0	0	0	0	0	0	0	0	0	0	0
<i>Brachychiton acerifolius</i>	Q1 2018			1	0	0	0	0	0	0	0	0	0	0	0
<i>Casuarina torulosa</i>	Q2 2018			1	0	0	0	0	0	0	0	0	0	0	0
				1	0	0	0	0	0	0	0	0	0	0	0
	Q3 2017			1	0	0	0	0	0	0	0	0	0	0	✓
				1	0	0	0	0	0	0	0	0	0	0	✓
<i>Corymbia citriodora</i>	Q4 2017			1	0	1	1	0	0	1	1	0	0	0	0
<i>Corymbia maculata</i>	Q3 2017			0	0	0	0	0	0	2	1	0	0	0	0
				1	0	3	0	0	0	1	0	0	0	0	0
	Q4 2017			1	0	4	1	0	0	2	0	0	0	0	0
				1	0	4	1	0	0	0	1	0	0	0	0
<i>Ficus microphylla</i>	Q1 2018			1	0	0	0	0	0	0	0	0	0	0	✓
				1	0	0	0	0	0	0	0	0	0	0	0

Site/Species	Assessment period	Emissions injury	Total injury	Foliar age years *	Chlorosis index	Cupping index	Tip Necrosis index	Marginal Necrosis index	Anthocyanin index	Leaf chewing index	Sap sucking index	Branch dieback	Crown density	Reproduction # – buds or flowers	Reproduction # – fruits
	2017														
	Q1 2018			1	0	0	0	0	0	0	0	0	0	0	✓
	Q2 2018			1	0	0	0	0	0	0	0	0	0	0	0
<i>Grevillea robusta</i>	Q3 2017			1	0	0	1	0	0	0	0	0	0	0	0
	Q4 2017			1	0	0	0	0	0	0	0	1	0	0	0
	Q1 2018			1	0	0	2	0	0	0	0	0	0	0	0
	Q2 2018			1	0	0	0	0	0	0	0	0	0	0	0
<i>Macadamia integrifolia</i>	Q4 2017			1	0	3	0	0	0	0	0	0	0	0	✓
<i>Eucalyptus acmenoides</i>	Q3 2017			mixed	0	0	1	0	0	1	1	0	0	0	✓
	Q4 2017			1	0	0	1	0	0	2	2	0	0	0	✓
	Q1 2018			mixed	0	0	0	0	0	3	1	0	0	0	✓
	Q2 2018			1	0	0	1	0	0	2	1	0	0	0	✓
<i>Eucalyptus dives</i>	Q4 2017			mixed	0	2	0	0	0	1	0	0	0	0	✓
<i>Eucalyptus grandis</i>	Q4 2017			mixed	0	2	2	0	0	1	2	0	0	0	0
<i>Eucalyptus robusta</i>	Q4 2017			1	0	1	2	0	0	2	1	0	0	0	0
<i>Eucalyptus tereticornis</i>	Q3 2017			1	0	2	2	0	0	1	1	0	0	0	0
	Q4 2017			1	0	1	2	0	0	0	0	0	0	0	0
	Q1 2018			1	0	2	3	0	0	2	2	0	0	✓	0
	Q2 2018			1	0	0	1	0	0	2	1	0	0	✓	0
<i>Olea europaea</i>	Q3 2017			1	0	2	0	0	0	0	0	0	0	0	0
	Q4 2017			1	0	1	0	0	0	0	0	0	0	✓	0
	Q1 2018			1	0	2	0	0	0	0	0	0	0	0	✓
	Q2 2018			1	0	1	0	0	0	0	0	0	0	0	0
<i>Vitis vinifera</i>	Q3 2017			-	-	-	-	-	-	-	-	-	-	-	-
	Q4 2017			0	0	1	2	0	0	2	1	0	n/a	0	✓
	Q1 2018			0	0	0	0	0	0	2	0	0	0	0	✓
	Q2 2018			-	-	-	-	-	-	-	-	-	-	-	-







Table key:







* 'new' = assessment undertaken on current season leaves, 'old' = assessment undertaken on previous seasons leaves, 'mix' = assessment undertaken on both current and previous season leaves.







For the assessment of reproductive strictures, '✓' means presence and 'x' means absence

- Indicates no visual assessment was undertaken due to the absence of foliage.

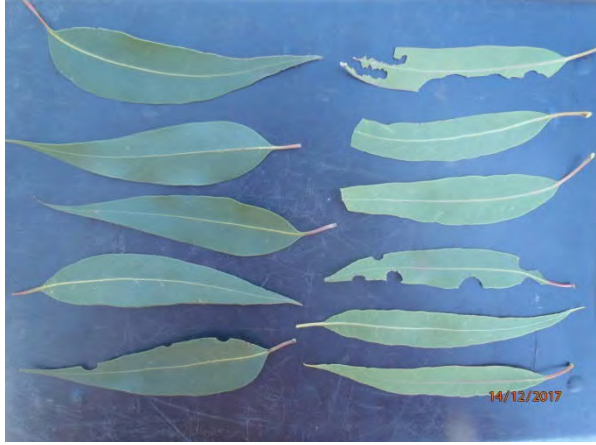





Appendix A3 – Foliage Condition Photographs

Site 1 – Access road north of office	
<i>Eucalyptus robusta</i> 1 (Q4 2017)	<i>Eucalyptus robusta</i> 2 (Q4 2017)
	
<i>Corymbia citriodora</i> (Q4 2017)	<i>Eucalyptus moluccana</i> (Q4 2017)
	
Site 2 – Office car park	
<i>Corymbia maculata</i> (Q4 2017)	<i>Eucalyptus robusta</i> (Q4 2017)
	







Site 3 – Access road south of office	
<i>Hakea salicifolia</i> (Q4 2017)	<i>Eucalyptus</i> sp. (Q4 2017)
	
Site 4 – South-west corner of site	
<i>Acacia longifolia</i> (Q4 2017)	<i>Eucalyptus amplifolia</i> (Q4 2017)
	
Site 5 – South-west corner of site	
<i>Eucalyptus moluccana</i> (Q3 2017)	<i>Bursaria spinosa</i> (Q4 2017)
	

Site 6 – 3 Palisade Street	
<i>Corymbia maculata</i> 1 (Q4 2017)	<i>Bursaria spinosa</i> (Q4 2017)
	
Site 7 – 3 Gillette Close	
<i>Eucalyptus acmenoides</i> (Q1 2018)	<i>Corymbia maculata</i> (Q4 2017)
	
Site 8 – Regiment Road east of Dumont Court	
<i>Corymbia maculata</i> (Q4 2017)	<i>Eucalyptus acmenoides</i> (Q4 2017)
	

Site 8 – Regiment Road east of Dumont Court (continued)***Eucalyptus resinifera* (Q4 2017)*****Bursaria spinosa* (Q4 2017)****Site 9 – Regiment Road south-east of Squadron Crescent*****Bursaria spinosa* (Q4 2017)*****Eucalyptus resinifera* (Q4 2017)****Site 10 – Wollombi Road between sewage works and creek*****Fraxinus excelsior* (Q4 2017)*****Populus nigra* (Q4 2017)**

Site 11 – Hill top on Wollombi Road, Farley	
<i>Corymbia maculata</i> (Q4 2017)	<i>Eucalyptus paniculata</i> (Q4 2017)
	
Site 12 – Western end of Quarry Road, Farley	
<i>Corymbia maculata</i> (Q1 2018)	<i>Eucalyptus paniculata</i> (Q1 2018)
	
Site 13 – NCIA entrance, Racecourse Road	
<i>Corymbia maculata</i> (Q2 2018)	<i>Eucalyptus amplifolia</i> (Q1 2018)
	

Site 14 – 99 Kyle Street***Angophora floribunda* (Q1 2018)*****Eucalyptus amplifolia* (Q2 2018)****Site 15 – 20 Gardiner Road*****Corymbia maculata* (Q1 2018)*****Eucalyptus paniculata* (Q4 2017)****Site 16 - 56 Gardiner Road*****Corymbia maculata* (Q4 2017)**

Site 17 – Gardiner Road, Southern end	
<i>Corymbia maculata</i> 1 (Q4 2017)	<i>Corymbia maculata</i> 2 (Q4 2017)
	
<i>Eucalyptus fibrosa</i> (Q4 2017)	<i>Eucalyptus punctata</i> (Q4 2017)
	
Site 18 – Maitland Saleyards, Kyle Street	
<i>Corymbia maculata</i> (Q1 2018)	<i>Eucalyptus moluccana</i> (Q4 2017)
	

Site 18 – Maitland Saleyards, Kyle Street (continued)***Eucalyptus amplifolia* (Q1 2018)*****Eucalyptus resinifera* (Q2 2018)****Site 19 – 200 Anambah Road – Reference site*****Corymbia citriodora* (Q4 2017)*****Corymbia maculata* (Q1 2018)*****Eucalyptus acmenoides* (Q1 2018)*****Eucalyptus robusta* (Q4 2017)**

Site 19 – 200 Anambah Road – Reference site (continued)

Eucalyptus tereticoris (Q1 2018)*Vitis vinifera* (Q4 2017)*Eucalyptus dives* (Q4 2017)*Ficus macrophylla* (Q2 2018)

[Appendix A4 – Analytical Laboratory Documentation](#)

CERTIFICATE OF ANALYSIS

Work Order : **EN1703754**
Client : **AECOM Australia Pty Ltd**
Contact : **MR MATTHIEU CATTEAU**
Address : **PO BOX 73 HUNTER REGION MC**
HRMC NSW NSW, AUSTRALIA 2310
Telephone : **+61 02 4911 4900**
Project : **60551495 Task 1.3**
Order number : **60551495 Task 1.3**
C-O-C number : **----**
Sampler : **AECOM**
Site : **----**
Quote number : **EN/004/16**
No. of samples received : **5**
No. of samples analysed : **5**

Page : 1 of 2
Laboratory : Environmental Division Newcastle
Contact : Hayley Worthington
Address : 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone : +612 4014 2500
Date Samples Received : 07-Sep-2017 13:40
Date Analysis Commenced : 11-Sep-2017
Issue Date : 12-Sep-2017 17:25



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting
 ø = ALS is not NATA accredited for these tests.
 ~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **VEGETATION**
 (Matrix: **BIOTA**)

Client sample ID

				E. Moluccana Site 5	Grasses Site 11	E. Amplifolia Site 13	C. Maculata Site 13	C. Maculata Site 15
Client sampling date / time				07-Sep-2017 00:00	07-Sep-2017 00:00	07-Sep-2017 00:00	07-Sep-2017 00:00	07-Sep-2017 00:00
Compound	CAS Number	LOR	Unit	EN1703754-001	EN1703754-002	EN1703754-003	EN1703754-004	EN1703754-005
				Result	Result	Result	Result	Result
EK040V: Fluoride in Vegetation								
Fluoride	16984-48-8	10.0	mg/kg	33.5	<10.0	69.9	<10.0	27.2

CERTIFICATE OF ANALYSIS

Work Order : **EN1705136**
Client : **AECOM Australia Pty Ltd**
Contact : **MR MATTHIEU CATTEAU**
Address : **PO BOX 73 HUNTER REGION MC**
HRMC NSW NSW, AUSTRALIA 2310
Telephone : **+61 02 4911 4900**
Project : **60551495 Task 1.3**
Order number : **60551495 Task 1.3**
C-O-C number : **----**
Sampler : **AECOM**
Site : **----**
Quote number : **EN/004/16**
No. of samples received : **6**
No. of samples analysed : **6**

Page : 1 of 4
Laboratory : Environmental Division Newcastle
Contact : Hayley Worthington
Address : 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone : +612 4014 2500
Date Samples Received : 15-Dec-2017 13:40
Date Analysis Commenced : 18-Dec-2017
Issue Date : 21-Dec-2017 17:13



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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.



Analytical Results

Sub-Matrix: **VEGETATION**
 (Matrix: **BIOTA**)

Client sample ID

				E. Moluccana Site 5	Grasses Site 11	E. Amplifolia Site 13	C. Maculata Site 13	C. Maculata Site 15
Client sampling date / time				14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00	14-Dec-2017 00:00
Compound	CAS Number	LOR	Unit	EN1705136-001	EN1705136-002	EN1705136-003	EN1705136-004	EN1705136-005
				Result	Result	Result	Result	Result
EK040V: Fluoride in Vegetation								
Fluoride	16984-48-8	10.0	mg/kg	27.7	<10.0	23.4	10.2	82.1



Analytical Results

Sub-Matrix: VEGETATION (Matrix: BIOTA)				<i>Client sample ID</i>	Vitis vinifera Site 19	----	----	----	----
				<i>Client sampling date / time</i>	14-Dec-2017 00:00	----	----	----	----
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	EN1705136-006	-----	-----	-----	-----	-----
					Result	----	----	----	----
EK040V: Fluoride in Vegetation									
Fluoride	16984-48-8	10.0	mg/kg	<10.0	----	----	----	----	----

CERTIFICATE OF ANALYSIS

Work Order : **EN1802310**
Client : **AECOM Australia Pty Ltd**
Contact : **MR MATTHIEU CATTEAU**
Address : **17 WARABROOK BOULEVARDE**
WARABROOK NSW, AUSTRALIA 2304
Telephone : **+61 02 4911 4900**
Project : **60551495 Task 1.3**
Order number : **60551495, task 1.3**
C-O-C number : **----**
Sampler : **AECOM**
Site : **----**
Quote number : **EN/004/16**
No. of samples received : **6**
No. of samples analysed : **6**

Page : 1 of 4
Laboratory : Environmental Division Newcastle
Contact : Hayley Worthington
Address : 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone : +612 4014 2500
Date Samples Received : 29-Mar-2018 16:36
Date Analysis Commenced : 03-Apr-2018
Issue Date : 09-Apr-2018 16:22



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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.



Analytical Results

Sub-Matrix: **VEGETATION**
 (Matrix: **BIOTA**)

Client sample ID

				E. Moluccana Site 5	Grasses Site 11	E. Amplifolia Site 13	C. Maculata Site 13	C. Maculata Site 15
Client sampling date / time				29-Mar-2018 00:00	29-Mar-2018 00:00	29-Mar-2018 00:00	29-Mar-2018 00:00	29-Mar-2018 00:00
Compound	CAS Number	LOR	Unit	EN1802310-001	EN1802310-002	EN1802310-003	EN1802310-004	EN1802310-005
				Result	Result	Result	Result	Result
EK040V: Fluoride in Vegetation								
Fluoride	16984-48-8	10.0	mg/kg	38.3	16.6	78.0	14.8	63.6



Analytical Results

Sub-Matrix: VEGETATION (Matrix: BIOTA)				<i>Client sample ID</i>	Vitis vinifera Site 19	----	----	----	----
				<i>Client sampling date / time</i>	29-Mar-2018 00:00	----	----	----	----
<i>Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	EN1802310-006	-----	-----	-----	-----	
					Result	----	----	----	----
EK040V: Fluoride in Vegetation									
Fluoride	16984-48-8	10.0	mg/kg	12.2	----	----	----	----	

CERTIFICATE OF ANALYSIS

Work Order : **EN1803933**
Client : **AECOM Australia Pty Ltd**
Contact : **MR MATTHIEU CATTEAU**
Address : **17 WARABROOK BOULEVARDE**
WARABROOK NSW, AUSTRALIA 2304
Telephone : **+61 02 4911 4900**
Project : **60551495**
Order number : **60551495, task 1.3**
C-O-C number : **----**
Sampler : **Aecom**
Site : **----**
Quote number : **EN/004/16**
No. of samples received : **5**
No. of samples analysed : **5**

Page : 1 of 2
Laboratory : Environmental Division Newcastle
Contact : Hayley Worthington
Address : 5/585 Maitland Road Mayfield West NSW Australia 2304
Telephone : +612 4014 2500
Date Samples Received : 29-Jun-2018 15:04
Date Analysis Commenced : 02-Jul-2018
Issue Date : 05-Jul-2018 16:44



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This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Merrin Avery	Supervisor - Inorganic	Newcastle - Inorganics, Mayfield West, NSW



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting
 ø = ALS is not NATA accredited for these tests.
 ~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **VEGETATION**
 (Matrix: **BIOTA**)

Client sample ID

				E. Moluccana Site 5	Grasses Site 11	E. Amplifolia Site 13	C. Maculata Site 13	C. Maculata Site 15
Client sampling date / time				29-Jun-2018 00:00	29-Jun-2018 00:00	29-Jun-2018 00:00	29-Jun-2018 00:00	29-Jun-2018 00:00
Compound	CAS Number	LOR	Unit	EN1803933-001	EN1803933-002	EN1803933-003	EN1803933-004	EN1803933-005
				Result	Result	Result	Result	Result
EK040V: Fluoride in Vegetation								
Fluoride	16984-48-8	10.0	mg/kg	39.7	<10.0	69.0	<10.0	57.6

Appendix B

Meteorological Monitoring - Wind Roses

Appendix B Meteorological Monitoring - Wind Roses

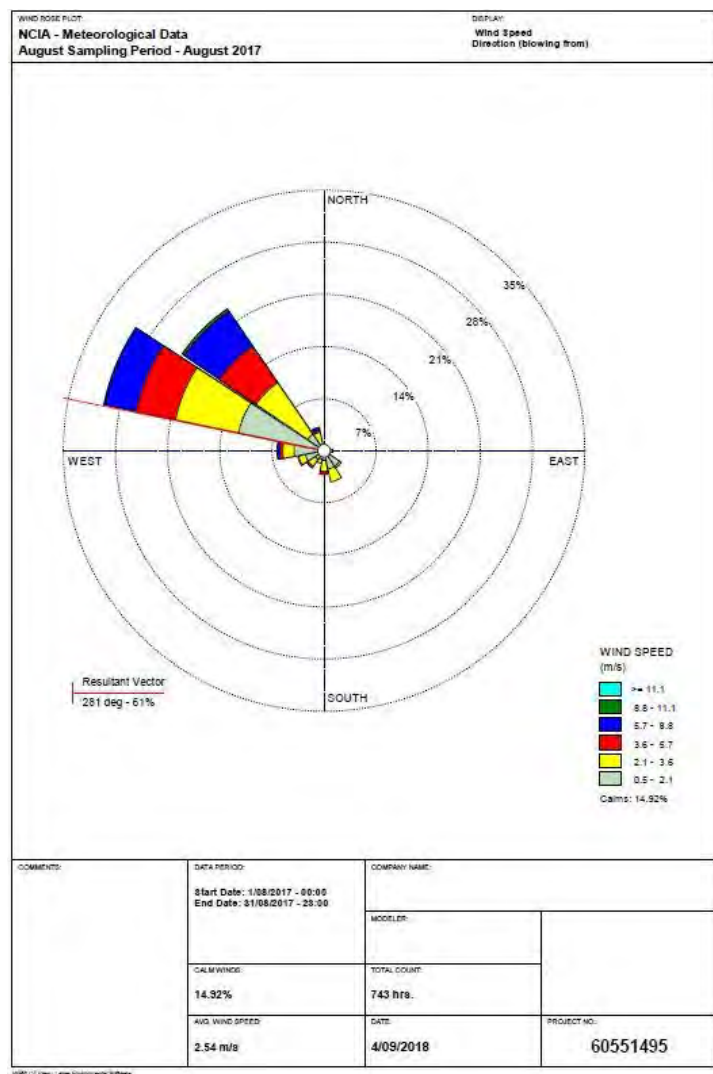


Figure B 1 Wind Speed and Direction (August 2017)

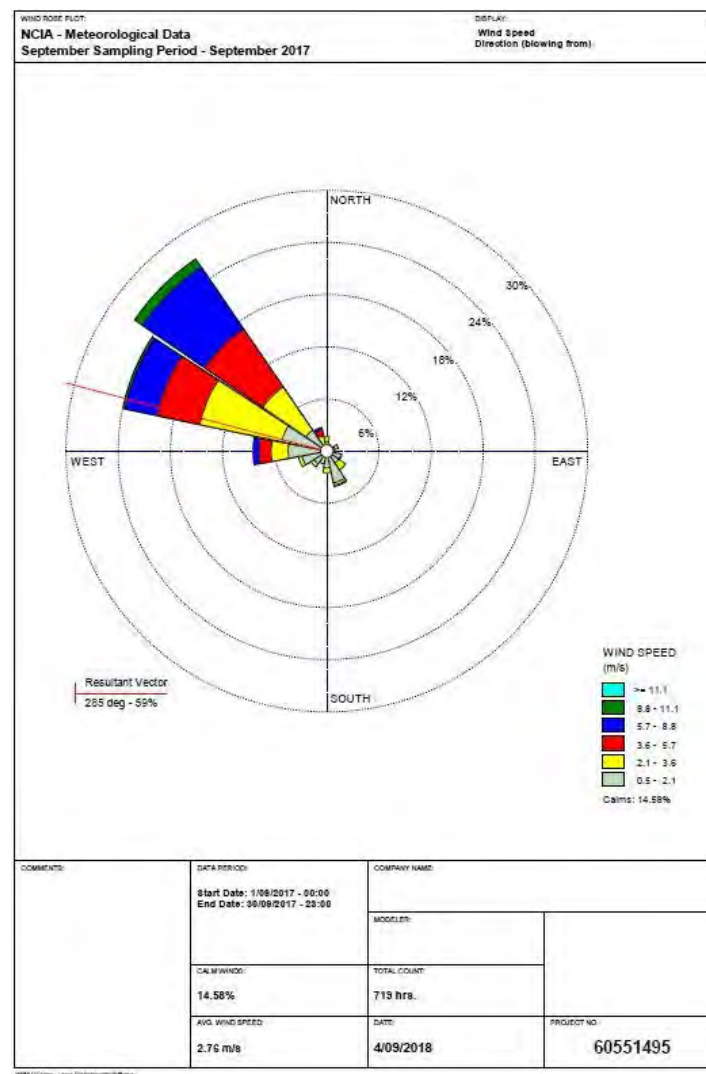


Figure B 2 Wind Speed and Direction (September 2017)

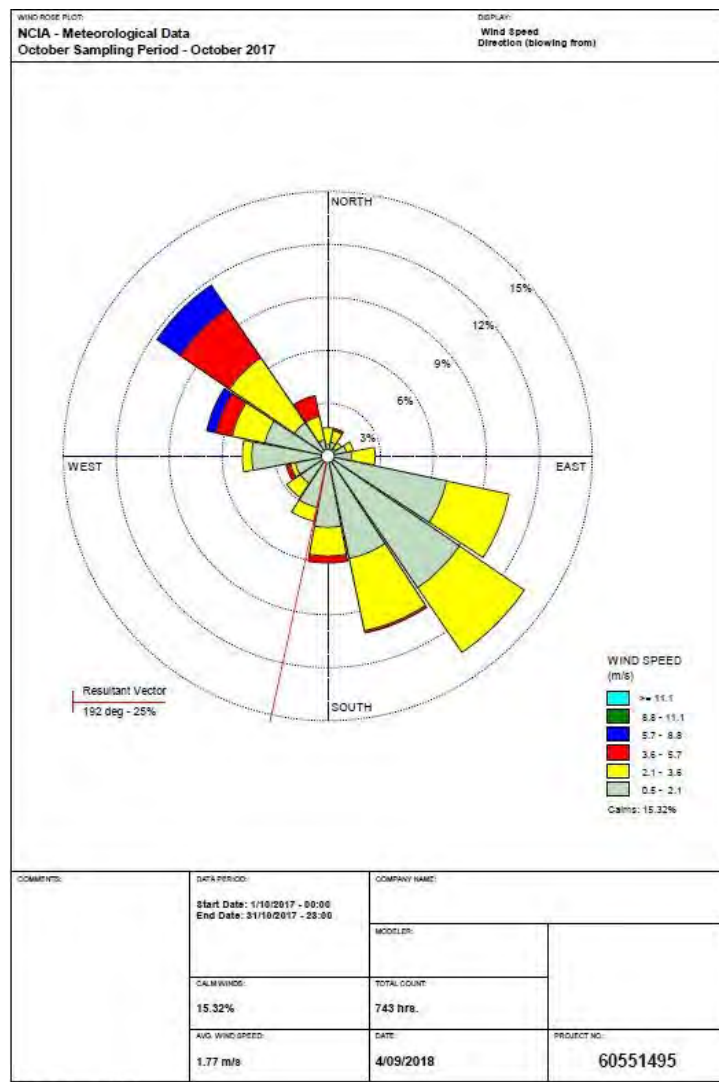


Figure B 3 Wind Speed and Direction (October 2017)



Figure B 4 Wind Speed and Direction (November 2017)

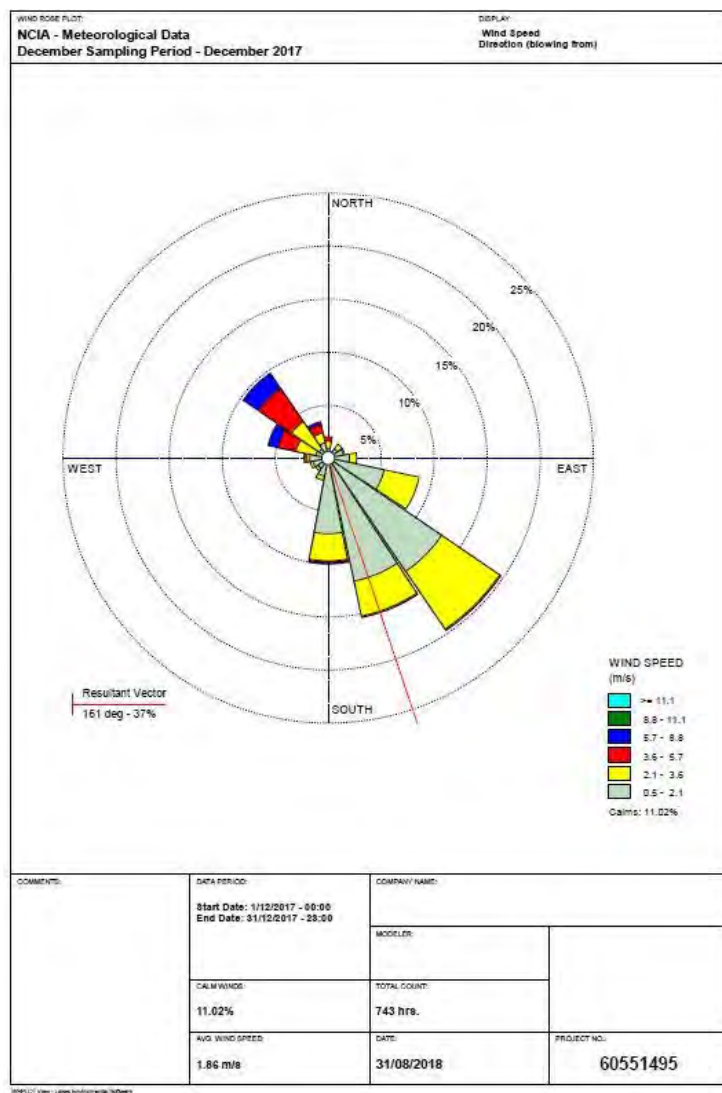


Figure B 5 Wind Speed and Direction (December 2017)

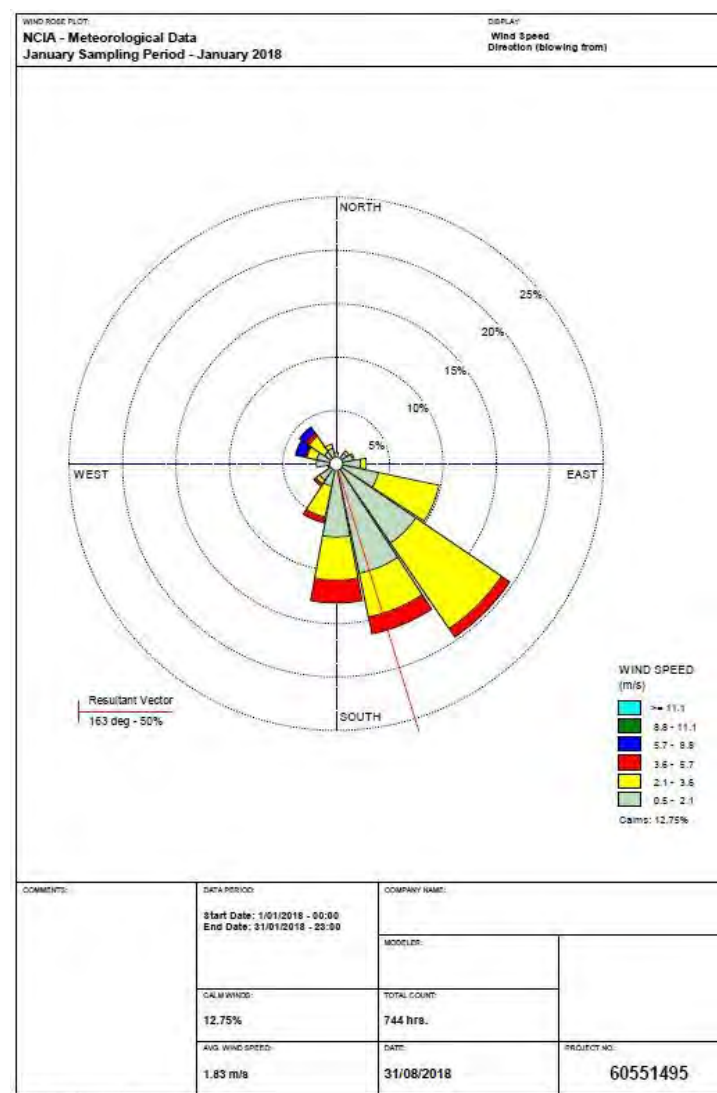


Figure B 6 Wind Speed and Direction (January 2018)

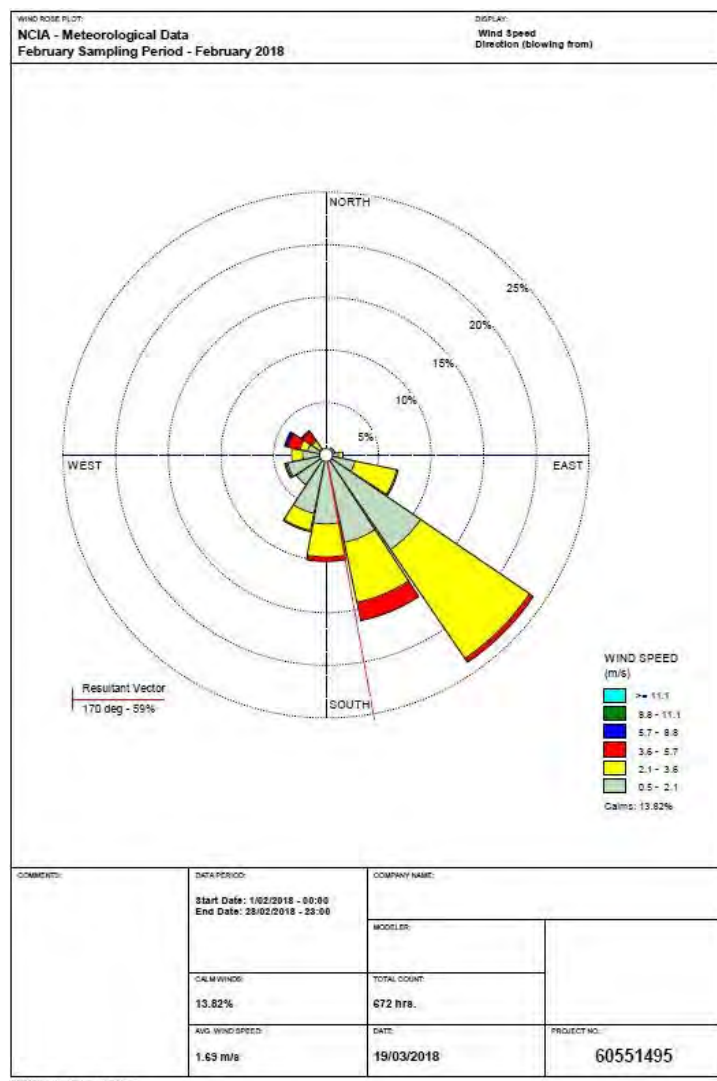


Figure B 7 Wind Speed and Direction (February 2018)

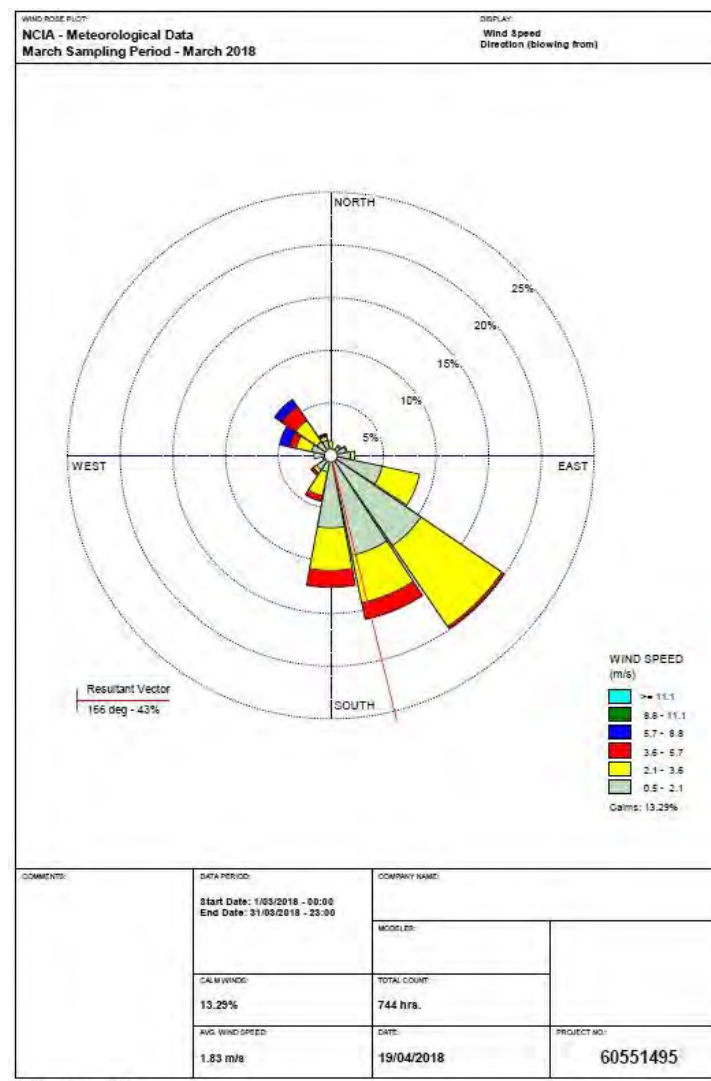


Figure B 8 Wind Speed and Direction (16 March to 31 March 2018)

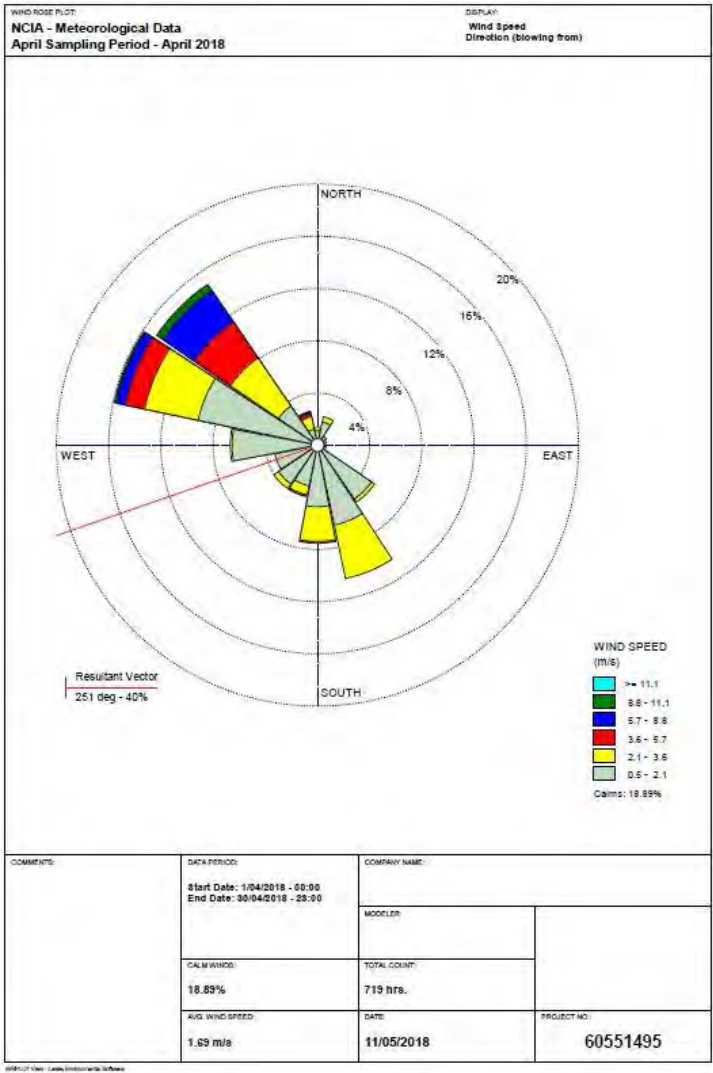


Figure B 9 Wind Speed and Direction (April 2018)

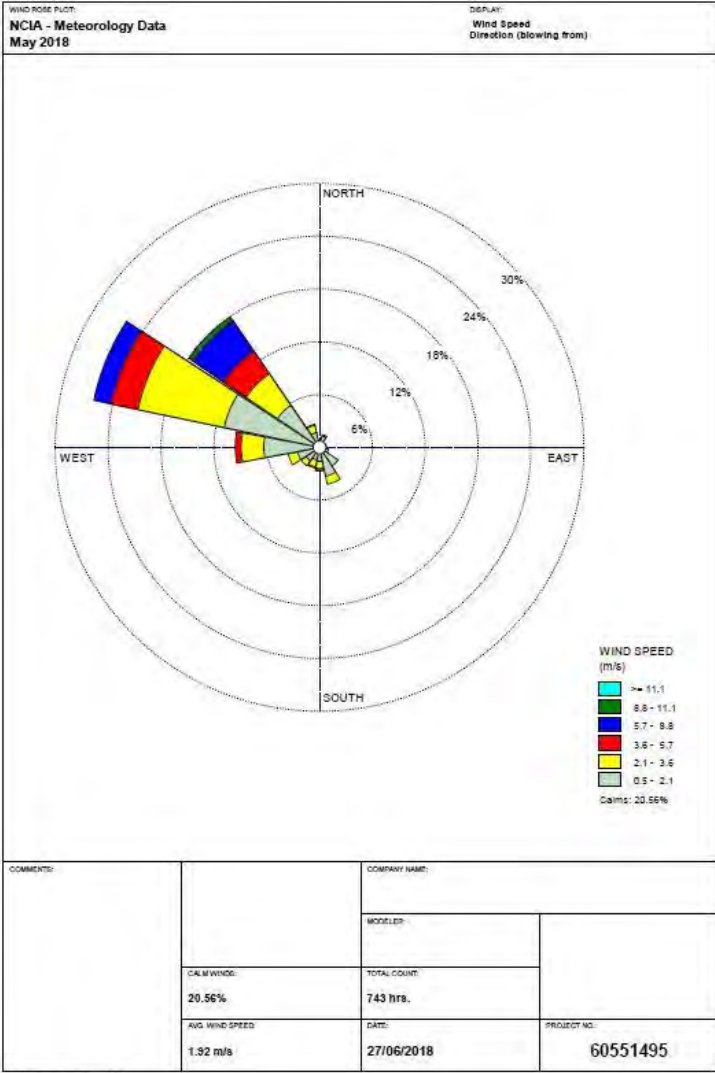


Figure B 10 Wind Speed and Direction (May 2018)

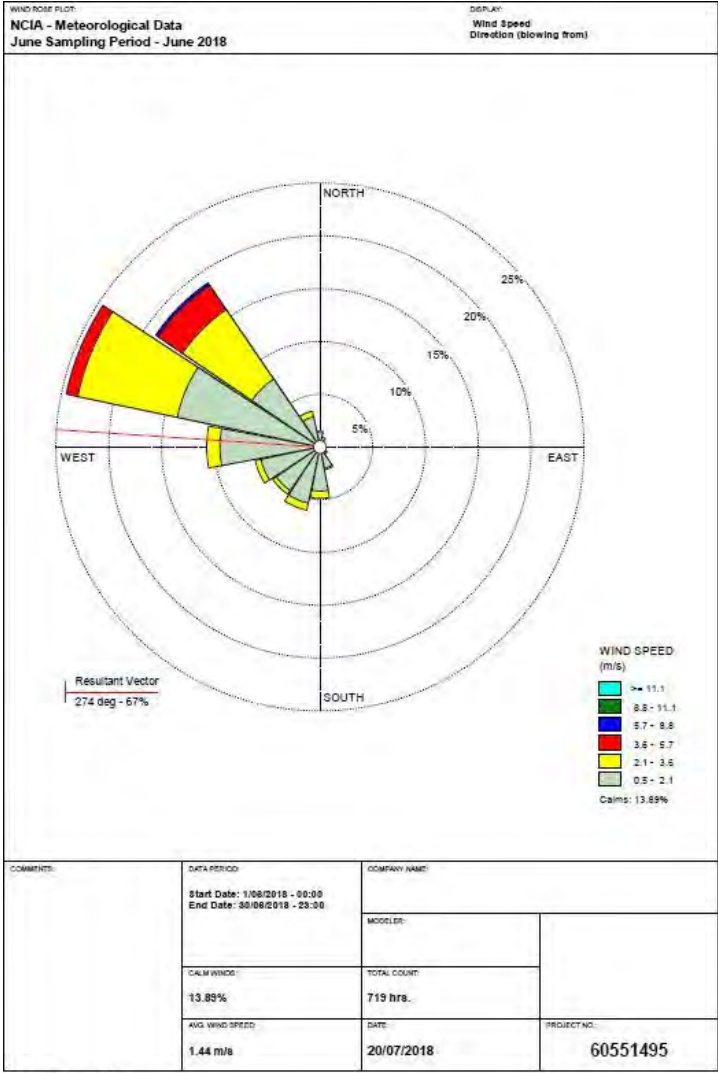


Figure B 11 Wind Speed and Direction (June 2018)

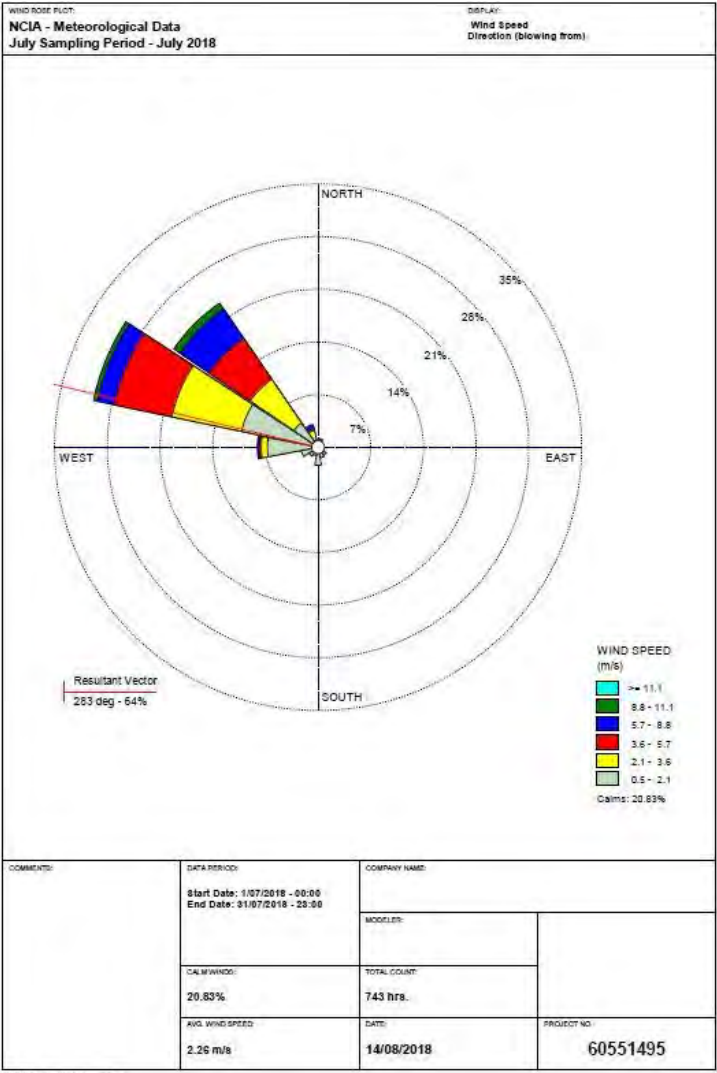


Figure B 12 Wind Speed and Direction (July 2018)

Appendix C

Incident Notification

Appendix C Incident Notification

28 June 2018

Matthew Corradin
Senior Operations Officer
Environment Protection Authority

Dear Matthew

National Ceramic Industries Australia: Show Cause Response: Alleged breaches of the Protection of the Environment Operations Act 1997

Thank you for providing National Ceramic Industries Australia (NCIA) with the opportunity to provide a response to the Show Cause letter received via email on 8 June 2018. The EPA's letter identifies three matters that require a response, these are:

1. The EPA is of the opinion that NCIA has allegedly breached Section 66(6) of the POEO Act for not publishing monitoring data on its website, as well as potentially breaching Section 66(4) for providing potential false and/or misleading information in the Annual Return, when indicating in the 2016-2017 Annual Return that monitoring data was published online as required.
2. NCIA has indicated that it has not complied with condition L2.1 of the licence by exceeding the Fluoride load limit of 1850kg by 561kg at EPA Point 15. The EPA is of the opinion that NCIA has allegedly breached Section 64(1) of the POEO Act which states:
If any condition of a licence is contravened by any person, each holder of the licence is guilty of an offence.
3. NCIA has indicated that it has not complied with condition L3.1/L3.4 of the licence by exceeding the Hydrogen Fluoride concentration limit of 5 mg/m³ by 4.7mg/m³ at EPA Point 15. The EPA is of the opinion that NCIA has allegedly breached Section 64(1) of the POEO Act.

The following sections of this response letter respond to the three matters raised by the EPA (see Attachment A).

1.0 Publishing monitoring data

NCIA is aware of its obligations to publish elements of its monitoring data on its website. Ambient Hydrogen Fluoride and Particulate (PM¹⁰) monitoring data collected as a requirement of EPL 11956 is not required to be published due to section 3.3.1 of the guidance document *Requirements for publishing pollution monitoring data* (EPA, 2013), which states:

Data clearly noted as 'ambient' in a licence condition requires the level of pollution to be measured at points that receive pollutants from multiple sources, for example, water bodies and air sheds that receive pollutants from licensed premises and other surrounding land uses. It is difficult to provide meaningful context around this data for the community (i.e. what proportion of the air impacts come from the licensed premise). For this reason, ambient data is not required to be published (see section 5). However, in recognition that there are community members that will be interested in this data, licensees are still required to provide this data if they receive a written request for it.

NCIA has been willing to provide the ambient monitoring data upon receiving a written request, however a written request for the data has never been received.

NCIA acknowledges its obligation to publish the monitoring data obtained through the annual stack emissions monitoring program required by EPL 11956. NCIA has published the Emission testing reports for the 3 EPL periods from 2012 to 2015, and the Annual Environmental Management Reports for the 4 years from 2012 to 2015.

A change in webhosting service providers, and NCIA's administrative personnel and associated responsibilities has resulted in an unfortunate outcome of the Emission testing reports and the Annual Environmental Management Reports for the past 2 years not being published on NCIA's website.

NCIA thanks the EPA for bringing this regrettable oversight in NCIA's monitoring data publishing obligations to its attention. NCIA commits to rectifying this lack of recent data publishing on its website by ensuring the missing reports will be published by 1 July 2018.

With respect to the allegation that NCIA has provided potential false and/or misleading information in the Annual Return, when indicating that monitoring data was published online as required. NCIA confirms awareness of these obligations at the time of preparing the Annual Return, though unfortunately the internal administrative processes and procedures failed to publish the required data. NCIA regrets that these administrative processes did not achieve the necessary outcomes. NCIA commits to ensuring the required monitoring data is uploaded to its website in a timely manner in the future and the missing monitoring data is uploaded by 1 July 2018.

The non-publishing of data was an oversight and controls have been implemented to ensure this is better managed and reviewed.

2.0 Compliance with condition L2.1 EPL 11956 - exceeding the Fluoride load limit of 1850kg by 561kg

NCIA acknowledges the exceedance of the Fluoride load limit, as was duly reported in the Annual Return to the NSW EPA and Annual Environmental Management Report to the Department of Planning and Environment (DP&E) for the corresponding reporting period. Discussion on the measures and actions NCIA has undertaken, and is currently undertaking, is presented in Section 3.0 as the load limit is directly related to the concentration limit.

NCIA was committed to providing a clear, concise and scientifically robust response to each of the four key areas highlighted by the EPA in its previous letter dated 16 December 2016. In this regard we would like to inform the EPA that since the submission of the EPL variation, NCIA continues to investigate sourcing materials with low fluoride content and continues to receive expert analysis (Technopiemonte in Italy) and opinion on the trace chemicals found in each material. A copy of chemical analysis and also specific trace testing for Fluoride is included as Attachment B. NCIA are committed to making the best possible tiles for the Australian market and ensuring compliance with regulations.

Over the past 12-18 months NCIA have investigated a wide range of potential new materials. At the same time NCIA have trialled continuous monitoring devices on the kiln emission points.

Not long after meeting with the EPA the Australian Industry was hit with an energy crisis. Projected gas and electricity pricing could have meant NCIA would cease production. NCIA's priorities were focused on keeping the facility open and discussions around the EPL variation were put on hold. NCIA are in the process of establishing a 1MW roof mounted solar system and installed a new press and a heat transfer system to reduce gas consumption. NCIA have also had initial discussions with the Department of Planning and Environment in regards to crushing not to specification tiles on site for reuse in the manufacturing process.

Noting this, NCIA would like to request a temporary pause in the processing of the submitted EPL Variation. Once NCIA establish a long term body formulation and finalise the projects above, NCIA commits to revisiting its EPL variation request and providing a detailed response to the EPA. This will allow the benefits and impacts of the new source material to be considered and incorporated into any EPL amendments as appropriate.

3.0 Compliance with condition L3.1/L3.4 of EPL 11956 - exceeding the Hydrogen Fluoride concentration limit of 5 mg/m³ by 4.7mg/m³

NCIA acknowledges the exceedance of the Fluoride load limit, as was duly reported in the Annual Return to the NSW EPA and Annual Environmental Management Report to the Department of Planning and Environment (DP&E) for the corresponding reporting period. Additionally, upon identifying the exceedance of the prescribed Hydrogen Fluoride concentration limit, NCIA notified the DP&E compliance team of the exceedance (see Attachment C).

In light of the Fluoride load and concentration limit exceedances NCIA has undertaken a range of actions to better understand and control the Fluoride emissions from its manufacturing plant.

Understanding the raw material inputs to the manufacturing process will enable NCIA to understand its emission outputs. NCIA continues to research and test extensively to improve its raw material usage

and emissions. Particular attention is given to fluoride and sulphur content when investigating new materials. An onsite laboratory has been established and is used for testing of inputs and outputs. NCIA have implemented daily testing of raw materials and finished product and in the future are looking to correlate this with the management of real time environmental monitoring information.

NCIA successfully trialled continuous fluoride monitors during the reporting period and were able to reconcile results obtained to the stack testing performed. NCIA is currently sourcing devices to install permanently on the kiln emission systems. It is anticipated that the decision on which equipment to install will be made in the second half of 2018.

As indicated in Attachment B NCIA was able to correlate a total fluoride result of 1.28 mg/m³ on one of the kilns during 2016-17 stack testing with continuous monitoring in the Kiln. The delay in implementing the continuous monitoring is sourcing the right equipment at the right price. The monitoring units are rather sensitive and they need to be positioned in an area in the kiln that does not vibrate.

NCIA is planning the refurbishment of the baghouse associated with Kiln 1. This will include new duct work and refurbishment of the baghouse unit. This project represents a significant investment of several million dollars and demonstrates NCIA's commitment to achieving stable and repeatable compliance monitoring outcomes.

For context, Attachment D shows NCIA's ambient monitoring results summary for May 2018. The monitoring results demonstrate measured fluoride at both the North East and South West monitoring locations are well below the regulatory criteria.

4.0 Closure

NCIA welcomes the opportunity to meet with the EPA to discuss this response to the EPA Show Cause letter. NCIA hopes that the responses in this letter satisfy the EPA that NCIA takes its environmental compliance obligations seriously and strives to operate its facility in accordance with EPL11956 and Project Approval 09_006.

Yours sincerely



James McIntyre
Associate Director - Environment
M +61 407 456 232
James.McIntyre@aecom.com

Attachment A: Show cause letter

Show Cause Letter

Licence - 11956



NATIONAL CERAMIC INDUSTRIES AUSTRALIA PTY LTD
ABN 83 100 467 267
PO BOX 765
MAITLAND NSW 2320

Our Reference 1565830
File Number EF13/3354
Date 08-Jun-2018

Dear Mr Schneider

Invitation to Show Cause
Alleged breaches of the
Protection of the Environment Operations Act 1997

I refer to the 2016-2017 Annual Return (AR) for environment protection licence 11956 (the licence) for the National Ceramic Industries Australia Pty Ltd (NCIA) Racecourse Road, Rutherford Facility (the Premises) received by the Environment Protection Authority (EPA) on 18 October 2016.

In reviewing the details of the AR, and also historical issues, the EPA has the following comments to make:

1. NCIA has indicated in the AR that monitoring data was published online as required. Section 66(6) of the *Protection of the Environment Operations Act 1997* (the POEO Act) states the following:

The holder of a licence subject to a condition referred to in subsection (1) (a) must, within 14 days of obtaining monitoring data as referred to in that subsection:

(a) if the holder maintains a website that relates to the business or activity the subject of the licence—make any of the monitoring data that relates to pollution, and the licensee's name, publicly and prominently available on that website in accordance with any requirements issued in writing by the EPA, or

(b) if the holder does not maintain such a website—provide a copy of any of the monitoring data that relates to pollution, to any person who requests a copy of the data, at no charge and in accordance with any requirements issued in writing by the EPA.

Review of NCIA's website shows that NCIA has not published at least the last two years of monitoring data on that website despite being issued with an Official Caution on 01 June 2016 for this exact matter.

The EPA is of the opinion that NCIA has allegedly breached Section 66(6) of the POEO Act as well as potentially breaching Section 66(4) for providing potential false and/or misleading information in the AR.

Show Cause Letter

Licence - 11956



These alleged offences carry an on-the-spot fine of \$1,000 and \$4,000 respectively, up to a maximum penalty of \$4,400 and \$250,000 respectively if the matter were to proceed to Court.

2. NCIA has indicated that it has not complied with condition L2.1 of the licence by exceeding the Fluoride load limit of 1850kg's by 561kg's at EPA Point 15.

This is not the first time that there has been an exceedance of the load limit with a much larger exceedance occurring in the previous reporting period (2296kg's exceedance). While some action has been taken to try and address this issue with a proposed variation to the licence, this has never been finalised following the EPA's letter dated 16 December 2016 requesting further information and assessment.

The EPA is of the opinion that NCIA has allegedly breached Section 64(1) of the POEO Act which states:

If any condition of a licence is contravened by any person, each holder of the licence is guilty of an offence.

This alleged offence carry an on-the-spot fine of \$15,000 up to a maximum penalty of \$1,000,000 if the matter were to proceed to Court.

3. NCIA has indicated that is has not complied with condition L3.1/L3.4 of the licence by exceeding the Hydrogen Fluoride concentration limit of 5 mg/m³ by 4.7mg/m³ at EPA Point 15.

As again, this is an ongoing issue of concern and is an alleged breach of Section 64(1) of the POEO Act.

This alleged offence carry an on-the-spot fine of \$15,000 up to a maximum penalty of \$1,000,000 if the matter were to proceed to Court.

The EPA takes any alleged breach of environmental legislation seriously.

INVITATION TO SHOW CAUSE

The purpose of this letter is to invite NICA to explain, in writing, why the EPA should not take regulatory action in response to the alleged breaches identified above. The response should provide any information, fact, or circumstance that you would like the EPA to consider when deciding whether to take further action in relation to the alleged offences and should include short term and long term options taken, to be taken or being considered by NCIA, with associated timeframes, to improve the performance of Premises discharges to ensure statutory compliance.

Any submissions you wish to make must be provided to Director Hunter Region, PO Box 488G NEWCASTLE NSW 2300 or by email to hunter.region@epa.nsw.gov.au (copy matt.corradin@epa.nsw.gov.au) and be received by no later than 5pm on 29 June 2018 for them to be taken into consideration.

Further information on the EPA's approach to compliance and enforcement can be found in the EPA's Compliance Policy at <http://www.epa.nsw.gov.au/legislation/130251epacompl.htm>

Show Cause Letter

Licence - 11956



If you have any questions about this matter, please contact me on (02) 4908 6830.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Matthew Corradin'.

MATTHEW CORRADIN
Senior Operations Officer
Environment Protection Authority

Attachment B: Recent raw material content analysis

	NCIA Mark Clay 09 03 2018 %	NCIA Axedale 09 03 2018 %	NCIA Ulan 09 03 2018 %	NCIA Cetyh 09 03 2018 %	NCIA Spray Dry 09 03 2018 %	NCIA Oberon 09 03 2018 %	NCIA Hytec 09 03 2018 %	NCIA Gun 09 03 2018 %
SiO ₂	77,0	60,2	75,9	52,0	71,7	74,1	72,5	74,0
Al ₂ O ₃	14,1	24,6	14,7	30,4	16,2	14,5	14,7	13,7
Fe ₂ O ₃	0,54	1,12	1,76	2,70	1,29	1,17	2,73	1,51
TiO ₂	0,16	1,56	0,21	1,32	0,64	0,17	0,33	0,29
CaO	0,04	0,06	0,14	0,05	0,25	0,24	0,27	0,29
MgO	0,03	1,14	0,39	0,23	0,48	0,17	0,25	0,20
Na ₂ O	0,86	0,26	0,10	0,10	1,84	3,12	2,42	3,65
K ₂ O	3,95	3,27	1,58	2,51	3,63	4,53	4,94	4,38
L.o.I.	2,61	7,39	4,98	9,93	3,92	1,61	1,53	1,43

F CONTENT EVALUATION

	%	g x Ton
Mark clay	0,00415	42
Axedale	0,01166	117
Ulan	0,03639	364
Spry dry	0,03907	391
Cetyh	0,01353	135
Gun	0,01059	106
Oberon	0,00981	98
Hytec	0,00712	74
Sh4 total (body+glaze)	0,01227	123
Sh5 total (body+glaze)	0,00857	86
Sh4 body only	0,01185	118
Sh5 body only	0,00827	83

Attachment C: Notification of fluoride exceedance

McIntyre, James

From: Chris Schneider <cschneider@ncia.com.au>
Sent: Friday, 15 June 2018 2:23 PM
To: McIntyre, James
Subject: FW: notification of exceedance

Follow Up Flag: Flag for follow up
Flag Status: Flagged

From: Leah Cook <Leah.Cook@planning.nsw.gov.au>
Sent: Tuesday, 8 August 2017 12:52 PM
To: Chris Schneider <cschneider@ncia.com.au>
Cc: DPE PSVC Compliance Mailbox <compliance@planning.nsw.gov.au>; Ann Hagerthy <Ann.Hagerthy@planning.nsw.gov.au>
Subject: RE: notification of exceedance

Hi Chris

Thanks for notifying us of this exceedance, as required by the approval.

We will review and be in touch should we require further information.

Regards,

Leah Cook

Team Leader - Compliance
Department of Planning & Environment
Suite 14, Level 1, 1 Civic Av
PO Box 3145
Singleton NSW 2330
<http://www.planning.nsw.gov.au>
E: leah.cook@planning.nsw.gov.au
compliance@planning.nsw.gov.au
P: 02 6575 3403 M: 0429 191 164 F: 02 65753415



Please consider the environment before deciding to print this e-mail

From: Chris Schneider [<mailto:cschneider@ncia.com.au>]
Sent: Tuesday, 8 August 2017 12:34 PM
To: Leah Cook <Leah.Cook@planning.nsw.gov.au>
Subject: notification of exceedance

Hi Leah,

We have concluded our annual emission testing and the team at AECOM have notified me of an exceedance for total fluoride from one of our Kilns. The testing was completed on 25/7 and I was notified yesterday after AECOM received the information back from the Lab.

The result of the testing was 9.7mg/m³ against our limit of 5 mg/m³

Production was running as normal and the other Kiln being fed the same input material returned a total fluoride of 1.28 mg/m³. The heat curves in the kilns and extraction is very similar so we are working through some reasons.

We have been working with continuous fluoride monitors and on the day of the testing had the monitor installed on kiln 2 – which corroborated the result of 1.28mg/m³ which we were very pleased with. Given the infeed material the emissions from both our kilns should be very similar.

We will look to install continuous monitoring devices permanently on both kilns in the coming months as we find it much more informative then the current testing regime.

I have not received the ambient monitoring for July but am not expecting any exceedances. I am informed by AECOM that all our other emission testing (mainly particulates) all passed.

The above information will be included in our annual reporting but if there is anything further you would like prior to this please let me know.

Regards,

Chris

EMISSION MONITORING RESULTS, KILN 1			
NCIA			
25-Jul-17			
PARTICULATE FLUORIDE			
GASEOUS FLUORIDE			
Sampling Conditions:			
Stack internal diameter at test location	980 mm		
Stack gas temperature (average)	205.8 °C	479.0 K	
Stack pressure (average)	1010 hPa		
Stack gas velocity (average, stack conditions)	19 m/s		
Stack gas flowrate (stack conditions)	14 m ³ /s		
Stack gas flowrate (0°C, dry gas, 1 atm pressure)	7.7 m ³ /s		
Particulate Fluoride Testing			
Test Period	11:08	-	12:29
Particulate Fluoride Mass	0.846 mg		
Gas Volume Sampled	0.789 m ³		
Particulate Fluoride Emission*1	1.1 mg/m ³		
Particulate Fluoride Mass Emission Rate*2	8.4 mg/s		
Regulatory Limit	** mg/m ³		
Gaseous Fluoride Testing			
Test Period	11:08	-	12:29
Gaseous Fluoride Mass	6.79 mg		
Gas Volume Sampled	0.789 m ³		
Gaseous Fluoride Emission*1	8.6 mg/m ³		
Gaseous Fluoride Mass Emission Rate*2	66 mg/s		
Regulatory Limit	** mg/m ³		
Moisture Content (%)	5.1		
Gas Density (dry at 1 atmosphere)	1.29 kg/m ³		
Dry Molecular Weight	29 g/g-mole		
Notes: *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas			
*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q _{gas} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.			
** A limit of 5 mg/m ³ applies to the Total Fluoride concentration.			

Attachment D: May 2018 ambient monitoring results

National Ceramic Industries Australia Pty Ltd

EPL Number: 11956 <http://www.environment.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=30714&SYSUID=1&LICID=11956>

Address: 175 Racecourse Road, Rutherford, NSW 2320

PO BOX 765, Maitland, 2330

North West Monitoring Location

GPS Coordinates: 359 680 mE, 6 379 476 mN

Monitoring Period: 26-Apr-18 31-May-18

Lab Results Published: 8-Jun-18

Date Published: 27-Jun-18

Pollutant	Unit of Measure	Monitoring frequency required by licence	Number of times measured during month	Min. Value	Mean value	Median Value	Max. Value	Regulatory criteria
PM ₁₀	Micrograms per m ³	continuously for 24 hours on a six day cycle	6	11.0	26.4	29.3	34.4	50 ¹
Hydrogen Fluoride	Micrograms per m ³	continuously (7 day periods)	5	0.09	0.26	0.26	0.54	1.7 ²
Hydrogen Fluoride	Micrograms per m ³	continuously for 24 hours on a six day cycle	6	0.10	0.21	0.21	0.31	2.9 ²

¹ Project Approval 09_0006 Table 2

² Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales NSW EPA (2016).

National Ceramic Industries Australia Pty Ltd

EPL Number: 11956 <http://www.environment.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=30714&SYSUID=1&LICID=11956>

Address: 175 Racecourse Road, Rutherford, NSW 2320

PO BOX 765, Maitland, 2330

South East Monitoring Location

GPS Coordinates: 359 837 mE, 6 378 806 mN

Monitoring Period: 26-Apr-18 31-May-18

Lab Results Published: 8-Jun-18

Date Published: 27-Jun-18

Pollutant	Unit of Measure	Monitoring frequency required by licence	Number of times measured during month	Min. Value	Mean value	Median Value	Max. Value	Regulatory criteria ¹
PM ₁₀ *	Micrograms per m ³	continuously for 24 hours on a six day cycle	6	9.3	18.2	19.6	24.6	50 ¹
Hydrogen Fluoride	Micrograms per m ³	continuously (7 day periods)	5	0.10	0.27	0.24	0.50	1.7 ²
Hydrogen Fluoride	Micrograms per m ³	continuously for 24 hours on a six day cycle	6	0.10	0.22	0.18	0.38	2.9 ²

¹ Project Approval 09_0006 Table 2

² Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales NSW EPA (2016).

27 June 2018

Chris Schneider
Managing Director
National Ceramic Industries Australia
PO Box 765

Maitland NSW 2320

Dear Chris

Environmental Monitoring for National Ceramic Industries Australia - May 2018

Please find enclosed the documentation for the environmental monitoring carried out for National Ceramic Industries Australia during May 2018. Sampling methodology and adopted assessment criteria are detailed below.

1.0 Sampling Methodology

Sampling was performed by AECOM Australia Pty Ltd (AECOM) and sample analysis was carried out by ALS NATA accredited laboratory. All sampling and analysis was carried out in accordance with Environmental Protection Authority (EPA) approved methods with reference to the following Australian Standards:

- Monitoring of fine suspended particulates (PM₁₀) on the EPA six day cycle in accordance with:
 - AS/NZS 3580.9.6 (2015) *Methods for the Sampling and Analysis of Ambient Air – Determination of Suspended Particulate Matter – PM₁₀ High Volume Sampler with Size Selective Inlet - Gravimetric Method.*
- Monitoring of fluorides in ambient air in accordance with:
 - AS/NZS 3580.13.2 (2013) *Determination of fluorides—Gaseous and acid-soluble particulate fluorides—Manual, double filter paper sampling.*
- Meteorological monitoring in accordance with:
 - AS 3580.1.1 (2007) – *Methods for sampling and analysis of ambient air – Part 1.1 – Guide to siting air monitoring equipment; and*
 - AS 3580.14 (2014) – *Methods for sampling and analysis of ambient air – Part 14: Meteorological monitoring for ambient air quality monitoring.*
- Monitoring of surface water quality in accordance with:
 - AS/NZS 5667.1 (1998) *Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples; and*
 - AS/NZS 5667.4 (1998) *Guidance on sampling from lakes, natural and manmade.*

2.0 Assessment Criteria

Suspended particulate loads are assessed against the impact assessment criteria defined in the Project Approval conditions (09_0006 – National Ceramic Industries Australia Tile Manufacturing Facility Expansion Project, 19 January 2012). The assessment criteria for PM₁₀ (particulate matter with an aerodynamic diameter of less than 10 µm) are:

- 50 µg/m³ over a 24-hour period; and
- 30 µg/m³ as an annual average.

Ambient fluoride concentrations are assessed against the guidelines defined in NSW EPA *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA (2016)). The NSW EPA impact assessment criteria for ambient fluoride are:

- 2.9 µg/m³ over a 24-hour period; and
- 1.7 µg/m³ over a 7-day period.

Surface waters are assessed in accordance with default trigger values for physical and chemical stressors for southeast Australia in the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000). These values are:

- pH in the range of 6.5 - 8.5 (Table 3.3.2 - NSW Lowland River); and
- Electrical conductivity (EC) in the range of 125 – 2200 $\mu\text{S}/\text{cm}$ (Table 3.3.3 - NSW Lowland River).

3.0 Monitoring Results

Monitoring results for the month of May 2018 are presented in the attachments to this letter. Monitoring results for the preceding two months are also presented to demonstrate quarterly trends in results.

All May PM_{10} monitoring results were below the consent 24 hour criterion of $50\mu\text{g}/\text{m}^3$. The PM_{10} rolling annual average concentrations at both the North West and South East sites remain below the Project Approval annual criterion of $30\mu\text{g}/\text{m}^3$. The North West annual average sits at $27.9\mu\text{g}/\text{m}^3$ following the completion of the May monitoring period while the South East average is $20.8\mu\text{g}/\text{m}^3$.

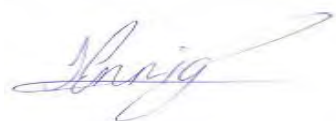
Fluoride results for May remain below the relevant assessment criteria at both the North West and South East monitoring sites with no exceedances of either the 24 hour or 7 day criteria this month.

The adopted ANZECC 2000 guidelines for pH and conductivity are the default trigger values for slightly disturbed aquatic ecosystems in NSW lowland rivers. All Pond 4 pH readings during May were within the ANZECC 2000 pH guideline. All Pond 4 EC readings taken during the May monitoring period were within the ANZECC guidelines. Water temperature was also measured weekly however no guideline is available for assessment. Pond 4 was not observed to be discharging during any of the May site visits.

Monitoring results and plots can be found attached including the wind rose for May. Laboratory certificates, field sheets and calibration data along with relevant meteorology data can be provided on request.

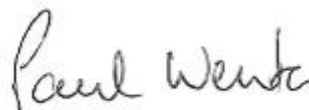
If you require any further information, please contact James McIntyre on 0407 456 232.

Yours faithfully,



James Enright
Scientist – Compliance Services
james.enright@aecom.com

Direct Dial: +T +61 2 4911 4900
Direct Fax: +F +61 2 4911 4999



Paul Wenta
Principal Scientist - Air Quality
paul.wenta@aecom.com

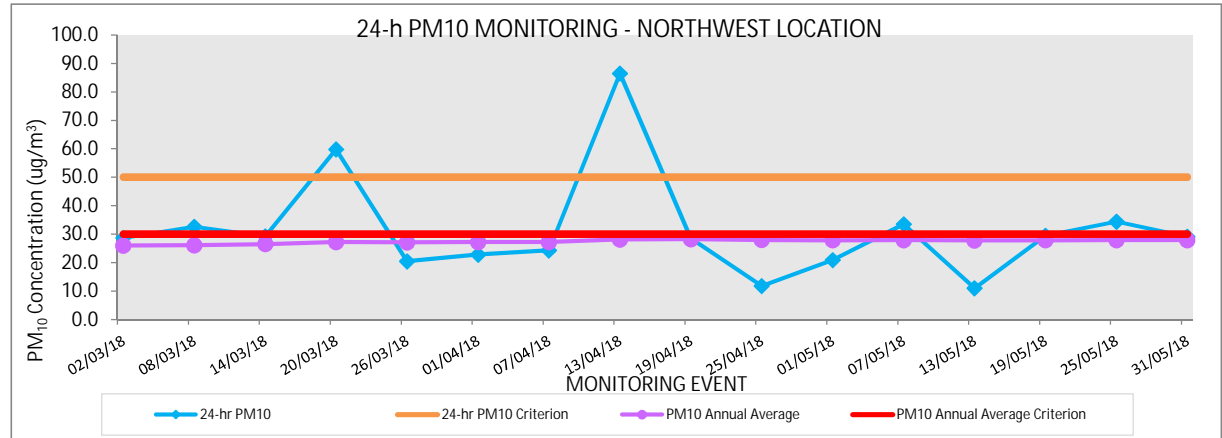
Mobile: +61 438 670 281
Direct Dial: +61 2 4911 4855
Direct Fax: +61 2 4911 4999

encl: Monitoring data tables and charts, wind rose

North West Monitoring Location - 24 hour PM10 Monitoring

North West - 24 hour PM10 Monitoring				
March 2018 to May 2018				
Monitoring Event	24-hr PM ₁₀	24-hr PM ₁₀ Criterion	PM ₁₀ Annual Average	PM ₁₀ Annual Average Criterion
	(µg/m ³)	(µg/m ³)	(µg/m ³)	
2-Mar-18	28.7	50	26.0	30
8-Mar-18	32.6	50	26.1	30
14-Mar-18	29.2	50	26.5	30
20-Mar-18	59.8	50	27.2	30
26-Mar-18	20.4	50	27.1	30
1-Apr-18	22.8	50	27.2	30
7-Apr-18	24.3	50	27.2	30
13-Apr-18	86.5	50	28.1	30
19-Apr-18	28.5	50	28.2	30
25-Apr-18	11.8	50	27.9	30
1-May-18	20.9	50	27.8	30
7-May-18	33.5	50	27.9	30
13-May-18	11.0	50	27.8	30
19-May-18	29.4	50	27.8	30
25-May-18	34.4	50	27.8	30
31-May-18	29.1	50	27.9	30

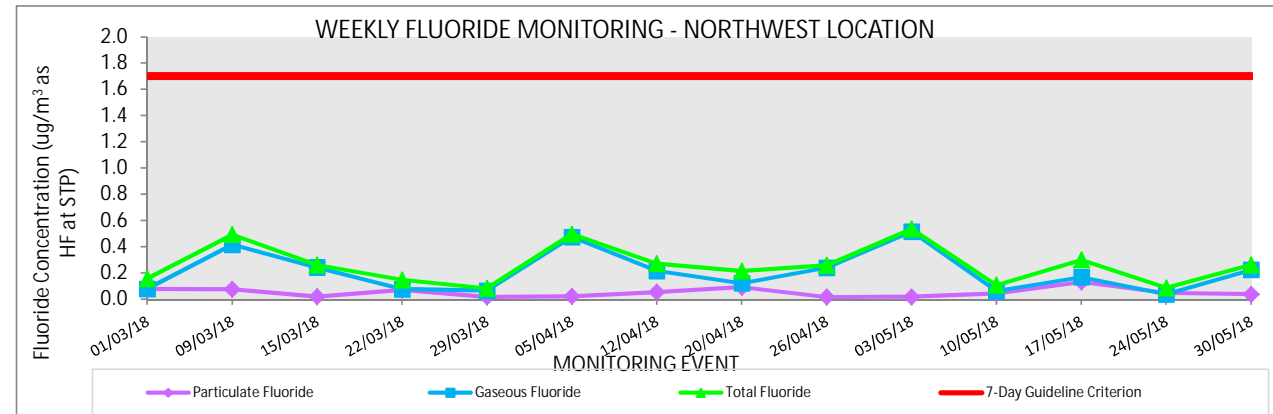
*Bold denotes exceedance



North West Monitoring Location - 7 Day Fluoride Monitoring

North West - 7 Day Fluoride Monitoring
March 2018 to May 2018

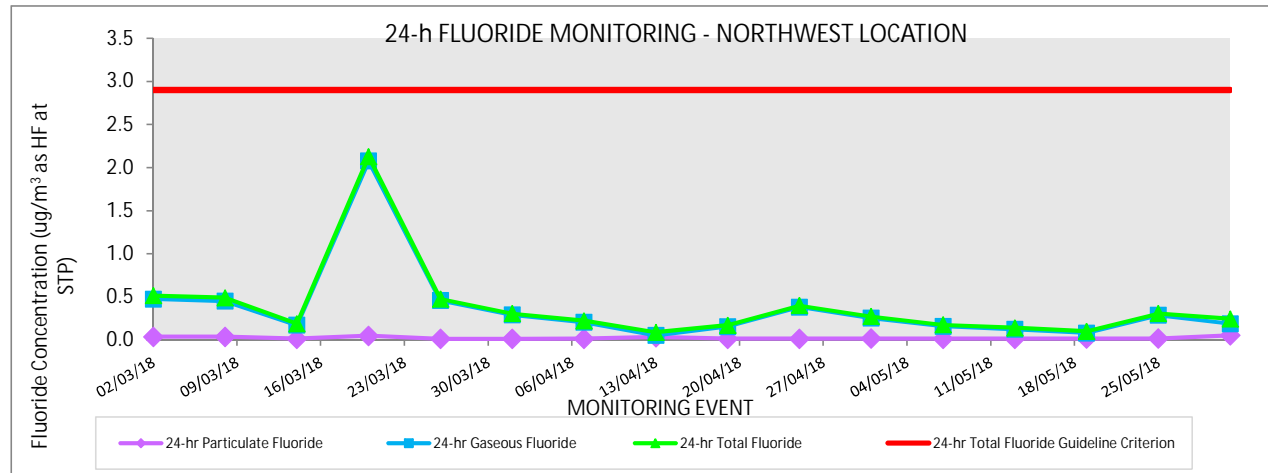
Monitoring Event	Particulate Fluoride	Gaseous Fluoride	Total Fluoride	7-Day Guideline Criterion
	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)
1-Mar-18	0.078	0.080	0.158	1.7
9-Mar-18	0.077	0.417	0.494	1.7
15-Mar-18	0.020	0.242	0.262	1.7
22-Mar-18	0.071	0.078	0.149	1.7
29-Mar-18	0.018	0.066	0.084	1.7
5-Apr-18	0.023	0.475	0.498	1.7
12-Apr-18	0.055	0.217	0.272	1.7
20-Apr-18	0.092	0.123	0.215	1.7
26-Apr-18	0.018	0.241	0.259	1.7
3-May-18	0.019	0.517	0.536	1.7
10-May-18	0.045	0.063	0.108	1.7
17-May-18	0.132	0.169	0.301	1.7
24-May-18	0.050	0.038	0.088	1.7
30-May-18	0.038	0.225	0.263	1.7



North West Monitoring Location - 24 hour Fluoride Monitoring

North West - 24 hour Fluoride Monitoring
March 2018 to May 2018

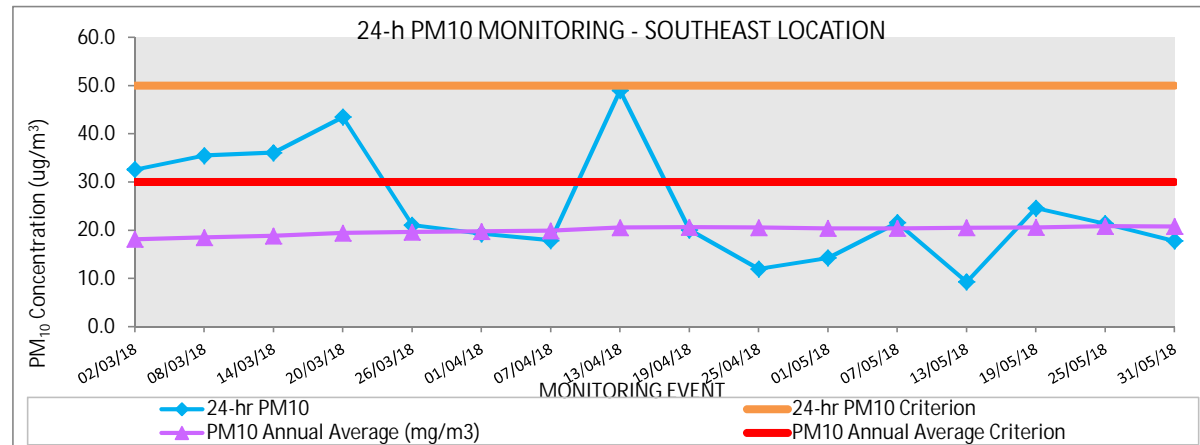
Monitoring Event	24-hr Particulate Fluoride	24-hr Gaseous Fluoride	24-hr Total Fluoride	24-hr Total Fluoride Guideline Criterion
	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)
2-Mar-18	0.039	0.476	0.515	2.9
8-Mar-18	0.038	0.453	0.491	2.9
14-Mar-18	0.016	0.175	0.191	2.9
20-Mar-18	0.050	2.079	2.129	2.9
26-Mar-18	0.015	0.461	0.476	2.9
1-Apr-18	0.015	0.293	0.308	2.9
7-Apr-18	0.016	0.208	0.224	2.9
13-Apr-18	0.035	0.056	0.091	2.9
19-Apr-18	0.016	0.157	0.173	2.9
25-Apr-18	0.016	0.384	0.400	2.9
1-May-18	0.018	0.256	0.274	2.9
7-May-18	0.016	0.162	0.178	2.9
13-May-18	0.016	0.127	0.143	2.9
19-May-18	0.018	0.084	0.102	2.9
25-May-18	0.019	0.289	0.308	2.9
31-May-18	0.055	0.192	0.247	2.9



South East Monitoring Location - 24 hour PM10 Monitoring

South East - 24 hour PM10 Monitoring
March 2018 to May 2018

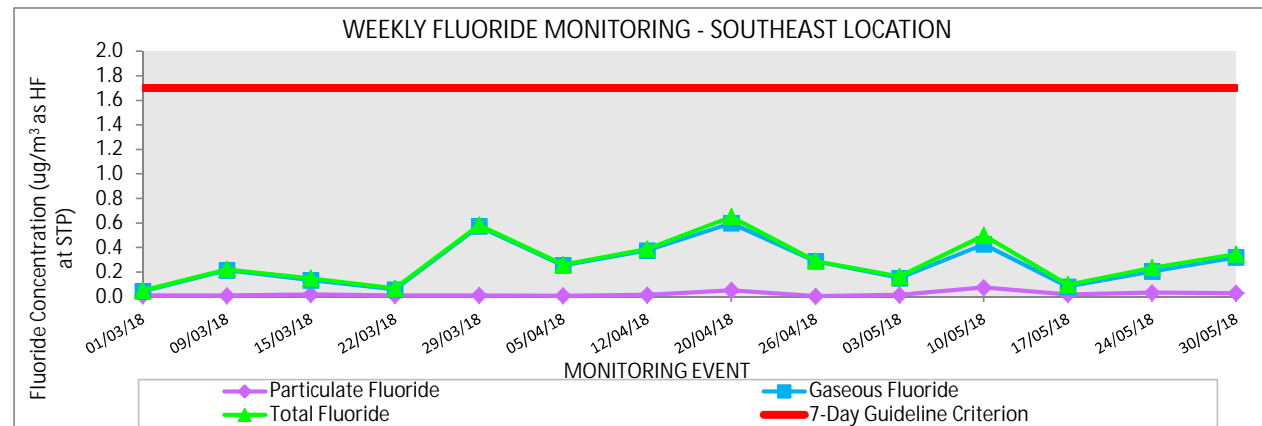
Monitoring Event	24-hr PM ₁₀	24-hr PM ₁₀ Criterion	PM ₁₀ Annual Average	PM ₁₀ Annual Average Criterion
	(µg/m ³)	(µg/m ³)	(µg/m ³)	
2-Mar-18	32.6	50	18.1	30
8-Mar-18	35.5	50	18.5	30
14-Mar-18	36.1	50	18.8	30
20-Mar-18	43.5	50	19.4	30
26-Mar-18	21.1	50	19.6	30
1-Apr-18	19.3	50	19.8	30
7-Apr-18	17.9	50	19.9	30
13-Apr-18	49.0	50	20.6	30
19-Apr-18	20.1	50	20.6	30
25-Apr-18	12.0	50	20.6	30
1-May-18	14.3	50	20.4	30
7-May-18	21.6	50	20.4	30
13-May-18	9.3	50	20.5	30
19-May-18	24.6	50	20.6	30
25-May-18	21.4	50	20.8	30
31-May-18	17.8	50	20.8	30



South East Monitoring Location - 7 Day Fluoride Monitoring

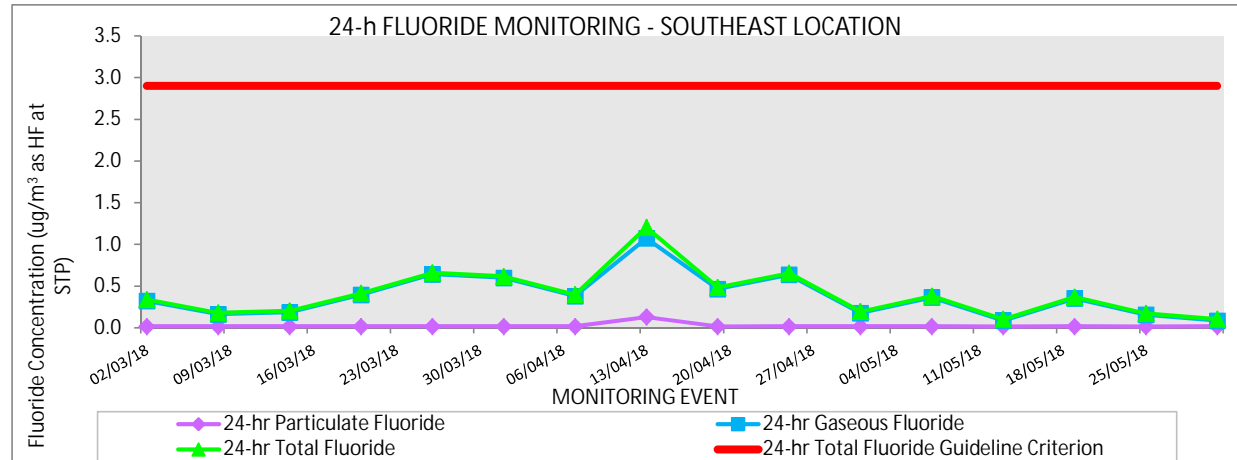
South East - 7 Day Fluoride Monitoring
March 2018 to May 2018

Monitoring Event	Particulate Fluoride	Gaseous Fluoride	Total Fluoride	7-Day Guideline Criterion
	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)
1-Mar-18	0.009	0.043	0.052	1.7
9-Mar-18	0.009	0.215	0.224	1.7
15-Mar-18	0.017	0.134	0.151	1.7
22-Mar-18	0.010	0.058	0.068	1.7
29-Mar-18	0.010	0.574	0.584	1.7
5-Apr-18	0.007	0.255	0.262	1.7
12-Apr-18	0.013	0.377	0.390	1.7
20-Apr-18	0.052	0.600	0.652	1.7
26-Apr-18	0.003	0.289	0.292	1.7
3-May-18	0.013	0.152	0.165	1.7
10-May-18	0.073	0.427	0.500	1.7
17-May-18	0.017	0.081	0.098	1.7
24-May-18	0.032	0.205	0.237	1.7
30-May-18	0.028	0.320	0.348	1.7



South East Monitoring Location - 24 hour Fluoride Monitoring

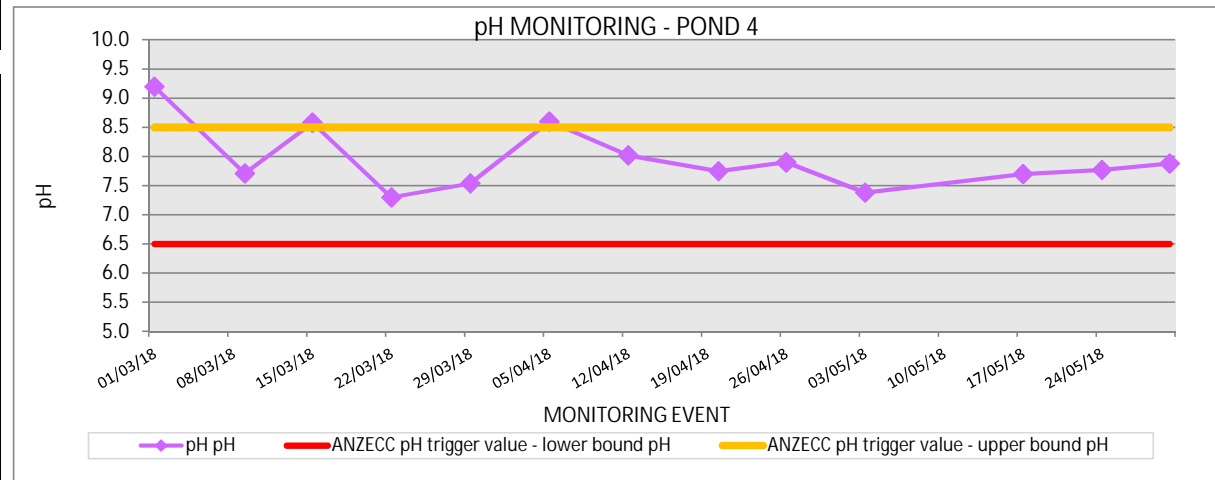
South East - 24 hour Fluoride Monitoring				
March 2018 to May 2018				
Monitoring Event	24-hr Particulate Fluoride	24-hr Gaseous Fluoride	24-hr Total Fluoride	24-hr Total Fluoride Guideline Criterion
	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)	($\mu\text{g}/\text{m}^3$ as HF at STP)
2-Mar-18	0.018	0.322	0.340	2.9
8-Mar-18	0.018	0.163	0.181	2.9
14-Mar-18	0.017	0.186	0.203	2.9
20-Mar-18	0.017	0.397	0.414	2.9
26-Mar-18	0.017	0.643	0.660	2.9
1-Apr-18	0.017	0.600	0.617	2.9
7-Apr-18	0.017	0.382	0.399	2.9
13-Apr-18	0.131	1.075	1.206	2.9
19-Apr-18	0.018	0.467	0.485	2.9
25-Apr-18	0.018	0.638	0.656	2.9
1-May-18	0.017	0.178	0.195	2.9
7-May-18	0.017	0.365	0.382	2.9
13-May-18	0.015	0.088	0.103	2.9
19-May-18	0.017	0.353	0.370	2.9
25-May-18	0.016	0.157	0.173	2.9
31-May-18	0.017	0.087	0.104	2.9



Pond 4 Monitoring Location - Weekly pH Monitoring

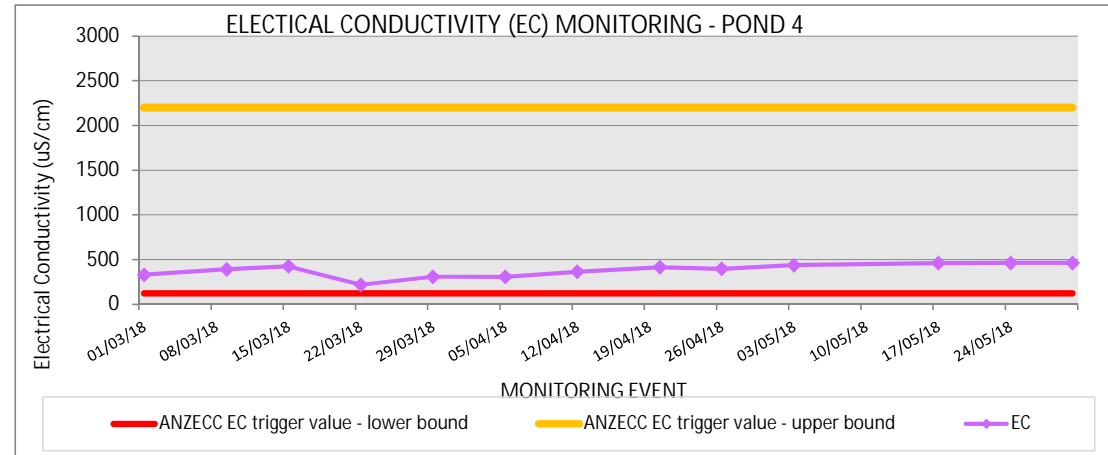
Pond 4 - Weekly pH Monitoring				
March 2018 to May 2018				
Monitoring Event	pH	ANZECC pH trigger value - lower bound	ANZECC pH trigger value - upper bound	Unable to Sample
	pH	pH	pH	
1/03/2018	9.20	6.5	8.5	
9/03/2018	7.71	6.5	8.5	
15/03/2018	8.58	6.5	8.5	
22/03/2018	7.30	6.5	8.5	
29/03/2018	7.54	6.5	8.5	
5/04/2018	8.60	6.5	8.5	
12/04/2018	8.02	6.5	8.5	
20/04/2018	7.75	6.5	8.5	
26/04/2018	7.90	6.5	8.5	
3/05/2018	7.38	6.5	8.5	
17/05/2018	7.70	6.5	8.5	
24/05/2018	7.77	6.5	8.5	
30/05/2018	7.88	6.5	8.5	

*Bold denotes exceedance



Pond 4 Monitoring Location - Weekly EC Monitoring

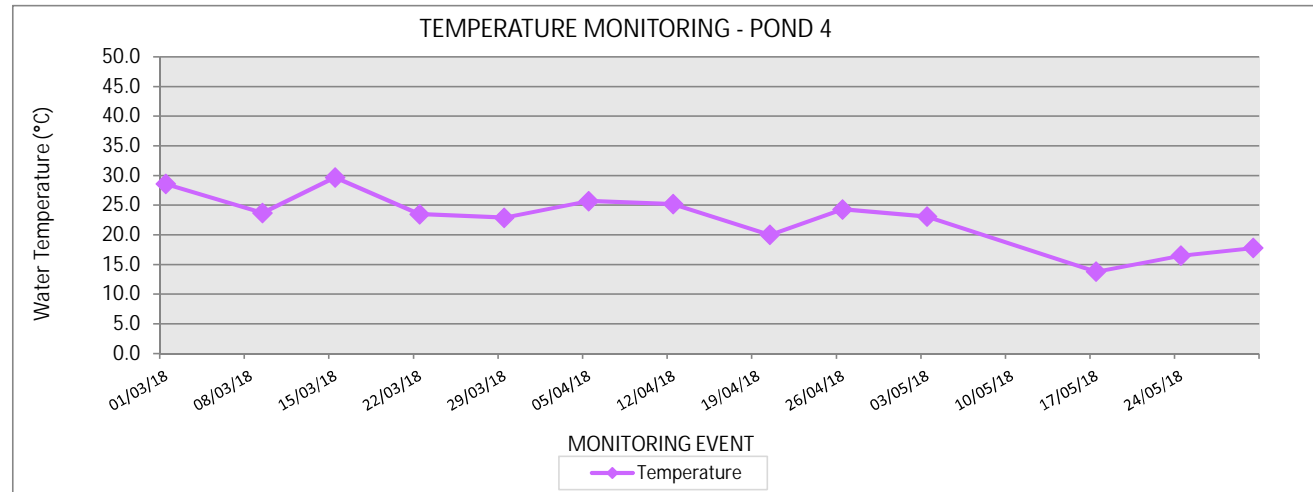
Pond 4 - Weekly EC Monitoring				
March 2018 to May 2018				
Monitoring Event	EC	ANZECC EC trigger value - lower bound	ANZECC EC trigger value - upper bound	Unable to Sample
	µS/cm	µS/cm	µS/cm	
1/03/2018	332	125	2200	
9/03/2018	392	125	2200	
15/03/2018	426	125	2200	
22/03/2018	221	125	2200	
29/03/2018	309	125	2200	
5/04/2018	307	125	2200	
12/04/2018	366	125	2200	
20/04/2018	415	125	2200	
26/04/2018	397	125	2200	
3/05/2018	438	125	2200	
17/05/2018	461	125	2200	
24/05/2018	463	125	2200	
30/05/2018	464	125	2200	



Pond 4 Monitoring Location - Weekly Temperature Monitoring

Pond 4 - Weekly Temperature Monitoring
March 2018 to May 2018

Monitoring Event	Temperature °C	Unable to Sample
1/03/2018	28.6	
9/03/2018	23.7	
15/03/2018	29.7	
22/03/2018	23.5	
29/03/2018	22.9	
5/04/2018	25.7	
12/04/2018	25.2	
20/04/2018	20.0	
26/04/2018	24.3	
3/05/2018	23.1	
17/05/2018	13.8	
24/05/2018	16.5	
30/05/2018	17.8	

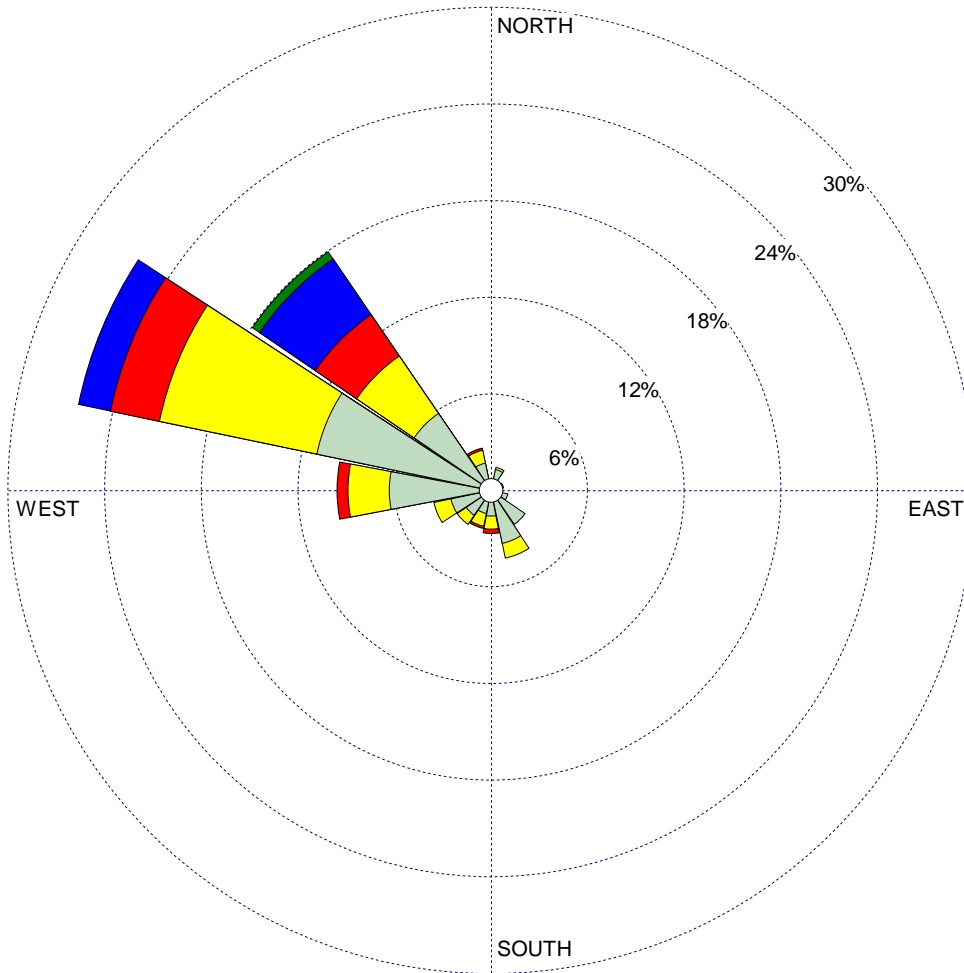


WIND ROSE PLOT:

NCIA - Meteorology Data
May 2018

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:

COMPANY NAME:

MODELER:

CALM WINDS:

20.56%

TOTAL COUNT:

743 hrs.

AVG. WIND SPEED:

1.92 m/s

DATE:

27/06/2018

PROJECT NO.:

60551495

Our Reference 3173526061
Contact Matthew Corradin
Date of Issue 02-Aug-2018



NATIONAL CERAMIC INDUSTRIES AUSTRALIA PTY LTD
ABN 83 100 467 267
PO BOX 765
MAITLAND NSW 2320

PENALTY NOTICE ADVICE

Dear Mr Schneider

Environment Protection Licence 11956
Alleged breaches of the
Protection of the Environment Operations Act 1997
PENALTY NOTICE x 2 and OFFICIAL CAUTION x 2

I refer to the 2016-2017 Annual Return (AR) for environment protection licence 11956 (the Licence) for the National Ceramic Industries Australia Pty Ltd (NCIA) Racecourse Road, Rutherford Facility (the Premises) received by the Environment Protection Authority (EPA) on 18 October 2017 and furthermore, to the Show Cause issued to NCIA on 08 June 2018 and NCIA's response received by the EPA on 29 June 2018.

As you are aware, the EPA has undertaken an investigation into those issues identified on review of the AR which has now been completed. The purpose of this correspondence is to advise you of the EPA's findings and the regulatory action taken.

Summary

The EPA has issued NCIA with two Penalty Notices totalling \$16,000 and two Official Cautions for allegedly failing to comply with various provisions of the *Protection of the Environment Operations Act 1997* (the POEO Act) and the conditions of the Licence, which is an alleged breach Section 64(1) of the POEO Act.

Background

On 07 June 2018, I undertook a review of the 2016-2017 AR and identified the following issues of concern:

1. NCIA is required to undertake "pollution" monitoring and therefore publish the results of the pollution monitoring within 14 days of receiving the monitoring results. Monitoring results had not been published since the 2014-2015 reporting period based on a thorough review of the relevant website, an alleged breach of Section 66(6) of the POEO Act. This is despite NCIA being issued with an Official Caution on 01 June 2016 for an alleged Section 66(6) offence based on review of the 2014-2015 AR.
2. NCIA has also potentially provided false and/or misleading information as Section F3 of the AR has been ticked yes to the monitoring results being published in accordance with relevant requirements.
3. NCIA has exceeded the fluoride (hydrogen fluoride) concentration limit of 5 mg/m³ at EPA Point 14 (Kiln 1) by 4.7 mg/m³ (total result was 9.7 mg/m³). This is concerning as it is almost double the

Environment Protection Authority NSW
PO Box A290 SYDNEY SOUTH NSW 1232
59-61 Goulburn Street SYDNEY NSW 2000
Tel: (02) 9995 5000 Fax: (02) 9995 5900
TTY (02) 9211 4723
ABN 43 692 285 758
www.epa.nsw.gov.au

Our Reference 3173526061
Contact Matthew Corradin
Date of Issue 02-Aug-2018



licence limit with only one sample result taken (yearly stack test). This means that it is feasible that other concentration limit exceedances may have occurred during the reporting period that were not identified.

4. NCIA has exceeded the fluoride load limit of 1850 kg by 561 kg (total result was 2411 kg) and correlates to the concentration exceedance above. This is of concern to the EPA.

Investigation findings

Based on the evidence collected in relation to this matter, the EPA is of the opinion that:

1. NCIA allegedly failed to publish the results of relevant pollution monitoring on the website, an alleged breach of Section 66(6) of the POEO Act which states:

The holder of a licence subject to a condition referred to in subsection (1) (a) must, within 14 days of obtaining monitoring data as referred to in that subsection:

(a) if the holder maintains a website that relates to the business or activity the subject of the licence—make any of the monitoring data that relates to pollution, and the licensee's name, publicly and prominently available on that website in accordance with any requirements issued in writing by the EPA.

2. NCIA allegedly provided false/misleading information in the AR by ticking yes at Section F3, an alleged breach of Section 66(4) of the POEO Act which states:

A person who gives a certificate for the purposes of a condition referred to in this section is guilty of an offence if any of the statements certified is false or misleading in a material respect.

3. NCIA allegedly breached condition L2.1 of the Licence by exceeding the fluoride load limit, an alleged breach of Section 64(1) of the POEO Act which states:

If any condition of a licence is contravened by any person, each holder of the licence is guilty of an offence.

4. NCIA allegedly breached condition L3.1/L3.4 of the Licence by exceeding the fluoride (hydrogen fluoride) concentration limit of 5 mg/m³ at EPA Point 14, an alleged breach of Section 64(1) of the POEO Act as detailed above.

Alleged offences

Under Section 66(6) of the POEO Act, it is an offence not to comply with the relevant pollution monitoring publication requirements.

The maximum penalty that can be imposed by a Court to a company for this offence is \$4,000. The "on-the-spot" fine amount for this offence is \$1,000.

Environment Protection Authority NSW
PO Box A290 SYDNEY SOUTH NSW 1232
59-61 Goulburn Street SYDNEY NSW 2000
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ABN 43 692 285 758
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Our Reference 3173526061
Contact Matthew Corradin
Date of Issue 02-Aug-2018



Under Section 66(4) of the POEO Act, it is an offence to provide false/misleading information which is then certified as being true and correct.

The maximum penalty that can be imposed by a Court to a company for this offence is \$250,000. The "on-the-spot" fine amount for this offence is \$8,000.

Under Section 64(1) of the POEO Act, it is an offence not to comply with the conditions of an in-force environment protection licence.

The maximum penalty that can be imposed by a Court to a company for each offence is \$1,00,000 and a further \$250,000 in the case of a continuing offence. The "on-the-spot" fine amount for this offence is \$15,000.

EPA considerations of appropriate compliance action

The EPA has considered its Compliance Policy and Prosecution Guidelines when determining the appropriate enforcement action. The EPA has also taken into account the previous regulatory action taken against NCIA by the EPA.

Decision

As indicated above, the EPA has taken the following regulatory action:

- For the alleged Section 66(6) offence: 1 Penalty Notice totalling \$1,000 has been issued.
- For the alleged Section 66(4) offence: 1 Official Caution has been issued.
- For the alleged Section 64(1) offence related to the load limit: 1 Penalty Notice totalling \$15,000 has been issued.
- For the alleged Section 64(1) offence related to the concentration limit: 1 Official Caution has been issued.

Options for dealing with PNs

NCIA should read the instructions on the back of the enclosed Penalty Notices carefully and ensure they are met. The choices are, within 28 days of the date of issue, are:

- Request a review of the circumstances by providing written representation;
- Pay the amount in full by one of the payment methods listed; or
- Elect to have the matter dealt with by a Court.

The request for review, payment or court election must be received by the State Debt Recovery Office within 28 days to prevent further collection action taking place. The *Fines Act 1996* prevents the State Debt Recovery Office from reducing a penalty, or extending the time for payment.

Environment Protection Authority NSW
PO Box A290 SYDNEY SOUTH NSW 1232
59-61 Goulburn Street SYDNEY NSW 2000
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Please note that the EPA keeps records of the compliance action it takes. If NCIA is identified in future as having committed further offences, the EPA may escalate its compliance action. This can include criminal prosecution or revocation of the Licence.

If you have any questions about this matter, please contact me on (02) 4908 6830.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Matthew Corradin', written over a light blue horizontal line.

MATTHEW CORRADIN
A/Unit Head Hunter South
Environment Protection Authority



NATIONAL CERAMIC INDUSTRIES AUSTRALIA
PTY LTD
PO BOX 765
MAITLAND NSW 2320

Penalty Notice

Penalty notice number	3173526061
Date of Offence:	07-Jun-2018
Amount due:	\$1,000.00
Date due:	30-Aug-2018
To pay now, call:	1300 130 112



NSW Environment Protection Authority

The NSW Environment Protection Authority (EPA) is the primary environmental regulator for New South Wales. We partner with business, government and the community to reduce pollution and waste, protect human health, and prevent degradation of the environment.

Act now to avoid further costs

Your payment options are below and the other options available to you are on the back of this fine. As the penalty notice recipient, you must respond to this fine.

Details of the offence

Offence: Fail to make monitoring data available on website - Corporation

Authorised Officer  Date of issue: 02-Aug-2018

How to Pay



Online:
Reference number: **3173526061**
Visit www.revenue.nsw.gov.au/pay to pay by
Mastercard or Visa*



BPAY:
Quote Biller Code **36848** and Reference
Number: **3173526061** to pay using your
cheque or savings account. Access BPAY via
your financial institutions website or phone
banking service. For more information visit
www.bpay.com.au

**Phone:**

Call 1300 130 112 to pay by Mastercard or Visa*

*A card payment fee of 0.4% applies. This is not subject to GST.

**Direct Debit:**

Call 1300 492 392 to set up a direct debit from your bank account or from MasterCard or Visa.

What are my other options?

I want to request a review of the fine

To read more information about possible grounds for leniency and to request a review, go to

<http://www.revenue.nsw.gov.au/fines/pn/review>

You must be able to provide supporting evidence.

FACT: 98% of reviews result in the recipient still needing to pay the fine.

I want to have the fine decided in court

To have the matter determined by a court, complete and submit the court election form at

<http://www.revenue.nsw.gov.au/fines/pn/court> You must provide reasons why you would like this matter dealt with in court. You cannot request a review after you have submitted the court election form.

FACT: The court may apply higher penalties or additional costs.

Privacy statement

Information collected from you, for the purpose stated on this form, may be provided to third parties with your consent or as required or permitted by law. Revenue NSW will correct or update your personal information at your request. Read more about privacy at www.revenue.nsw.gov.au

Revenue NSW contact details

Phone: 1300 138 118 (7:30 am – 8:00 pm, Monday to Friday)

Overseas callers: +612 4937 9207

Website: www.revenue.nsw.gov.au

Hearing or speech impaired users:

TTY 133 677 | Speak and Listen 1300 555 727

Telephone Interpreter service

131 450 and ask the interpreter to phone 1300 138 118
(7:30 am – 8:00 pm, Monday to Friday)

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NATIONAL CERAMIC INDUSTRIES AUSTRALIA
PTY LTD
PO BOX 765
MAITLAND NSW 2320

Penalty Notice

Penalty notice number	3173526070
Date of Offence:	02-Jul-2017
Amount due:	\$15,000.00
Date due:	30-Aug-2018
To pay now, call:	1300 130 112

ACT NOW

NSW Environment Protection Authority

The NSW Environment Protection Authority (EPA) is the primary environmental regulator for New South Wales. We partner with business, government and the community to reduce pollution and waste, protect human health, and prevent degradation of the environment.

Act now to avoid further costs

Your payment options are below and the other options available to you are on the back of this fine. As the penalty notice recipient, you must respond to this fine.

Details of the offence

Offence: Contravene condition of licence - Corporation

Authorised Officer  Date of issue: 02-Aug-2018

How to Pay



Online:

Reference number: **3173526070**

Visit www.revenue.nsw.gov.au/pay to pay by

Mastercard or Visa*



BPAY:

Quote Biller Code **36848** and Reference Number: **3173526070** to pay using your cheque or savings account. Access BPAY via your financial institutions website or phone banking service. For more information visit www.bpay.com.au

**Phone:**

Call 1300 130 112 to pay by Mastercard or Visa*

*A card payment fee of 0.4% applies. This is not subject to GST.

**Direct Debit:**

Call 1300 492 392 to set up a direct debit from your bank account or from MasterCard or Visa.

What are my other options?

I want to request a review of the fine

To read more information about possible grounds for leniency and to request a review, go to <http://www.revenue.nsw.gov.au/fines/pn/review>

You must be able to provide supporting evidence.

FACT: 98% of reviews result in the recipient still needing to pay the fine.

I want to have the fine decided in court

To have the matter determined by a court, complete and submit the court election form at <http://www.revenue.nsw.gov.au/fines/pn/court> You must provide reasons why you would like this matter dealt with in court. You cannot request a review after you have submitted the court election form.

FACT: The court may apply higher penalties or additional costs.

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