Tomago Aluminium Company

Annual Environment Report

2020

Contents

EXECUTIVE SUMMARY

This Annual Report details the environment management and monitoring program implemented in 2020 by Tomago Aluminium Company to meet the requirements of the Development Consent conditions (DA 391-80 & DA 4908-90).

Tomago Aluminium produced 590,916 tonnes of saleable aluminium in 2020.

Overall Environmental Management during 2020 was effective with compliance with conditions being achieved with the exception of some samples being unable to be taken due to the omgoing drought legacy and minor equipment breakdowns.

Air Quality
An annual average fluoride emission rate of 0.46 kilograms of fluoride per tonne of aluminium produced was achieved. Concentration and Load Based Limits based limits on fluoride, sulfur dioxide, particulates and nitrogen oxides were met.

Ambient monitoring for fluoride demonstrated close alignment with EIS modelled concentrations apart from Site 181 (Tomago Farm) and all monitoring sites outside the designated buffer zone met the ANZECC air quality guidelines for fluoride.
The sites have seen relatively consistent average ambient concentrations in relation to prior years for both fluoride and sulfur dioxide in 2020.
There was one single day during 2020 when the 24 hour sulfur dioxide average exceeded the NEPM standard level at The Tomago Farm site. All the ambient sulfur dioxide monitoring stations are located within the designated buffer zone for the smelter.

Vegetation
Vegetation monitoring highlighted that the fluoride impact on vegetation is confined to areas close to the smelter perimeter. The area of impact has again decreased slightly from 2019, while the area showing marked or more severe injury has increased slightly. Fluoride concentrations in both overstorey and forage at the monitoring sites remain relatively stable.

Water
Monitoring of surface water, groundwater and stormwater on the smelter site and the surrounding environs was completed in 2020, with sampling of the Hunter River routinely for metals continued.

Surface water
Eleven of twelve sites were monitored monthly. Some slight elevation in fluoride levels is evident at two sites very close to the smelter, however the fluoride concentrations measured in 2020 are similar to those measured over the past 5 years. One of the sites was dry for the entire year.

Groundwater
Fluoride concentration in the groundwater reserve known as the “Tomago Sandbeds” remains at background levels.
Monitoring data from the smelter site highlights some localised areas of higher fluoride. Concentrations have predominantly remained stable when compared to previous data, with groundwater levels continuing to fall during 2020.

Stormwater
Stormwater was continually monitored during discharge in 2020. Stormwater discharge limits for controlled discharge of stormwater were met. A bio-accumulation program consisting of oyster and sediment sampling and analysis was conducted again in 2020 with no abnormal trends identified.

Energy
In 2020, smelter energy efficiency remained stable. The installation of improved energy efficient Potcells continued in 2020.

Waste Management
On site storage of spent potlining increased from 9959 tonnes to 11866 tonnes with the processing and dispatch of 6350 tonnes in 2020. Processing is scheduled to be ramped up during 2021.

Wallaroo Waste Disposal Facility
All monitoring completed where possible and results remain at background levels. Groundwater monitoring was inhibited by reduced groundwater levels during 2020.

Noise
No noise complaints received in 2020 with half-yearly monitoring at three sites returning noise levels typical of previous data.

Independent Audits
A Recertification Audit on the Tomago Aluminium Environment Management System to the requirements of ISO 14001 was completed, as well as a Hazard Audit in accordance with the DPIE’s Hazardous Industry Planning Advisory Paper No. 5, ‘Hazard Audit’.

1. INTRODUCTION

This document provides a summary of the environmental performance of the Tomago Aluminium Smelter during 2020. The report has been prepared specifically for the Department of Planning (DoP) to comply with the conditions of development consent for the Tomago Aluminium Smelter Expansion Project. Annual reporting requirements in relation to Environmentally Hazardous Chemicals Act licences are also included.

The report is used to provide regulatory bodies and the community with a technical summary of the company's environmental performance.

The report reviews levels of production, compliance with conditions of development consent as well as summarising and assessing monitoring data for:

- Source emissions
- Ambient air quality in the vicinity of the smelter
- Water quality in the vicinity of the smelter
- Impact of smelter operations on vegetation
- Waste management

The data summarised in this report is collected through an extensive environmental monitoring program conducted by the company. Detailed reports containing this data are forwarded quarterly to the following government departments and statutory authorities:

Office of Environment and Heritage
- Environment Protection Authority
- National Parks and Wildlife Service

Department of Primary Industries (NSW Fisheries)
Port Stephens Council
Hunter Water Corporation
Department of Planning and Environment

Separate environmental assessments of potential impacts of smelter operations carried out in 2020 include:

- Ecosystem monitoring
- Vegetation assessment in the vicinity of the smelter

These were prepared and reported to regulatory agencies during 2020 also via the quarterly reporting process.

The appendices of this document contain information on sample site locations for the monitoring of environmental impact associated with the operation of the aluminium smelter and Wallaroo waste disposal facility, development consent conditions and the Environment Protection Licences for the smelter and Wallaroo landfill facility.
Readers seeking clarification or additional information should refer in the first instance to Environment Superintendent, Mrs Robyn Parker (49 669329) of the People, Safety and Environment Department of Tomago Aluminium.

2. SITE DESCRIPTION

The existing TAC smelter is located at 638 Tomago Road in the industrial suburb of Tomago, which is part of the Port Stephens Local Government Area (LGA). A regional context map is shown in Figure 2.1.

Figure 2.1: Regional Context

A number of small to medium industrial facilities are located adjacent to the plant. The nearest residential areas are located to the southwest at Hexham (3km) and to the northwest at Tarro (4.6km) and Beresfield (5.7km).

Neighbouring non industrial/manufacturing facilities include a caravan park (approximately 1.5 km west), Hunter Region Botanic Gardens (approximately 2 km north), historic Tomago House (approximately 1 km south east) and NSW Corrective Services Training Centre (previously Tomago Periodic Detention Centre, approximately 1 km South). A site location map which includes a depiction of the smelter's buffer zone is shown in Figure 2.2.

A map showing the site's approval boundary is shown in Figure 2.3, and facilities and infrastructure is shown in Figure 2.4.

Figure 2.2: Site Location including buffer zone

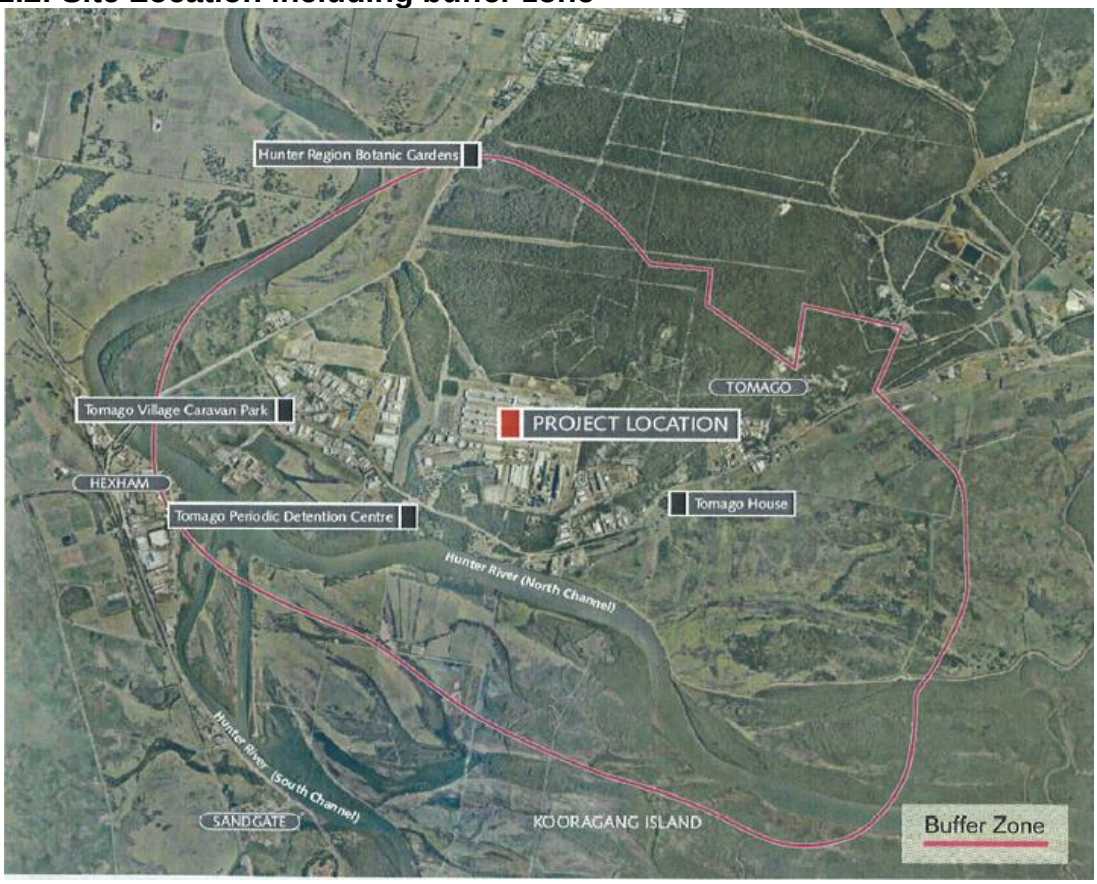


Figure 2.3: Site Approval Boundary

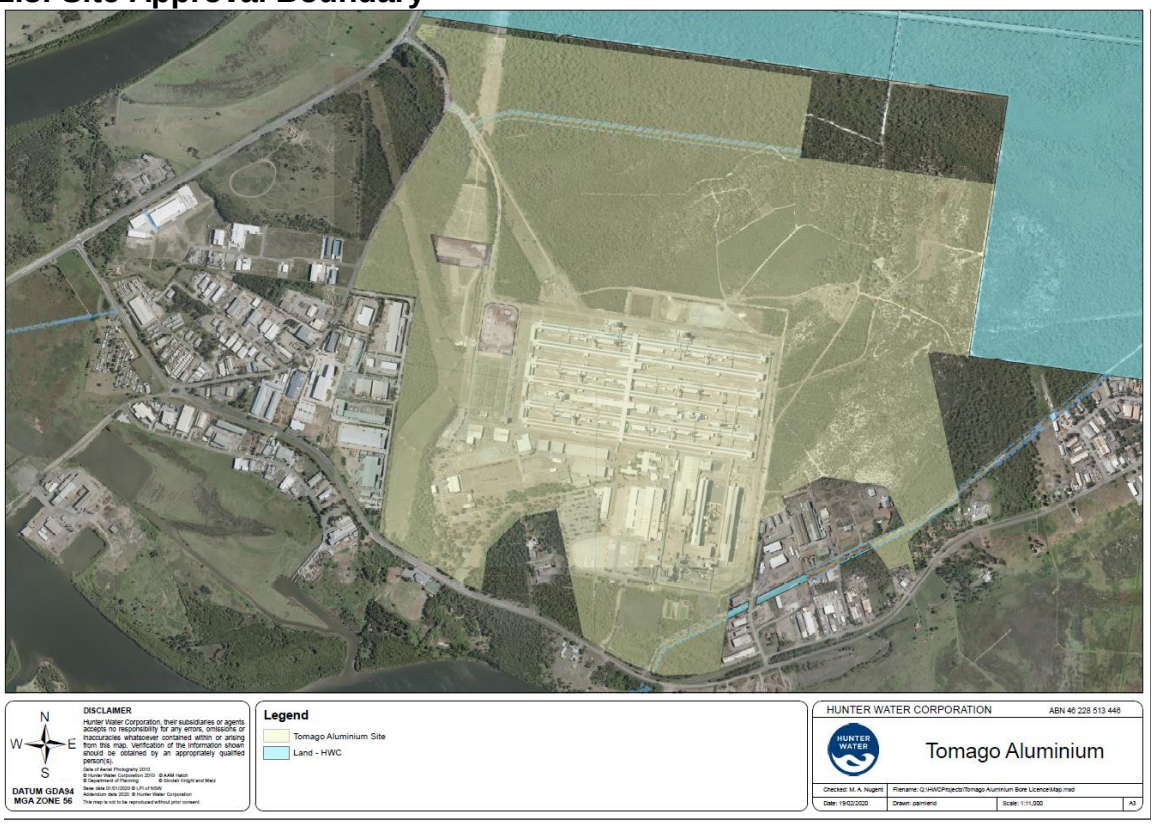
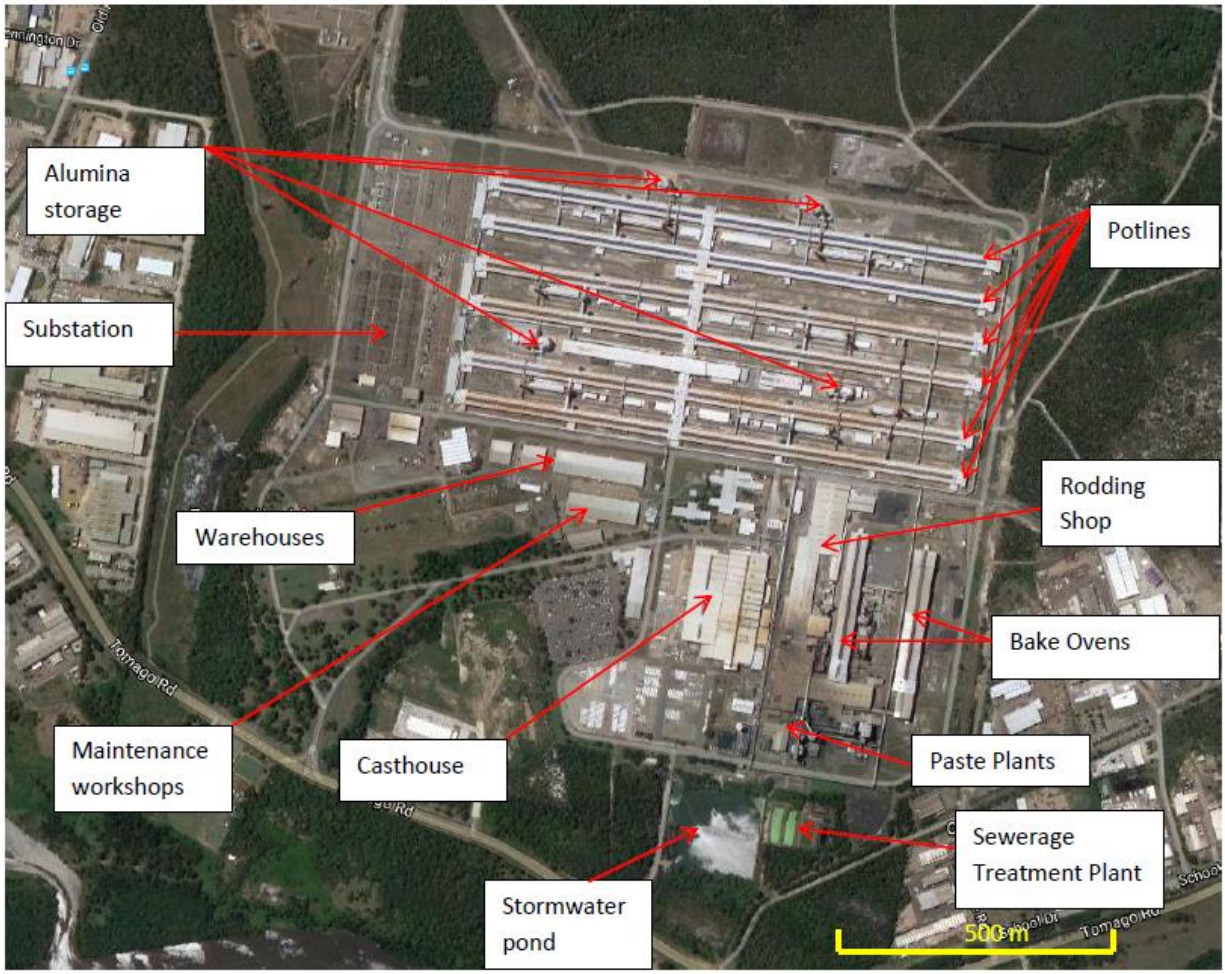


Figure 2.4: Site facilities and infrastructure



3. COMPANY HISTORY – CONDITIONS OF DEVELOPMENT CONSENT

The Tomago Aluminium site is about 13 km North West of Newcastle, within the Port Stephens Council local government area.

Tomago Aluminium Company Pty Ltd was formed in March 1980 with aluminium production beginning in September 1983. In 1991 development consent was granted for a two-stage expansion of the Tomago Aluminium smelter.

This consent contained a total of 55 conditions; many of which were continuations of the original consent conditions for the establishment of the smelter. A large number of conditions relate to ongoing environmental management actions such as environmental monitoring and reporting. The first stage of the expansion was completed in 1993. The EPA granted Pollution Control Approval for the second stage, extension of Potlines 1 and 2, in February 1997 and additional production capacity was on line by December 1998.

Approval to modify development consents for the smelter was granted in August 2001, to allow a production increase to 530,000 tpa. Work was completed in 2006 on this production expansion project known as AP22.

In December 2009 approval was granted to further increase production capacity to 575,000 tonnes.

In October 2015 approval was granted to increase saleable aluminium production capacity to 585,000 tonnes.

In November 2016 approval was granted to increase saleable aluminium production capacity to 600,000 tonnes. The capacity increase has been achieved by minor increases in potline amperage enabled by improvements in pot cell design. The two existing development consents (DA 391-80 & DA 4908-90) were modified.

3.1 Current Approvals for TAC

Approval Type	Approval name/number	Expiry
Development Approval	DA 391-80	N/A
Development Approval	DA 4908-90	N/A
Environment Protection Licence	EPL 6163 (TAC site)	N/A
Environment Protection Licence	EPL 6048 (Wallaroo Landfill Site)	N/A
Environmentally Hazardous Chemicals Act Licence	EHC Licence No. 3	Feb 2021
Environmentally Hazardous Chemicals Act Licence	EHC Licence No.4	24 Oct 2021
Specific Immobilisation Approval	SIA2019-S-18	17 Dec 2021
Specific Immobilisation Approval	SIA2019-S-07	17 Dec 2021
Resource Recovery Exemption	Tomago Aluminium Refractory Brick Exemption January 2019	28 Jan 2021

3.2 Status of Development Consent Conditions

Development Consents DA 391/80 and DA 4908/90 contain conditions that require regular review to assess compliance status. Table 1 provides a brief summary of these with details provided in this report supporting compliance. In 2018 an independent environment audit on the development consent conditions and Environment Protection Licences was undertaken. All actions from this audit are now closed.
On 23rd October 2020 DA 391/80 Mod 8 and DA 4908/90 Mod 7 involving minor changes to monitoring conditions were approved.
The next independent environment audit will be completed during 2021.

Table 1: Summary of consent conditions compliance

Consent condition	Environment aspect/compliance status	Section reference
That the applicant shall carry out all those operating and monitoring measures as described and specified in the Statement to prevent, minimise or ameliorate adverse environmental ,social and economic impact except where there is inconsistency with the conditions of this development consent, the consent for the smelter expansion the subject of DA 4908/90 dated 2 August 1990, submitted to Port Stephens Shire Council, or the authorities' requirements shall prevail	Air quality, Water quality, Noise monitoring programs established and conducted	2,4,5,6,7,8,9,10
That the applicant shall, subject as hereinafter provided, establish monitoring stations to collect relevant information on air and water quality and noise pollution. Further, that the applicant shall prepare a programme for the purposes of air and water quality and noise pollution and shall submit such a programme and details of the location of the installations to the State Pollution Control Commission (hereinafter called the "Commission") for approval prior to the commencement of the programme. Further, the information collected and recorded at the monitoring stations shall be forwarded to the Commission at such intervals as required by the Commission and to any monitoring committee which may be established for the purposes indicated above;	Air quality, Water quality, Noise monitoring programs established and conducted	4.2,7,10
That the applicant shall enter into licence agreements with owners within 4 kilometres of the potlines for the purposes of conducting monthly analysis of surface water sites for fluoride levels. Further, the applicant shall obtain the prior consent of the commission and the Hunter District Water Board (hereinafter called the "Board") to enter upon the Board's lands situated within the Board's catchment area for the purposes of conducting monthly analysis of surface water site for fluoride levels. Further, the results shall be made available on the first day of each month to the commission and to the Board and to any monitoring committee which may be established for the purposes of monitoring fluoride emission from the proposed development.	Surface Water	7.1
that the applicant shall establish and operate monitoring systems as may be required by the Board (including those referred to in Condition 5 above):- (a) on the land the subject of the application and the Board's land at Grahamstown, Nelson Bay, Anna Bay and Tomago which lands constitute part of the Board's Catchment Area for the purposes of providing information on the changes in fluoride concentration and determining from time to time, the level of fluoride concentration therein in groundwater, surface water, rainwater and on fauna and flora in those catchment areas; and (b) at adjacent to the liquid effluent disposal area on the land for the purposes of checking the level of chemical or bacteriological contamination reaching groundwater and on the movement of the infiltrated effluent relative to local groundwater flow;	Surface Water, Vegetation and Groundwater monitoring sites established and results assessed	5,7.2
that the applicant shall, in accordance with the requirements of the Commission:- (a) install adequate stand-by emission collection and treatment facilities to meet possible machine or plant failure; (b) ensure that the facilities are in good working order and condition at all times; (c) ensure that the bakehouse and potline dry scrubbing systems have adequate stand-by equipment for all rotation and mechanised devices, such as fans, pumps and feeders; (d) install an additional bakehouse emission scrubber, generally in accordance with 1990 smelter expansion EIS	Air quality monitoring program implemented and equipment uptime monitored and reported.	4.2.1

that the applicant shall minimise energy usage and conserve heat and energy such as by the use of thermal energy recovery from the gases evolved during the smelting operation, heat recovery measures in anode baking and, minimisation of heat loss from electrolytic cells where technically and economically practicable in the design and construction of the smelter;	Energy usage monitored and opportunities assessed and implemented when feasible.	8
The Applicant shall: (a) install continuous real time monitoring of gaseous fluoride emissions from the roof vents in each potline; and (b) Maintain and operate an ambient air quality monitoring network, including sulphur dioxide monitoring in the vicinity of the smelter, to the satisfaction of the EPA.	Air Quality monitoring program in place which includes continuous monitoring of gaseous fluoride emissions in roof vents. Eight ambient fluoride and five ambient sulphur dioxide monitoring stations established and maintained as per EPA requirements.	4.2.1 4.2.2
The Applicant shall ensure that the noise from the operation of the development does not exceed any noise limits specified in the EPL for the facility.	Noise monitoring undertaken at three sites on a six monthly basis.	10
The Applicant must undertake pre and post modification noise audits to ensure the expansion does not increase noise emissions from the transformers. The auditing must be undertaken by a suitably qualified and experienced person whose appointment has been endorsed by the Director-General, and include: (a) a pre modification noise audit and report which must: i. be provided to DECCW and the Department and approved by the Director-General prior to the commencement of the expansion; ii. be undertaken during a period when the facility is operation under normal conditions; iii. identify the existing noise levels produced by the transformer; and iv. report any noise complaints received in the last 12 months. (b) a post modification noise audit and report which must: i. be provided to DECCW and the department and approved by the Director-General; ii. be undertaken within 5 years of this modification approval or once the facility is operational at full capacity, whichever comes sooner; iii. identify the noise levels produced by the transformer; iv. compare the transformer noise levels with the levels identified in the pre modification noise audit in (a) above; v. report any noise complaints received since the undertaking the previous noise audit; vi. assess whether any noise management or mitigation measures are required; vii. describe any measures proposed to be implemented, including a timetable for the implementation; and viii. detail how the effectiveness of these measurements would be assessed and reported.	Completed in 2015. Reports provided to EPA and Department of Planning & Environment	
In consultation with the NPWS, the Applicant shall assist in the development of, and participate in, a periodic monitoring program targeting specific areas/species within Kooragang Island Nature Reserve.	Air quality/ ecological impact. Monitoring sites established within Kooragang Nature Reserve	5
Within 12 months of the approval of the DA 391-80 MOD 4, and then as directed by the Director-General, the Applicant shall commission and pay the full cost of an independent Environmental Audit of the development. This Audit must: (a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Director-General; (b) include a Hazard Audit in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 5 - Hazard	Independent Environmental Audit completed in 2018. Independent environment audits for accreditation or surveillance under ISO 14001 conducted annually.	11

Audit Guidelines. The audit shall include a review of the Safety Management System and of all incidents recorded and be accompanied by a program for the implementation of all recommendations made in the audit report. If the Applicant intends to defer the implementation of a recommendation, justification must be included; (c) assess the environmental performance of the development, and its effects on the surrounding environment and sensitive receivers; (d) assess whether the development is complying with the conditions, relevant standards, performance measures, and statutory requirements; (e) review the adequacy of any strategy/plan/program required under this approval; and, if necessary; (f) recommend measures or actions to improve the environmental performance of the development, and/or any strategy/plan/program required under this approval.	Hazard Audit done in 2020 and next IEA due 2021	
The Applicant at its own expense, shall expand, including, if so required, the establishment of additional monitoring stations, and operate the existing monitoring programs for ambient air and water quality and noise pollution in accordance with any reasonable requirements of the Commission, whether these monitoring programs are carried out by the Applicant, the Commission or an agent of the Commission. Further, the information collected and recorded at the monitoring stations shall be forwarded to the Commission at such intervals as required by the Commission.	Air quality, Water quality, Noise Environment monitoring program expanded with results detailed in quarterly and annual environment reports	4.2 7 10
The Applicant shall ensure that the storage areas for spent pot linings are secure and do not allow contaminants to reach groundwater. If such contamination is detected, the Applicant shall immediately remove the spent pot linings to secure location and satisfactorily remove the contamination.	Waste Dedicated SPL storage sheds constructed to manage SPL storage	9
The Applicant shall establish a fluoride monitoring system within the Gardens and the results obtained shall be made available to the Chairman of the Gardens or his representative.	Air quality Ambient fluoride monitoring station established at Botanic Gardens	4.2.2
The Applicant shall provide to the Department of Planning, NSW Agriculture and Fisheries, the Commission, the Board, NPWS, and the Council the results and analyses of environmental monitoring undertaken in pursuance of the provisions of conditions number 5 and 48. Such results and analyses shall be provided on a quarterly basis, for review by the responsible government bodies in order to identify any areas of non-compliance so that the necessary remedial action can be instituted. The Applicant shall agree to Council making the reports available on request for public inspection.	Reporting Quarterly and annual environment reports provided to interested parties	1
The Applicant shall prepare and implement, an Air Quality Monitoring Program for the development to the satisfaction of the Director-General. This program must: (a) be prepared in consultation with DECCW; (b) be submitted to the Director-General for approval by 1 May 2010; (c) include: i. three additional SO2 monitoring sites; ensuring sufficient monitoring points around "the Farm" precinct; ii. mapping of all monitoring points; iii. a description of the monitoring to be undertaken including pollutants, units of measure, frequency and sampling method; iv. a program to monitor the ongoing performance of the development; and v. a description of the contingency measures that would be implemented should the monitoring identify any non-compliances/exceedances.	Air quality Air quality monitoring program lodged with Director General in 2010 and again in 2018 following request from DOP&E Compliance Unit. Approval granted 14/6/18	4.2.2

The Applicant shall prepare and submit an Air Quality Verification Report to the satisfaction of the Director- General and DECCW by 30th May 2013	AECOM Air quality Verification Report 29/5/13. Lodgement of report 30/5/13	
Within 24 hours of any incident with actual or potential significant impacts on people or the biophysical environment, a report shall be supplied to the director outlining the basic facts. A further detailed report shall be prepared and submitted following investigation into the causes and identification of additional preventative measures. That report must be submitted to the director no later than 14 days after the incident. The applicant shall maintain a register of accidents, incidents and potential incidents.	Reporting requirement included in EMS. No incidents deemed reportable in 2019.	3.5
The Applicant shall prepare and implement, an updated Waste Management Plan for the site in consultation with DECCW and to the satisfaction of the Director-General.	Waste Management Plan lodged 21/6/11. Resubmitted in 2018. DOP&E approval 30/7/18	9
The Applicant shall prepare and implement, a revised Flora and Fauna monitoring Plan for the site in consultation with the DECCW to the satisfaction of the Director General	Buffer zone Management plan sent 21/6/10. Resubmitted in 2018 following request from DOP Compliance Unit. DOP&E approval 26/6/18	5 6
Additional requested information for AER post 2018		
1. Figures – please consider consolidating Figures 2.3 and 2.4 and show the development consent boundary over a current aerial image of the site	It was considered to lose too much detail from Figure 2.4 to consolidate the two, however figure 2.3 has been modified to show boundary over current aerial image.	2
2. Approvals – please include a table listing all the current approvals for the TAC site, including, but not limited to: a. Development Consents; b. Environmental Protection Licenses issued under the *Protection of the Environment Operastions Act 1997*; and c. Licences issued under the *Environmental Hazardous Chemicals Act 1985*.	Approvals listed in tabular form including any applicable expiry dates	3.1
3. Waste – Please include additional data on the volumes of the following wastes generated during the reporting period and stored on site as of 31 December: a. restricted waste (including the dredged stormwater basin sediment) b. general solid waste; and c. reject paste	a. tabulated b. tabulated c. reject paste is not a waste, it is recycled by the process,however a table showing the storage of these types of materials has been included	9.1
4. Noise – please report the maximum measured result for each noise monitoring site recorded during the reporting period against the noise goals and clearly identify if there has been any exceedance of the noise goals.	Maximums Included in tables. Goal exceedances identified.	10
5. Complaints – please include a section summarising the total number of complaints received and TAC response to each complaint.	Section included	3.4

3.3 Performance of the Development

The smelter operated at full capacity during 2020 producing an annual saleable production of 590,916 tonnes. Strategic decisions made throughout the year meant that this tonnage was approximately 1.3% below the original 2020 target. The saleable production target for 2021 is 593,584 tonnes.
Load based targets for the EPA licence year (November 2019 to October 2020) were met. Discharge concentration limits and volumes were met and the environmental monitoring program was completed to schedule.

3.4 Complaints

There were no complaints received during 2020.

3.5 EPA Reportable Incidents

Date	Incident nature
04/01/20	Voltage transformer failure during power curtailment activities resulting in loss of power to 7 of 9 Gas and Fume Treatment Centres for between 67 and 281 minutes.
11/02/20	Bake Ovens No 2 & 3 Fume Treatment Centre bypass for 101 minutes due to an electrical issue on one of the clean gas fans.
15/04/20	Bake Ovens No 2 & 3 Fume Treatment Centre outage for 79 minutes due to an erth fault on the crane collector rails within the ovens.
17/04/20	Bake Ovens No 2 & 3 Fume Treatment Centre deliberate bypass for 307 minutes to enable the emergency repair of a hot joint on one of the circuits.
06/05/20	Bake Ovens No 2 & 3 Fume Treatment Centre bypass for 101 minutes due to an electrical issue on one of the clean gas fans.
08/05/20	Outage of all Gas and Fume Treatment Centres for between 35 and 154 minutes due to a complete compressor house outage following the installation of an incorrect replacement part.
09/06/20	Bake Ovens No 2&3 Fume Treatment Centre bypass for 108 minutes due to a faulty cooling tower water control valve transmitter.
28/06/20	Bake Ovens No 2&3 Fume Treatment Centre bypass for 40 minutes following a bypass request by person unknown.
12/07/20	Outage of all Gas and Fume Treatment Centres for between 88 and 161 minutes caused by an earth fault on one compressor, which caused a trip of all auxiliary power.
13/07/20	Outage of all Gas and Fume Treatment Centres for between 112 and 347 minutes due to a trip of substation Group 25 resulting in a PLC remote rack communication failure and subsequent error in the switching schedule used when transferring the auxiliary load.
25/09/20	Bake Ovens No 1 Fume Treatment Centre bypass for 74 minutes due to an electrical issue on one of the fans motors.
29/09/20	Bake Ovens No 1 Fume Treatment Centre bypass for 110 minutes due to an electrical issue on one of the fans motors.
27/10/20	Outage of Potline 3 West Gas Treatment Centre for 54 minutes due to a short circuit in one of the filters.
28/10/20	Outage of Potline 2 East Gas Treatment Centre for 89 minutes due to the failure of an inlet gas thermocouple.
12/11/20	Bake Ovens No 1 Fume Treatment Centre bypass for 81 minutes due to an accidental trip during maintenance activities.
30/11/20	Bake Ovens No 2 & 3 Fume Treatment Centre bypass for 71 minutes due to the pressing of an E-stop during maintenance activities.

All relevant information on the EPA reportable incidents has been given to the EPA and DoPE as per established protocols defined in the Tomago Aluminium Environment Management System.

4. ENVIRONMENT MANAGEMENT AND PERFORMANCE

4.1 Environment Management System

Tomago Aluminium Company operates an Environmental Management System (EMS) certified to ISO 14001- 2015. The EMS drives continual improvement and assists with the management of compliance to regulatory requirements. A surveillance audit and recertification audit of the system were conducted by Quality Control Services (Environmental) during 2020.

4.2 Air Quality

4.2.1 Source Emissions

Key atmospheric emissions from aluminium smelting include fluorides (both gaseous and particulate) and sulfur dioxide. During the 2009 approval process load limits of 298 tonnes for fluoride and 11,900 tonnes for sulfur dioxide were established. These limits were respected in the 2019-2020 licence year.

Pot cell emissions are collected and transported to a number of Gas Treatment Centres (GTCs) to minimise fluoride emissions to the environment. At each GTC, fresh alumina is injected into the stream of potline off take gases, and the alumina reacts with hydrogen fluoride in the gas stream. Once reacted, the fluoride and alumina mix is collected with other particulate emissions in the baghouses and recycled back into the potrooms. Similarly, emissions generated from the baking of carbon anodes is directed to Fume Treatment Centres (FTCs) where they are scrubbed with alumina. The fluoride scrubbing efficiency of the GTCs and FTCs is greater than 99%.

During the 2019-2020 licence year average uptime on the Gas and Fume Treatment Centres was 99.8%.

4.2.1.1 Fluoride Source Emissions

The level of fluoride emissions from smelting operations is a major indicator of environmental performance.

The EPA licence conditions require that the total fluoride emissions from the smelter must not exceed:

(a) The equivalent of 0.8 kilograms of total fluoride per tonne of aluminium produced (0.8 kg F/t Al) as a monthly average

(b) The equivalent of 0.56 kilograms of total fluoride per tonne of aluminium produced (0.56 kg F/t Al) as an annual average, and

(c) The equivalent of 0.6 kilograms of total fluoride per tonne of aluminium produced (0.6 kg F/t Al) as an annual average for more than one year out of every five years.

(d) A total fluoride load of 298 tonnes for the EPL licence year (November to October).

The majority of total fluoride emissions result from ventilation through the roof vents of the potrooms.

The roof ventilator of each potroom is monitored twice per month and each stack is monitored six times per quarter for total fluoride emissions. Continuous gaseous fluoride monitoring exists on all Gas and Fume Treatment Centre stacks on site.
The annual average fluoride level in 2020 was 0.46 kg F / t Aluminium produced.
The total fluoride load for 2019/2020 EPA licence year (November 2019 to October 2020) was 276.3 tonnes, against a Load Based Licence Limit of 298 tonnes.
Table 4.1 displays the fluoride emissions from the stacks and potline roof vents along with the total plant emission rate for each month.
Figure 4.1 displays the total plant emission rate for each month and **Figures 4.2A** and **4.2B** display the annual average emission rates and annual fluoride total loads for the past 5 years.
Note: Total loads are calculated on EPA licence year of November – October.

Table 4.1 - AVERAGE MONTHLY FLUORIDE EMISSION RATES FROM THE TOMAGO ALUMINIUM SMELTER FOR 2020

(All results are in kilograms total fluoride per tonne of aluminium produced)

STACK (EPA Point No.)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Potline 1 West (1)		0.06	0.04		0.05	0.04		0.04	0.03		0.06	0.06
Potline 1 East (2)	0.05		0.07	0.04		0.04	0.05		0.05	0.04		0.05
Potline 2 West (3)	0.05	0.05		0.06	0.04		0.04	0.04		0.04	0.05	
Potline 2 East (4)	0.05		0.04	0.06		0.06	0.03		0.04	0.04		0.06
Potline 1&2 Ext'n (9)		0.05	0.04		0.04	0.04		0.03	0.04		0.05	0.04
Potline 3 West (7)	0.07	0.07		0.08	0.07		0.03	0.03		0.05	0.06	
Potline 3 East (8)		0.10	0.06		0.05	0.07		0.03	0.05		0.06	0.08
Bake Oven 1 (5)	0.003	0.004		0.002	0.002		0.001	0.002		0.002	0.001	
Bake Oven 2 (6)	0.003		0.003	0.002		0.002	0.001		0.001	0.002		0.003

Roof Vents (EPA Point No.)	Monthly Licence Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Potroom A (10)		0.43	0.54	0.45	0.42	0.37	0.40	0.33	0.39	0.41	0.58	0.48	0.48
Potroom B (11)		0.38	0.43	0.39	0.40	0.36	0.40	0.43	0.41	0.39	0.38	0.40	0.39
Potroom C (12)		0.47	0.52	0.57	0.47	0.42	0.37	0.34	0.36	0.36	0.49	0.43	0.49
Potroom D (13)		0.59	0.64	0.60	0.50	0.48	0.47	0.44	0.40	0.47	0.50	0.42	0.47
Potroom E (14)		0.41	0.44	0.48	0.34	0.30	0.34	0.32	0.27	0.36	0.30	0.34	0.34
Potroom F (15)		0.37	0.54	0.47	0.37	0.39	0.26	0.28	0.24	0.32	0.28	0.34	0.32
Total Plant Emission (30)	**0.8**	**0.50**	**0.58**	**0.55**	**0.48**	**0.44**	**0.42**	**0.39**	**0.38**	**0.43**	**0.47**	**0.46**	**0.47**

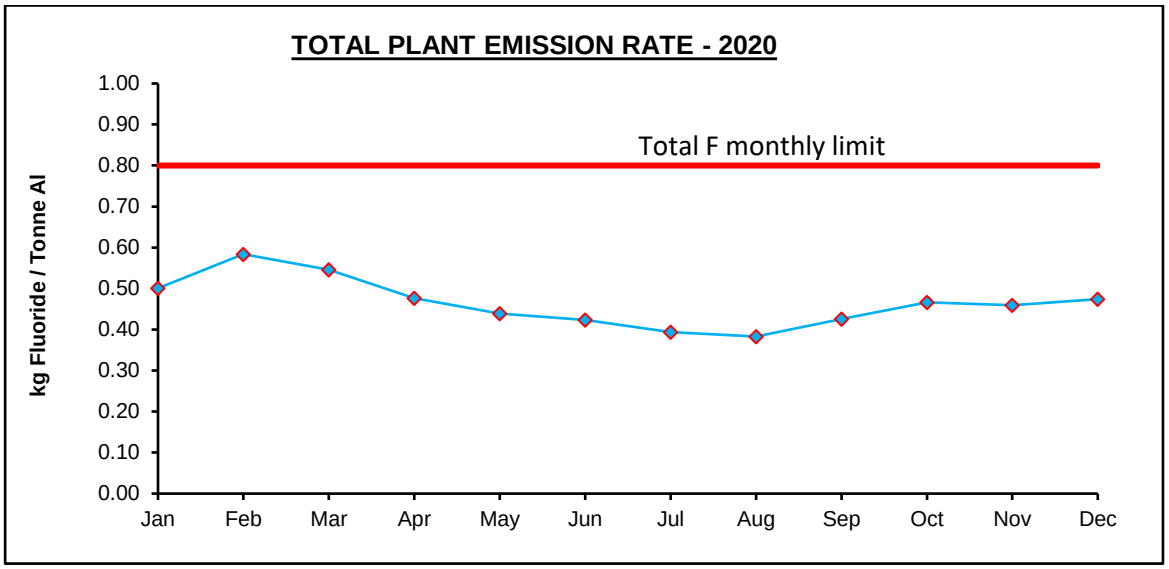


Figure 4.1: TOTAL MONTHLY FLUORIDE EMISSION RATES FROM THE TOMAGO ALUMINIUM SMELTER

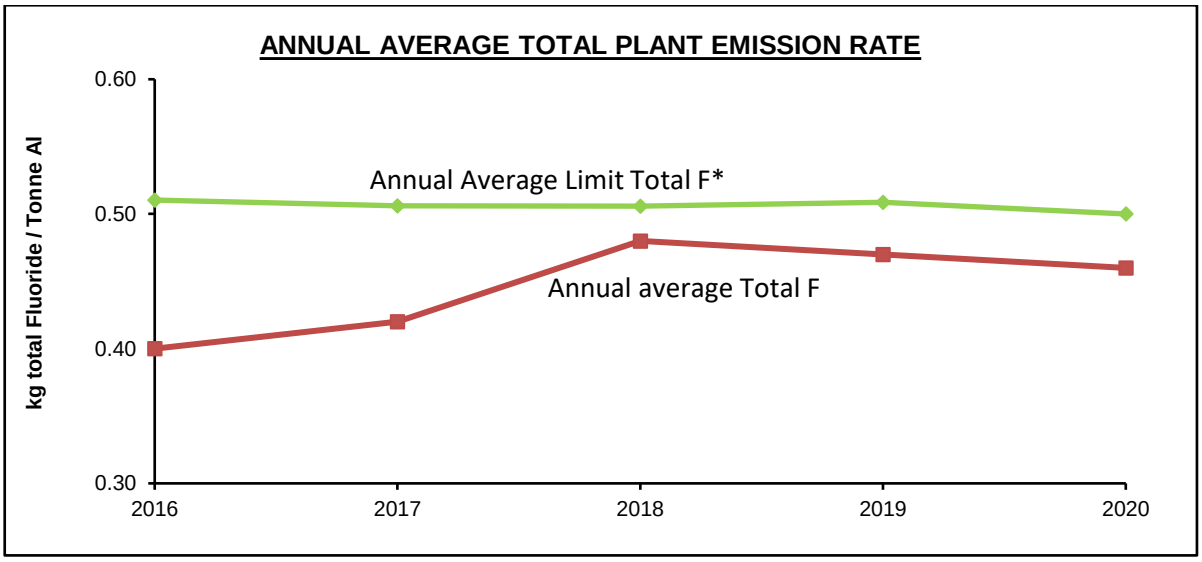


Figure 4.2A: ANNUAL AVERAGE FLUORIDE EMISSION RATES FOR THE TOMAGO ALUMINIUM SMELTER (2016 - 2020)

***Calculated using hot metal production and Fluoride load limit, not licence concentration limit

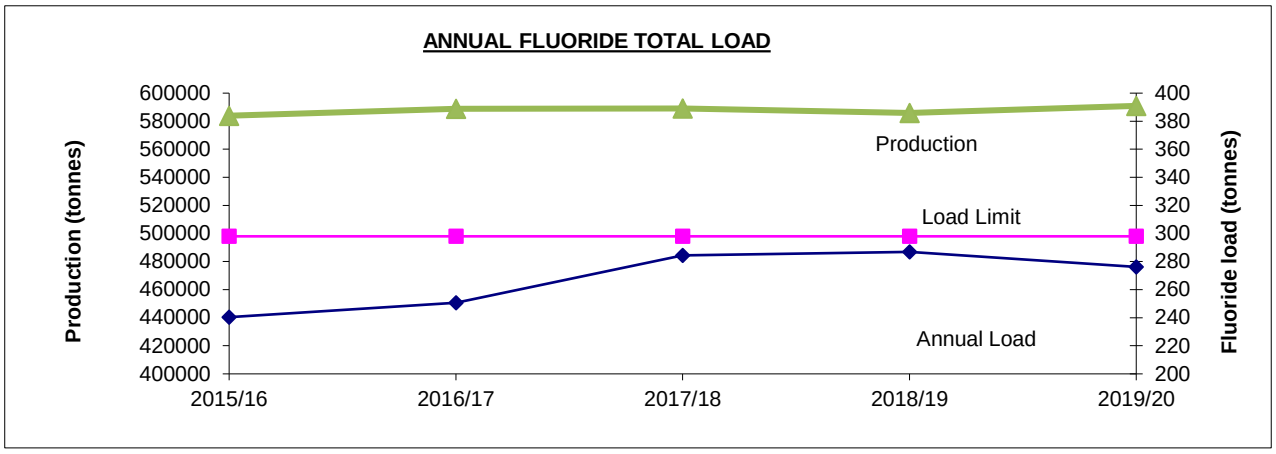


Figure 4.2B: ANNUAL FLUORIDE TOTAL LOAD FOR THE TOMAGO ALUMINIUM SMELTER (2015/16 – 2019/20)

4.2.1.2 Sulfur Dioxide Source Emissions

Sulfur dioxide emissions from aluminium smelting operations are the result of the concentration of sulfur in petroleum coke, the raw material used in the manufacture of carbon anodes for the electrolysis process and, to a much lesser extent, the sulfur level in coal tar pitch, used as a binder in the anode manufacturing process.
The smelter has a current total load limit of 11,900 tonnes per annum of sulfur dioxide. Sulfur dioxide annual total loads for the past 5 years are presented in Figure 4.3. Sulfur dioxide emission rates are presented in Table 4.2 and Figure 4.4 displays the annual average emission rates for the past 5 years.

Note: Total loads are calculated on EPA licence year of November – October.

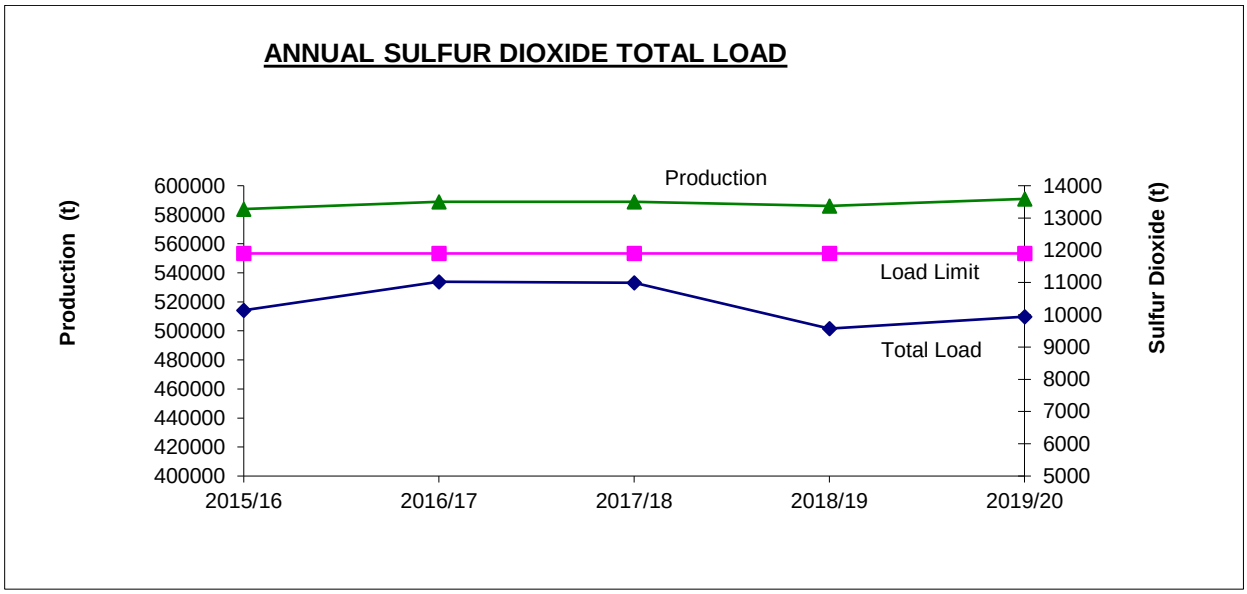


Figure 4.3: ANNUAL SULFUR DIOXIDE TOTAL LOADS FOR THE TOMAGO ALUMINIUM SMELTER (2015/16 – 2019/20)

Table 4.2: SULFUR DIOXIDE EMISSION RATES FROM THE TOMAGO ALUMINIUM SMELTER FOR 2020

(All results are in kilograms of sulfur dioxide per tonne of aluminium produced)

Stacks	2020
POTLINE 1	15.6
POTLINE 2	15.7
POTLINE 3	14.7
BAKE OVENS	1.3
PLANT TOTAL	**16.6**

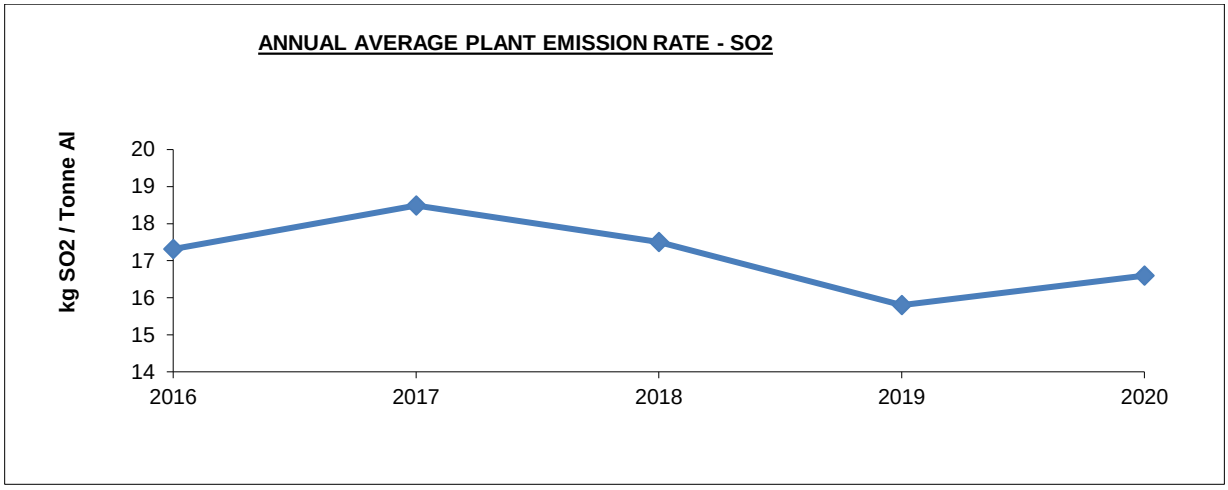


Figure 4.4: ANNUAL SULFUR DIOXIDE EMISSION RATES FOR THE TOMAGO ALUMINIUM SMELTER (2016 – 2020)

4.2.1.3 Other Source Emissions

Other point source emissions tested as per the requirements of POEO Licence 6163 for the 2019-20 Licence year are detailed in Tables 4.3, 4.4 and 4.5 below.

Table 4.3: ANNUAL POTLINE AND BAKE OVENS STACK TESTING 2019-2020 LICENCE YEAR

EPA Monitoring Point	1	2	3	4	5	6	7	8	9
Descriptor	Line 1 West Stack	Line 1 East Stack	Line 2 West Stack	Line 2 East Stack	Anode Plant 1 Stack	Anode Plants 2&3 Stack	Line 3 West Stack	Line 3 East Stack	Line 1&2 Extension Stack
Total Solid Particles, mg/m3	6.4	9.2	6.6	10	14	3.0	18	19	8.7
Monitoring frequency requirement	Annually	Annually	Annually	Annually	Annually	Annually	Annually	Annually	Annually
Date Tested	24/06/2020	29/01/2020	8/05/2020	31/03/2020	30/04/2020	28/04/2020	29/11/2019	27/05/2020	24/08/2020
Licence Limit, mg/m3	50	50	50	50	50	50	50	50	50
Nitrogen Oxides, g/m3					0.15	0.14			
Monitoring frequency requirement					Annually	Annually			
Date Tested					29/04/2020	27/04/2020			
Licence Limit, mg/m3					2.0	2.0			
Total PAH's as Benzo(a)pyrene equivalent, mg/m3					0.000018	0.00015			
Monitoring frequency requirement					Annually	Annually			
Date Tested					29/04/2020	27/04/2020			
Licence Limit, mg/m3					0.005	0.005			

Table 4.4: ANNUAL PASTE PLANTS STACK TESTING 2019-2020 LICENCE YEAR

EPA Monitoring Point	31	32	33	34
Descriptor	No.1 Paste Plant, Pitch Circuit Stack	No.1 Paste Plant, Proportioning Circuit Stack	No.2 Paste Plant, Pitch Circuit Stack	No.2 Paste Plant, Proportioning Circuit Stack
Total Solid Particles, mg/m3	1.1	3.1	12	13
Monitoring frequency requirement	Annually	Annually	Annually	Annually
Date Tested	15/05/2020	26/03/2020	23/07/2020	23/07/2020
Licence Limit, mg/m3	50	50	50	50
Total PAH's as Benzo(a)pyrene equivalent, mg/m3	0.000019	0.00012	0.00014	0.000038
Monitoring frequency requirement	Annually	Annually	Annually	Annually
Date Tested	15/05/2020	26/03/2020	23/07/2020	23/07/2020
Licence Limit, mg/m3	0.005	0.005	0.005	0.005

Table 4.5: ANNUAL DELINE DEDUST STACK TESTING 2019-2020 LICENCE YEAR

EPA Monitoring Point	**38**	
Descriptor	Deline/Regain Spent Potliner Dust Filter	
	Total Solid Particles, mg/m3	**Fine Particulates, mg/m3**
	2.2	1.2
Monitoring frequency requirement	Annually	Annually
Date Tested	17/01/2020	17/01/2020
Licence Limit, mg/m3	20	10

During 2020, TAC's Envronment Protection Licence (6163) was amended from having a concentration limit for Total PAH's on Monitoring Points 31-34, to a concentration limit on Total PAH's as benzo(a)pyrene equivalent. This limit was applied to Monitoring Points 5 and 6.

4.2.2 Ambient Air Monitoring

The ambient concentrations of fluoride and sulfur dioxide are monitored in the vicinity of the smelter. A major objective of this monitoring program is to determine the dispersion of atmospheric fluoride and sulfur dioxide and to confirm the effectiveness of the established and recognised buffer zone.

4.2.2.1 Ambient Fluoride Monitoring

The buffer zone was determined through modelling smelter emissions using the Buoyant Line and Point Source (BLP) model; the area encapsulated by the 0.3 µg/m3 isopleth for gaseous fluoride being the designated buffer zone.

The buffer zone was designated during the approval process for the third potline in 1991 to accommodate an annual emission equivalent of 298 tonnes of total fluoride per year. The establishment of the buffer zone is to assist in the management of land use around the smelter and to ensure incompatible activities such as dairy cattle grazing were controlled. Tomago Aluminium purchased land that was zoned as either rural or residential under the Development Consent. As production at the smelter has increased, the 298 tonne of total fluoride per year limit has been respected.

The model has proven to be an accurate indicator of annual ambient gaseous fluoride concentration in the vicinity of the smelter.

A comparison of the annual average concentrations to the emission dispersion modelling results is presented in Figure 4.5. In general, the model tends to under-predict concentrations to the South-East of the smelter, and over-predict concentrations to the North-West.

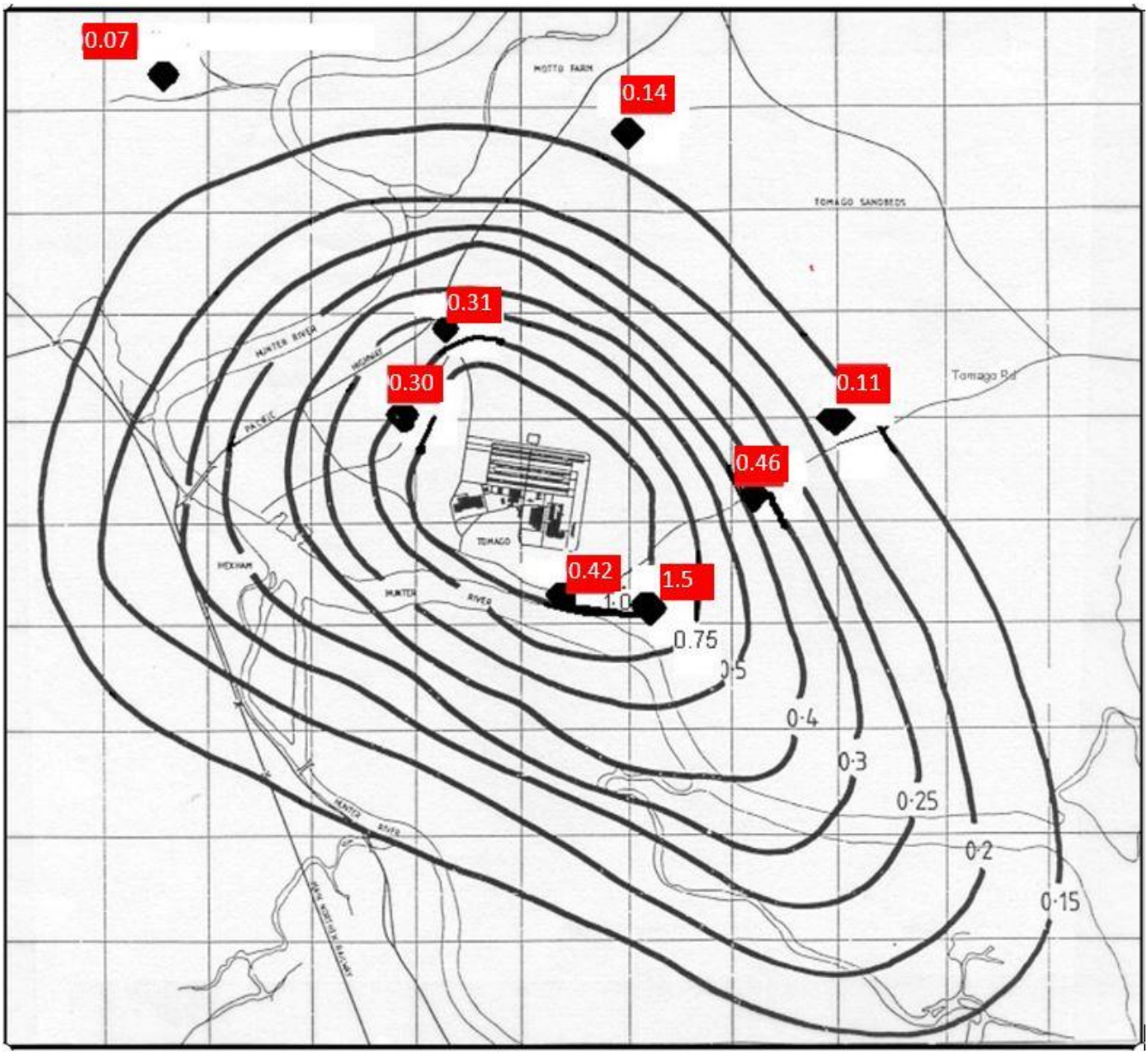


Figure 4.5: Comparison of annual average ambient gaseous fluoride concentrations in 2020 to predicted EIS modelled concentrations.

Tomago Aluminium operates 8 sites for the monitoring of fluoride in ambient air (see Appendix 1, Map1).

Ambient fluoride monitoring is undertaken in accordance with Australian Standard AS/NZS 3580.13.2. The weekly average gaseous fluoride results are illustrated in Figure 4.6 where they are compared to 7 day National Goals established by the Australian and New Zealand Environment Conservation Council (ANZECC). Figure 4.7 displays the annual average total fluoride ambient levels for the past 5 years.

The ANZECC guidelines state (in part) that:

"...goals for ambient air fluoride are designed to protect against injury to plants and grazing animals rather than to protect human health. This is because fluoride can injure vegetation at one-thousandth the level of concern to human health."

"The goals set for General Land Use (including residential) are designed to protect most of the sensitive species in the natural environment.

The goals set for Specialised Land Use apply when commercially valuable plants, which are demonstrated to be very sensitive to fluoride are being considered."

"The ambient air goals for fluoride are intended for areas of commercial or conservation value and not intended for comparison with airborne or foliar fluoride levels within industrial areas or buffer zones associated with fluoride emitting industries."

"Air quality objectives will generally be applied at the outer limits of an industrial buffer zone." (ANZECC 1990).

The concentrations of gaseous fluoride in ambient air are compared to these guidelines. A conservative approach is taken with sites within the designated buffer zone compared to the general land use goals while sites outside the buffer zone compared to the specialised land use goals.

During 2020 at site 181, the Tomago Farm, there were several exceedances of the goals. This site experiences elevated levels due to the prevalence of seasonal westerly to north westerly winds. There was also one occasion when the goals were exceeded at Site 84 directly to the west of the smelter during a week of persistent strong easterly winds. Both these sites are well within the company buffer zone, which was established in recognition that some locations would exhibit fluoride levels in excess of the ANZECC goals.

The annual average ambient fluoride results for 2020 remain reasonably consistent with the data collected over the prior 4 years.

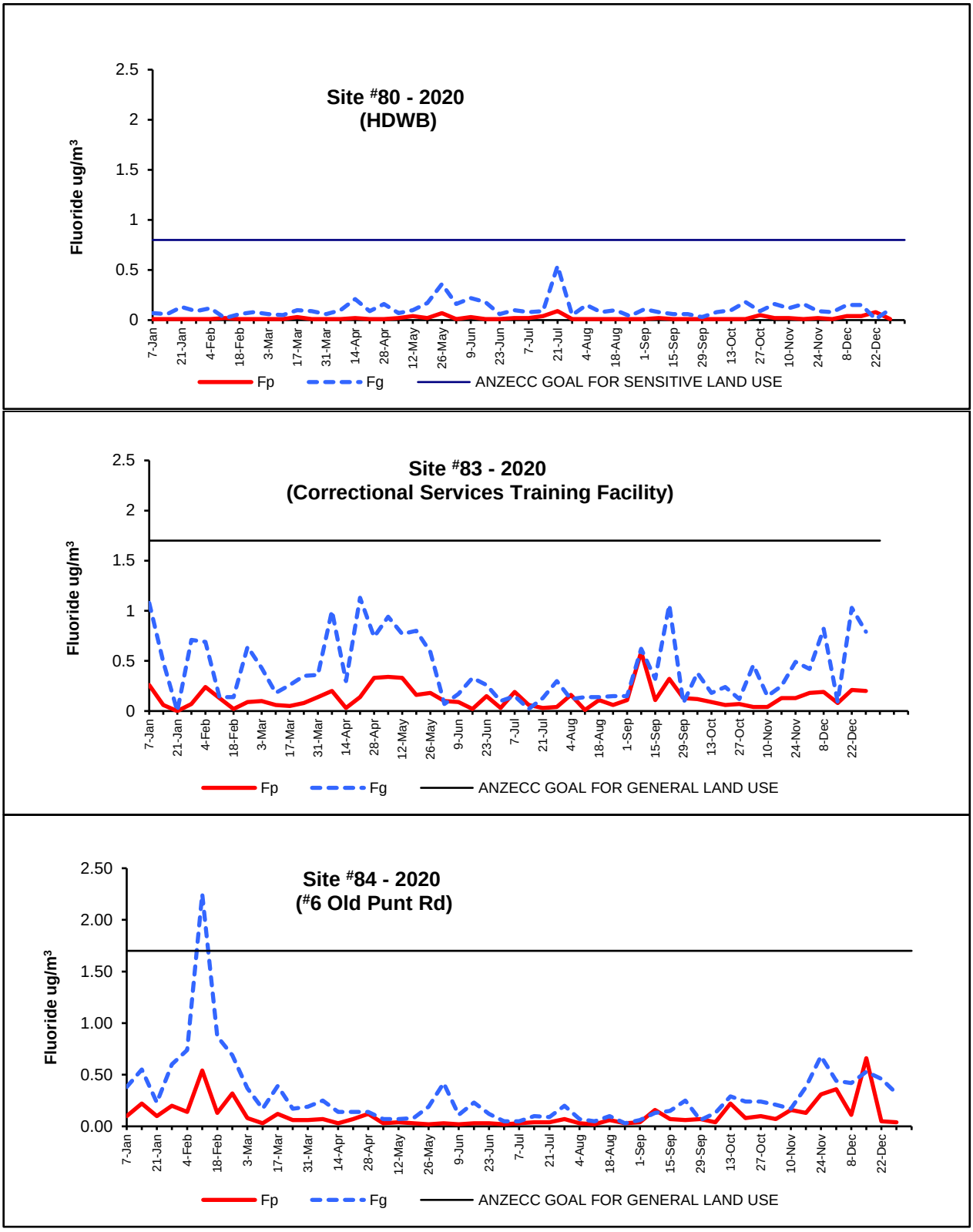


Figure 4.6: Tomago Aluminium weekly ambient fluoride monitoring results for 2020

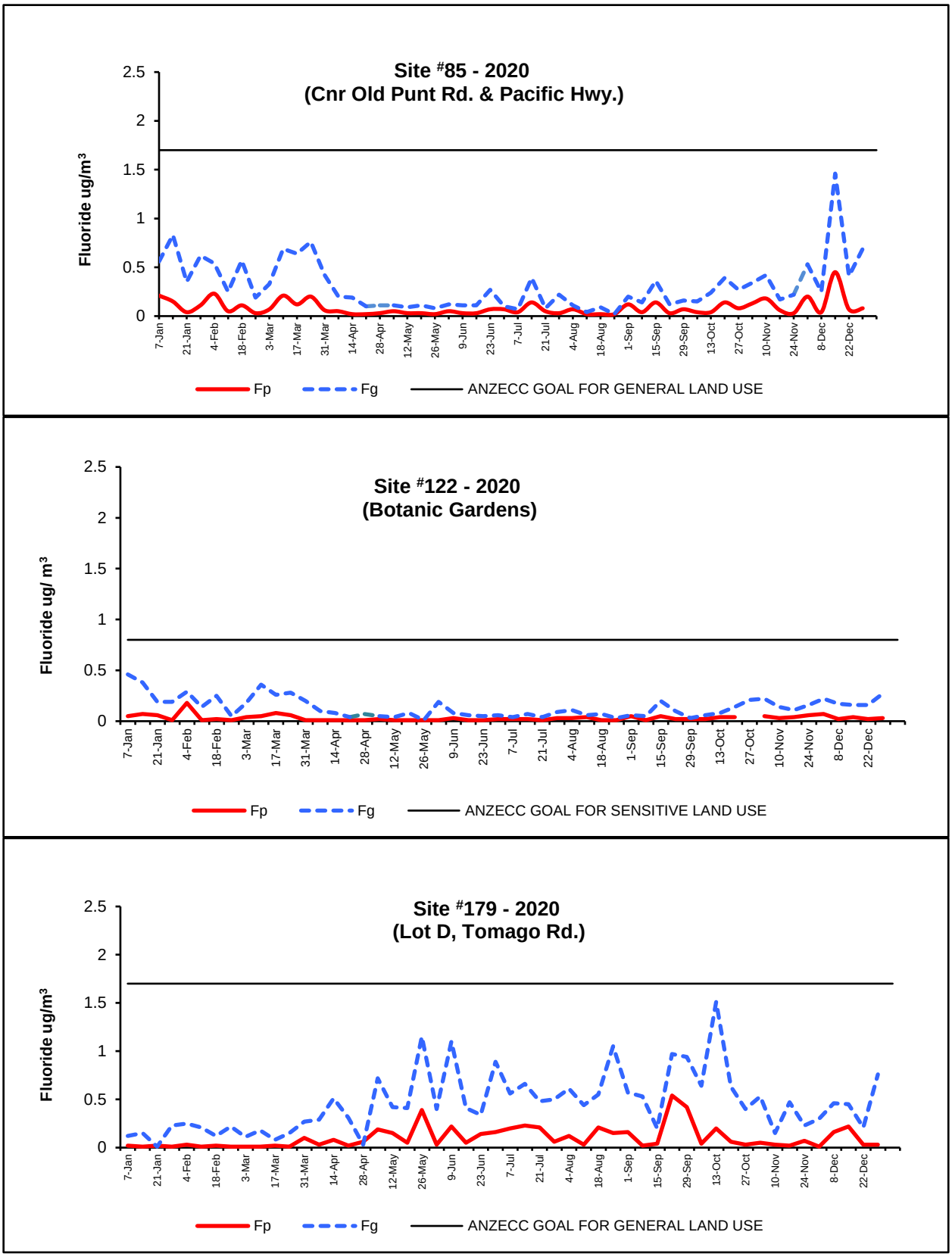


Figure 4.6: Tomago Aluminium weekly ambient fluoride monitoring results for 2020

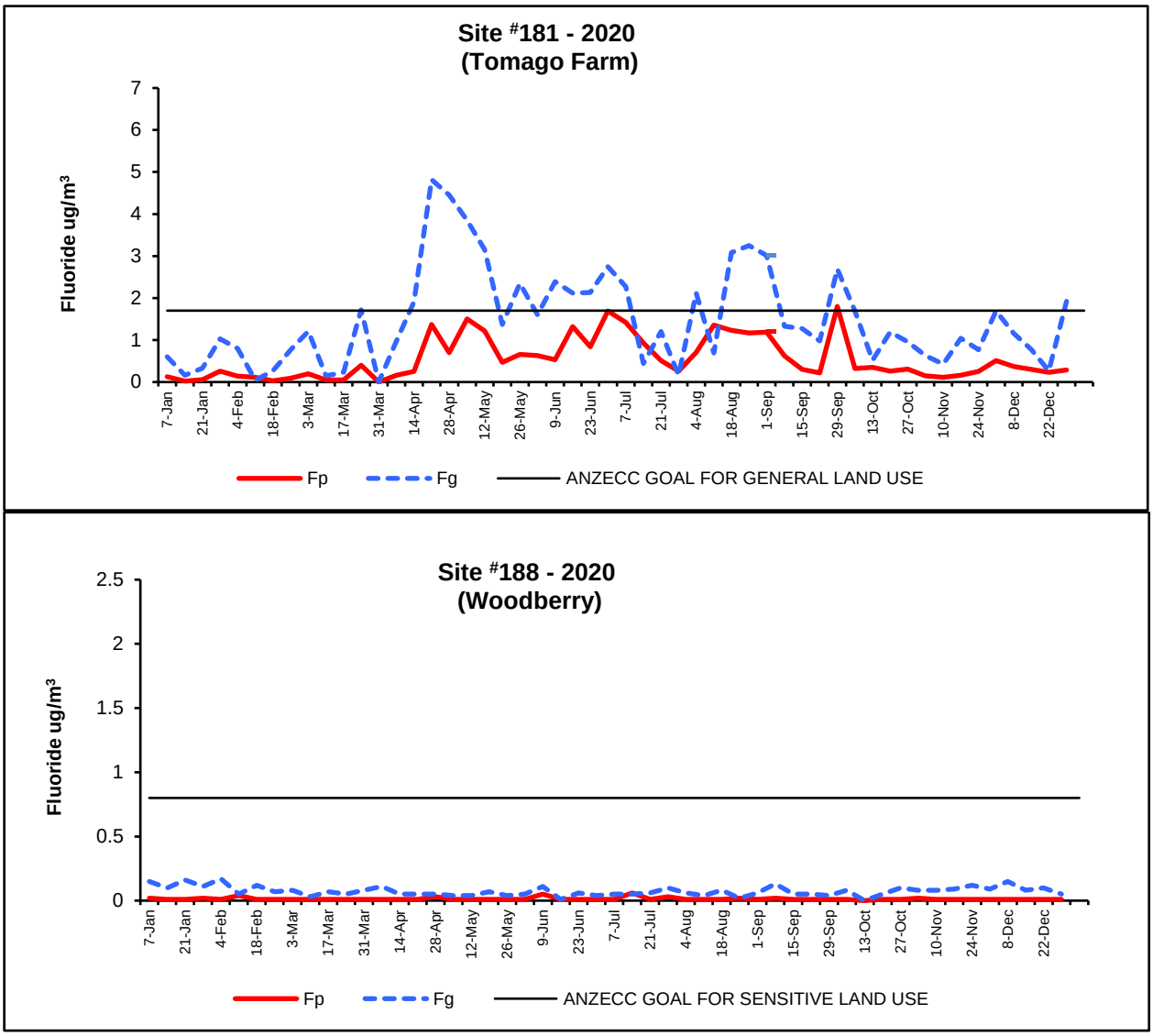


Figure 4.6: Tomago Aluminium weekly ambient fluoride monitoring results for 2020

Note: ANZEC recommended limit for SENSITIVE LAND USE is 0.8ug/m3 and for GENERAL LAND USE is 1.7ug/m3.

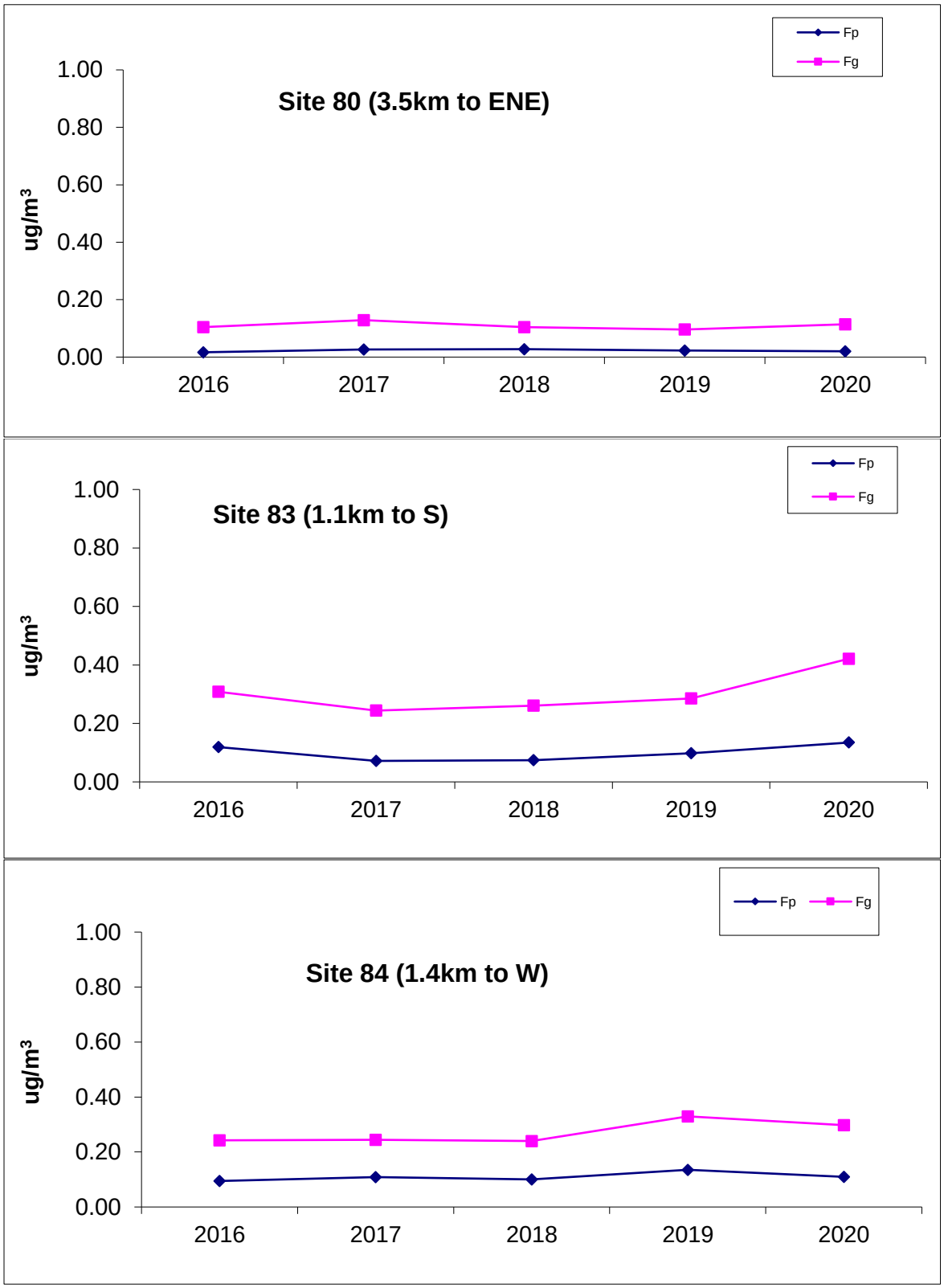


Figure 4.7: Tomago Aluminium annual average total fluoride in ambient air levels (2016 – 2020)

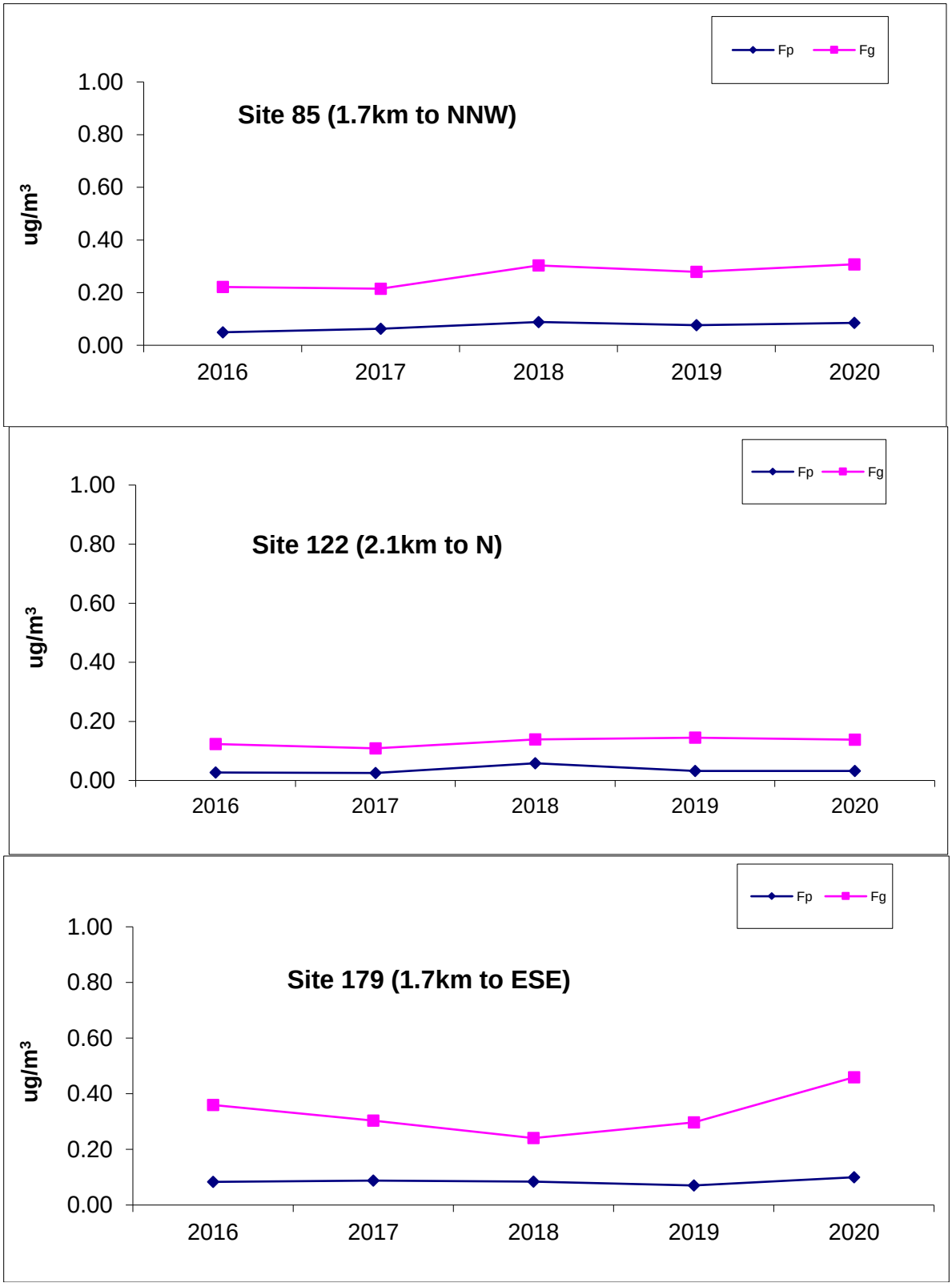


Figure 4.7: Tomago Aluminium annual average total fluoride in ambient air levels (2016 – 2020)

Figure 4.7: Tomago Aluminium annual average total fluoride in ambient air levels (2016 – 2020)

4.2.2.2 Ambient Sulfur Dioxide Monitoring

Concentrations of sulfur dioxide were determined in accordance with Australian Standard AS 3580.4.1 at five sites during 2020.

The results for 2020 are presented in Tables 4.6 and 4.7 and presented graphically in Figures 4.8A to 4.8E and 4.9. The NEPM air quality concentration levels and goals are:

Averaging Period	NEPM Standard Levels
1 hour	20.0 pphm
1 day	8.0 pphm
1 year	2.0 pphm

The NEPM goal allows for 1 hour and 1 day Standard Levels to be exceeded for one day per year.

The desired environmental outcome of the NEPM is ambient air quality that allows for the adequate protection of human health and well-being.

There was one occasion during May 2020 when the NEPM level was exceeded at at the Tomago Farm site. This event occurred on a day of strong, persistent West to North-West winds.

It should be noted that all the ambient sulfur dioxide monitoring stations are located within the designated buffer zone for the smelter.

Table 4.6: MAXIMUM SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 AT TOMAGO ALUMINIUM MONITORING SITES

SITE		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Meteorological Station	Max 24 hour Value (pphm)	1.6	0.3	1.7	1.4	6.4	3.4	5.9	2.2	0.6	2.0	2.6	1.3
Grid Ref (812 681)	Max 1 hour value (pphm)	9.7	2.7	6.7	6.5	11	11.4	13.4	7.4	3.8	7.7	8.8	8.2
Tomago Farm Monitor	Max 24 hour Value (pphm)	1.5	0.8	4.5	5.3	10.4	5.7	6.4	7.9	5.2	2.4	4.0	3.0
Grid Ref (813 665)	Max 1 hour value (pphm)	6.2	2.7	14	14.4	14.5	12.3	16.4	14.3	11.6	10.8	13.8	9.7
Highway Monitor	Max 24 hour Value (pphm)	1.7	1.6	2.4	0.4	0.7	1.1	0.4	1.4	1.4	1.1	1.4	3.7
Grid Ref (793 688)	Max 1 hour value (pphm)	7.0	5.9	7.6	2.4	2.7	3.7	2.7	12.8	4.7	5.0	6.0	9.3
Laverick Ave Monitor	Max 24 hour Value (pphm)	1.4	2.5	2.9	1.7	0.6	0.5	0.5	0.5	1.2	1.2	1.3	2.6
Grid Ref (784 667)	Max 1 hour value (pphm)	6.7	8.0	8.2	17.5	2.0	1.4	3.6	2.0	7.2	6.1	5.8	7.9
Site 179 Monitor	Max 24 hour Value (pphm)	0.6	0.7	1.2	1.9	3.2	3.3	2.1	2.1	1.5	1.5	0.7	1.3
Grid Ref (817 671)	Max 1 hour value (pphm)	2.2	3.8	4.4	7.8	10.4	10.5	7.9	7.2	8.2	5.6	4.7	6.5

Table 4.7: ANNUAL AVERAGE SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 AT TOMAGO ALUMINIUM MONITORING SITES

SITE	Meteorological Station	Tomago Farm	Highway	Laverick Ave	Site 179
Annual Average (pphm)	0.4	1.1	0.3	0.3	0.4

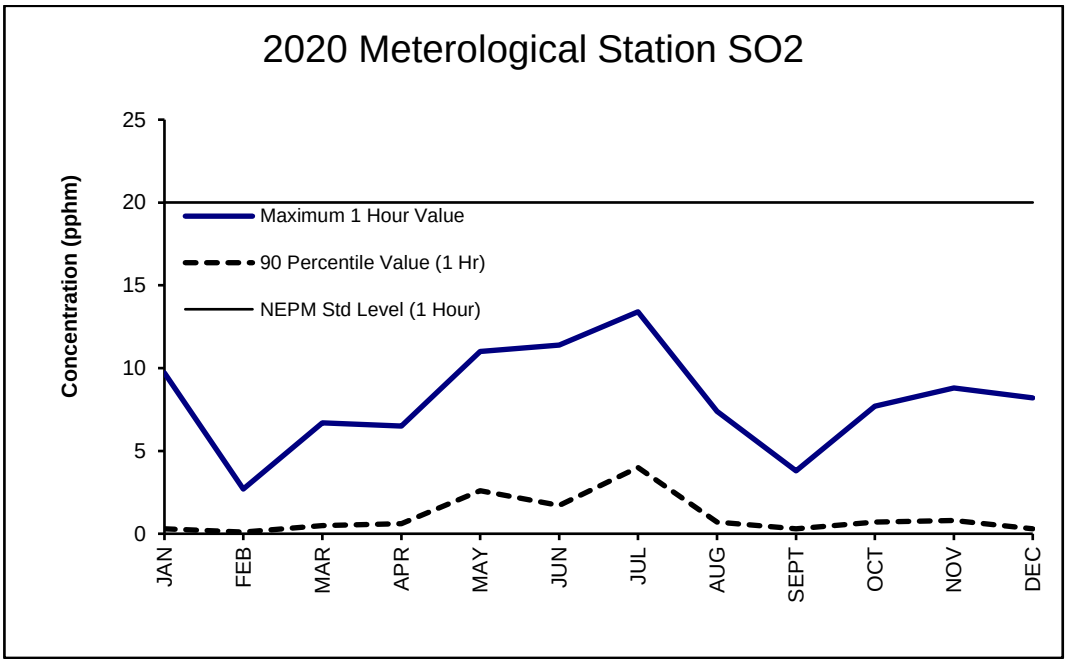


Figure 4.8A: SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 COMPARED TO NEPM STANDARD 1 HOUR LEVELS (Met Station)

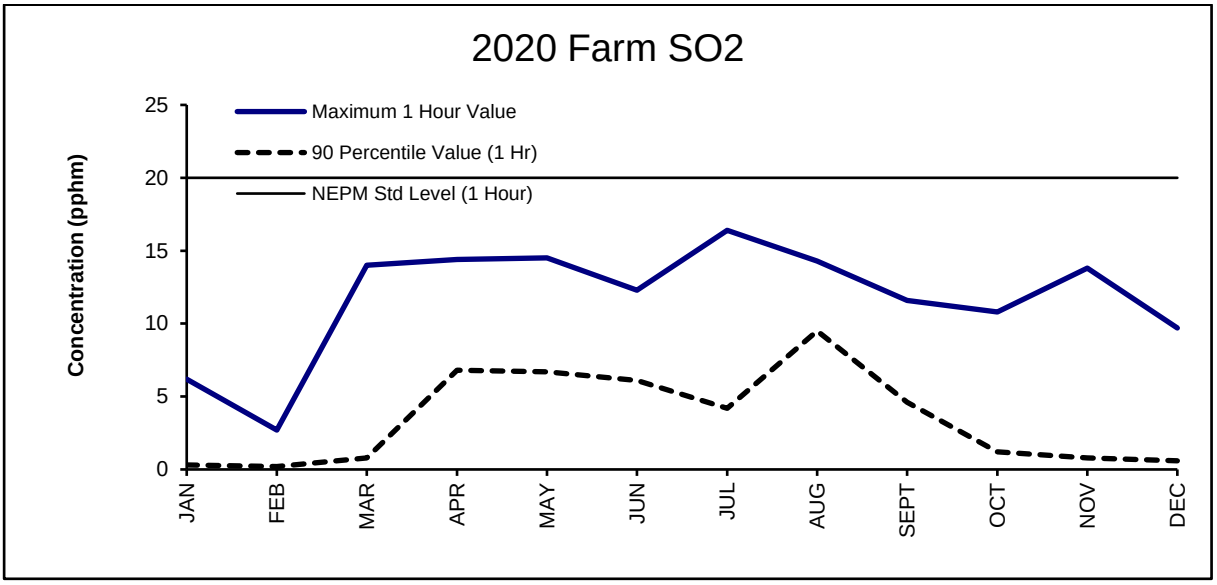


Figure 4.8B: SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 COMPARED TO NEPM STANDARD 1 HOUR LEVELS (Farm)

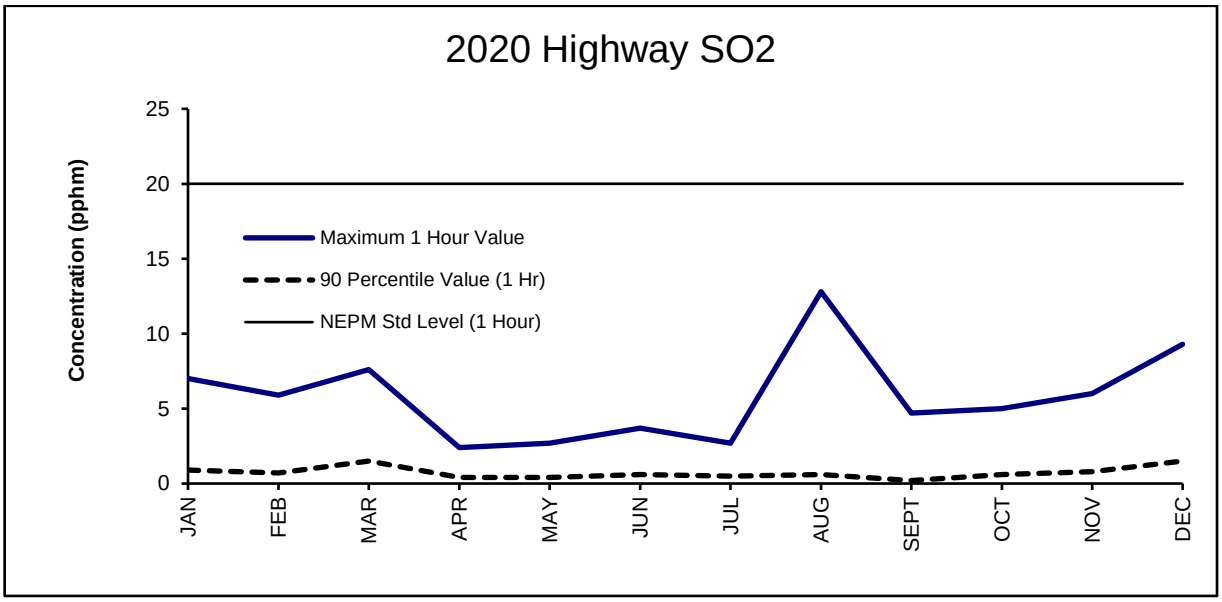


Figure 4.8C: SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 COMPARED TO NEPM STANDARD 1 HOUR LEVELS (Highway)

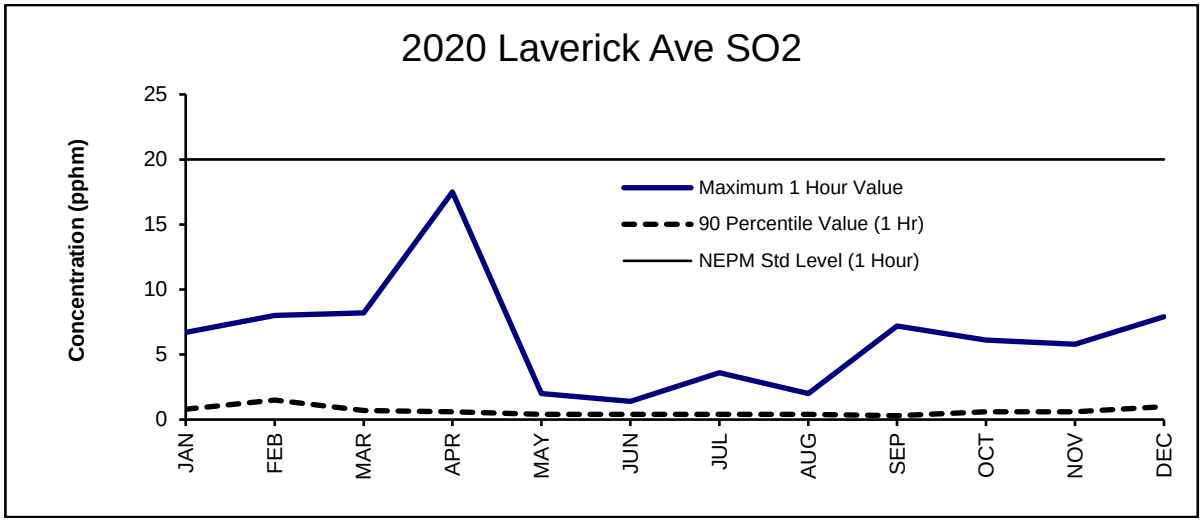


Figure 4.8D: SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 COMPARED TO NEPM STANDARD 1 HOUR LEVELS (Laverick Ave)

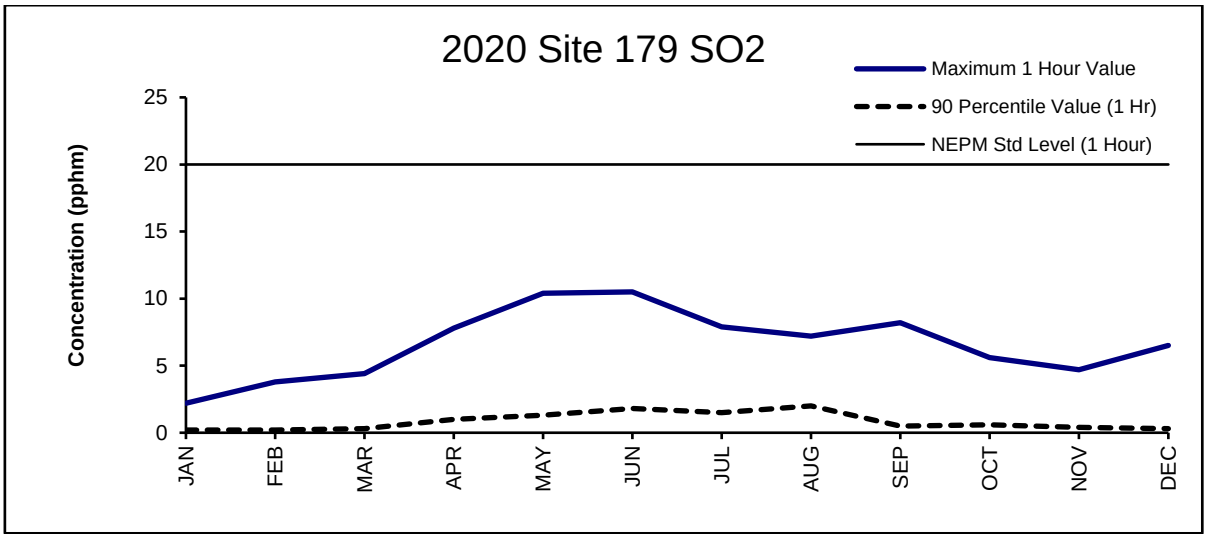


Figure 4.8E: SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2020 COMPARED TO NEPM STANDARD 1 HOUR LEVELS (Site 179)

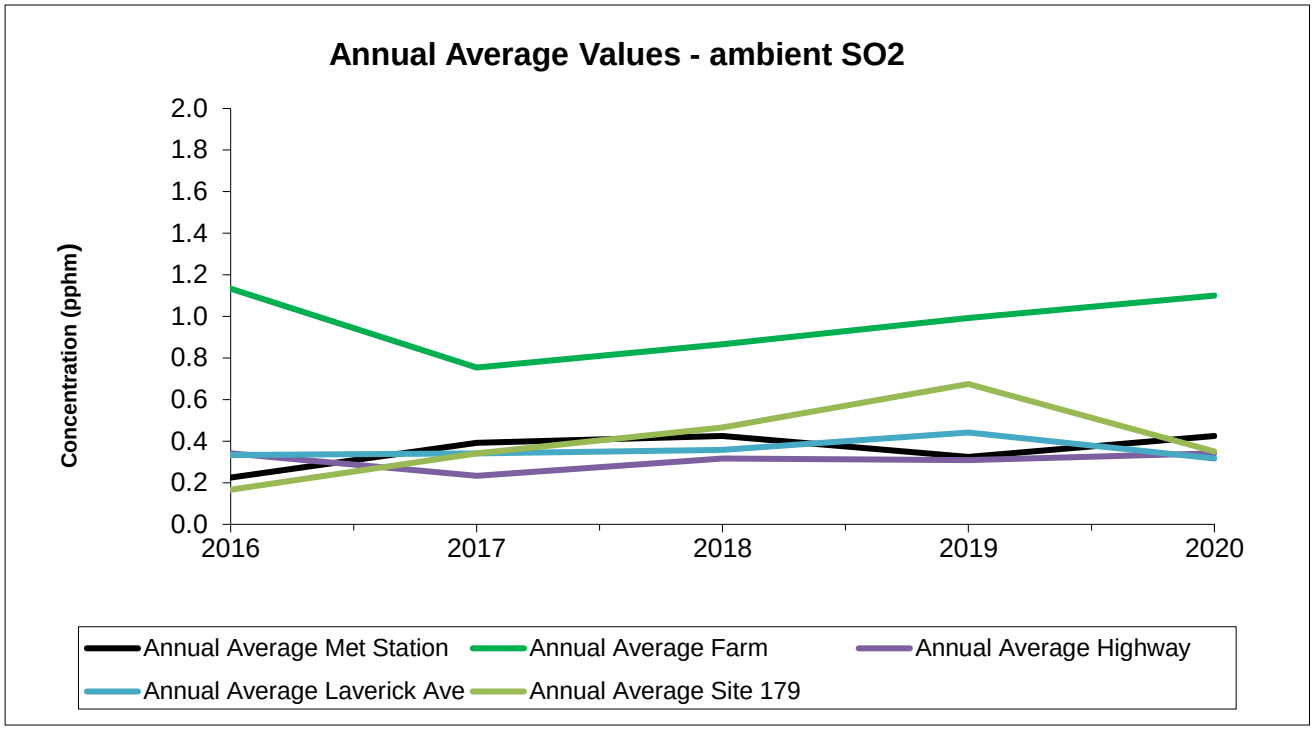


Figure 4.9 AVERAGE ANNUAL SULFUR DIOXIDE CONCENTRATIONS IN AMBIENT AIR FOR 2016 - 2020

4.3 Meteorological Monitoring

Tomago Aluminium operates a meteorological station to assist in the modelling of emissions and to allow interpretation of results.

The meteorological station provided reliable, continuous data during 2020 for wind direction, wind speed, rainfall, humidity, temperature and solar radiation. Detailed meterological data reports are provided in the Quarterly Environment Reports. Data capture rate for 2020 was greater than 99 %.

5. VEGETATION

An extensive vegetation monitoring program is conducted with sites that are situated at varying distances from the smelter sampled on a monthly or quarterly basis. To complement this program an annual visual inspection of the condition of vegetation is conducted by an external consultant.

Gaseous fluoride concentrations in the air can affect the condition of vegetation. Gaseous fluoride is absorbed by plants via the leaf stomata during normal respiration processes. The gaseous fluoride is preferentially absorbed instead of carbon dioxide and can reduce the capacity of the plant to photosynthesise. The extent to which fluoride accumulates in vegetation depends upon a number of variables including exposure regimes, meteorological conditions and plant species characteristics. Specific plant characteristics are an important variable as species can vary in their sensitivity to fluoride. Sensitive species often display foliar damage at tissue concentrations of 50 μg/g. Intermediate species may be damaged at 200 μg/g and resistant species can tolerate tissue concentrations above 500 μg/g before exhibiting symptoms. Background concentrations are typically around 20 μg/g.

5.1 Visual Assessment

A total of 598 sites were assessed in late November and early December 2020. Visible injury symptoms attributable to gaseous emissions from the smelter, particularly hydrogen fluoride and sulfur dioxide, were identified and graded. The grading was used to provide a semi-quantitative indication of the occurrence of injury. Symptoms assessed include: marginal and interveinal chlorosis, undulation, cupping or buckling of the leaf blade, necrosis (death) of tissues at the tip of the leaf, necrosis along the marginal of the leaf, accumulation of anthocyanins (tannin-like materials) in the leaf, leaf- chewing insect or browsing injury, sap-sucking insect injury. Other possible causes of injury, including drought, storm effects, fire or mechanical damage were noted to indicate total injury expression and a separate estimate of injury expression was made for the effects of atmospheric pollutants.
The sites were mapped and the injury category interpolated to produce a model of vegetation injury around the smelter.
Figure 5 shows a model of visible injury in vegetation attributed to smelter operations from this report. Table 5.1 compares the area of each Injury Category within the Modelling Domain since 2016.

Following is the discussion and conclusion from the report on visual assessment by Ecoplan Australia in December 2020 of vegetation surrounding the smelter site.

"Discussion

The smelter emissions have an impact on vegetation that is limited to an area of about 442 ha around the smelter perimeter. This area varies from 300 to about 1,300 m wide (widest in the north and east, narrowest in the west and southeast). Within this area the vegetation showing marked or more severe injury (category 4 or greater) covers about 5.5 ha, mostly opposite the potrooms in the north and southwest.

The area of impact has decreased slightly from 2019 while the area showing marked or more severe injury has increased slightly.

There were no symptoms that could be attributed to fluoride in the Hunter Region Botanic Gardens; either within the introduced collections or the naturally occurring forest. Likewise, there was no injury detected in the vegetation at City Farm on Ash Island.

Conclusion

Emission injury could be detected in vegetation within a discrete area on the smelter perimeter. The area most affected was located north, west and east of the potrooms. Within most of the area of the smelter environs the effect on vegetation was slight and had not resulted in a reduction in growth or flowering in any species."

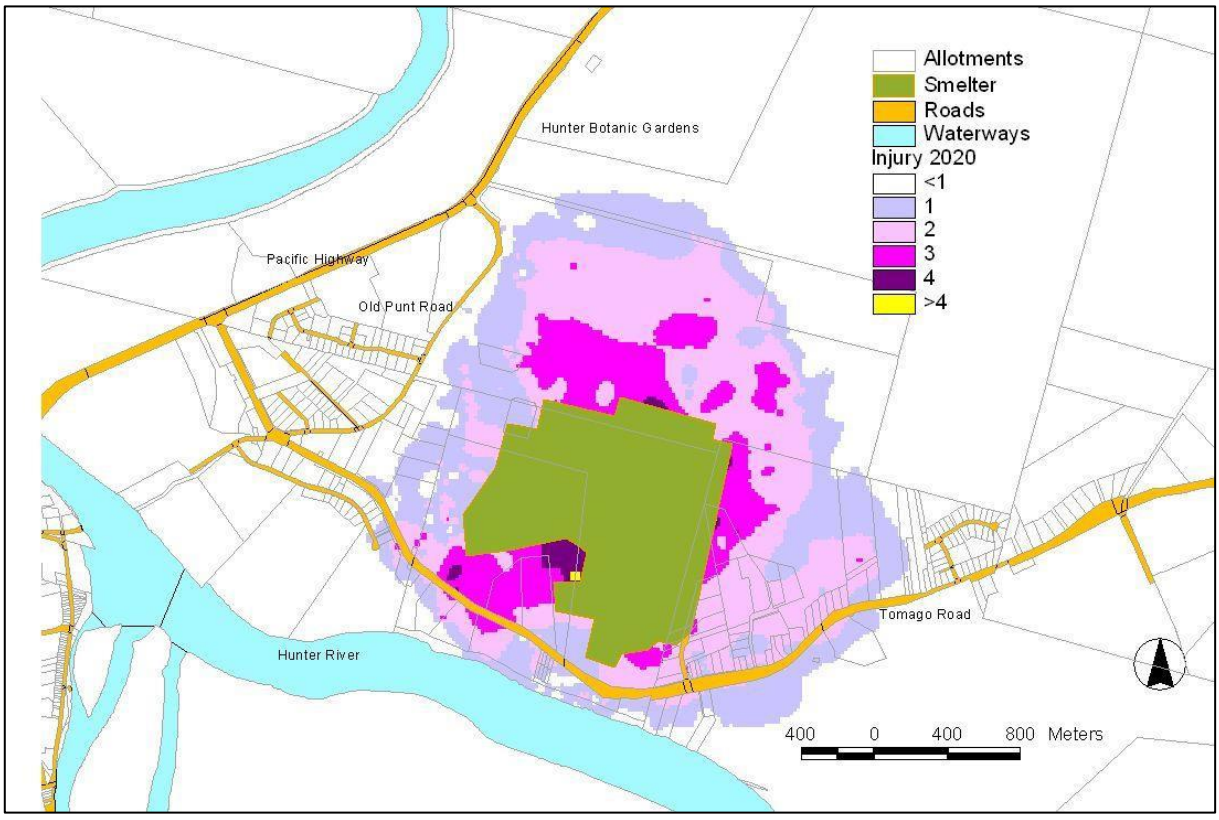


Figure 5 Model of visible injury in vegetation attributable to smelter operations as assessed by Ecoplan Australia in December 2020.

Table 5.1 Area of each vegetation injury category within the modelling domain

	2020		2019		2018		2017		2016	
Category	Area (ha)	Area %	Area (ha)	Area %	Area (ha)	Area %	Area (ha)	Area %	Area (ha)	Area %
0	1784.5	80.1	1781.8	80.0	1770.3	79.5	1742.3	78.2	1807.3	81.2
1	185.2	8.3	191.2	8.6	173.6	7.8	221.4	9.9	157.3	7.1
2	183.4	8.2	173.2	7.8	197.2	8.9	186.6	8.4	174.9	7.9
3	68.1	3.1	77.0	3.5	82.7	3.7	74.7	3.4	81.7	3.7
4	5.3	0.2	3.5	0.2	2.9	0.1	1.9	0.1	5.3	0.2
<4	0.2	0	0.1	0.0	0.1	0.0	0.0	0.0	0.4	0.0
Total	2226.8	100.0	2226.8	100.0	2226.8	100.0	2226.8	100.0	2226.8	100.0

5.2 Overstorey Monitoring

Overstorey sites at varying distances from the smelter (refer Appendix 1, map 2) are sampled on a monthly or quarterly basis and the fluoride concentration in leaf tissue is determined. The average results for 2020 and the four years prior are displayed in Table 5.2.

The smelter's EIS predicted there would be no impact on the Hunter Region Botanic Gardens and monitoring has confirmed this. The conclusions contained within the Ecoplan visual assessment report in section 5.1 above agree with the overstorey monitoring. Sites 122, 185 and 194 in Table 5.2 are on the southern boundary or within the gardens. These results confirm that levels within the Gardens remain at or near background levels.
The mangrove and wetland fluoride levels are well under the Compensatory Mechanism for Replanting Trigger of 500 ug/g, with an overall average of 25 ug/g in 2020 and the highest result of 155 ug/g at Site 126 in October.

Fluoride concentrations in overstorey at the monitoring sites remain relatively stable.

Table 5.2 AVERAGE FLUORIDE CONCENTRATIONS IN OVERSTORY AROUND THE TOMAGO ALUMINIUM SMELTER 2016 – 2020

SITE	2016	2017	2018	2019	2020
6	9	9	12	22	12
111	1039	835	711	1143	806
112	287	247	334	366	278
113	125	149	225	114	121
114	491	463	594	527	940
115	149	176	173	193	164
116	93	98	129	79	98
117	425	363	238	394	289
118	327	241	167	169	303
119	185	151	165	272	129
120	26	27	48	48	42
121	20	24	39	38	38
122	18	17	18	21	20
123	19	32	25	23	27
124	14	32	29	33	23
125	6	8	5	5	8
126	38	31	26	32	44
128	12	18	17	15	17
129	8	14	14	13	14
130	16	23	29	37	22
131	16	6	8	7	9
132	5	8	9	8	13
133	9	8	10	24	13
134	18	10	10	18	10
136	6	9	8	18	14
137	10	9	13	11	11
138	6	6	5	9	6
139	14	9	8	8	9
141	14	5	6	13	10
142	6	6	9	14	9
144	8	5	5	8	9
147	10	5	11	6	8
149	8	8	6	9	6
151	8	13	10	9	13
168	128	112	123	74	162
169	15	14	18	25	18
170	43	28	20	18	14
171	20	22	10	15	15
172	9	19	10	14	12
173	6	9	7	9	9
174	40	38	45	33	51
175	27	30	47	39	48
182	36	46	49	39	54
183	39	34	49	41	44
184	26	29	30	24	35
185	35	24	21	36	23
190	19	48	38	25	28
191	14	22	15	15	16
192	6	8	6	8	6
193	13	13	13	13	23
194	54	54	59	79	41

5.3 Forage

22 forage sites are established on pastures within and outside the designated buffer zone (see Appendix 1 Map 3). The Australian and New Zealand Environment and Conservation Council (ANZECC) published national goals for fluoride content in forage which were established to protect domestic grazing animals. The intent of the national goals is "for pastures, to prevent the development of pollutant-induced disease in grazing animals".

The monitoring results for 2020 are presented in Table 5.3, and the last 5 years results are presented in Table 5.4.

Table 5.3 FLUORIDE CONCENTRATIONS IN FORAGE AROUND THE TOMAGO ALUMINIUM SMELTER FOR 2019

(All results are in micrograms fluoride per gram of dried vegetation)

SITE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	30	15	60	405	540	80	325	340	405	135	15	60
31	q	30	q	q	5	q	q	10	q	q	5	q
32	5	20	30	5	5	10	10	5	5	5	5	10
34	5	nra	20	5	5	10	5	5	5	nra	5	40
87	35	5	70	80	100	55	20	30	35	15	15	25
125	q	30	q	q	20	q	q	nra	q	q	nra	q
126	q	35	q	q	20	q	q	10	q	q	25	q
130	40	20	15	30	30	25	45	35	30	25	10	15
131	q	55	q	q	15	q	q	5	q	q	5	q
133	q	35	q	q	20	q	q	5	q	q	5	q
134	5	15	15	5	5	25	5	5	5	5	5	5
141	q	5	q	q	5	q	q	5	q	q	5	q
142	5	10	10	5	5	10	5	5	10	5	5	5
143	q	5	q	q	5	q	q	5	q	q	5	q
160	q	5	q	q	5	q	q	5	q	q	5	q
166	5	nra	20	5	5	5	5	5	10	nra	5	15
167	10	10	10	35	80	25	35	60	80	55	25	10
176	5	10	15	5	5	20	5	10	5	5	5	5
178	5	5	10	5	5	5	5	5	5	5	5	5
211	10	10	10	45	70	10	15	20	30	20	5	5
307	5	5	15	30	5	10	5	5	10	5	5	5
308	5	10	5	5	5	5	5	5	5	5	5	5

q = sampled quarterly
nra = no result available

ANZECC Goals for Fluoride in forage or hay or silage grown as feed:

- Running 12 month average <40 µg/g
- Average of two consecutive months <60 µg/g
- A monthly sample should not exceed 80 µg/g

During the year 2020, sites 4 and 167 (to the south-east), and 87 and 126 (to the south-west) exceeded the goals. All the exceedances are a result of prevailing seasonal meteorological conditions and are consistent with previous years' results. These sites are situated within the company buffer zone which was established in recognition that some locations would exhibit forage fluoride levels in excess of the ANZECC goals. The ongoing management of the land within the Buffer Zone ensures that grazing animals are not subjected to pasture fluoride levels in excess of the ANZECC goals. The annual average fluoride levels in forage sites remain relatively stable.

Table 5.4 **FLUORIDE CONCENTRATIONS IN FORAGE AROUND THE TOMAGO ALUMINIUM SMELTER FOR 2016 – 2020**

SITE	2016	2017	2018	2019	2020
4	144	144	138	192	201
31	6	5	5	9	13
32	5	6	6	9	10
34	5	5	5	16	11
87	49	43	27	32	40
125	6	6	8	11	25
126	15	10	21	45	23
130	23	27	32	39	27
131	5	5	6	10	20
133	6	5	10	11	16
134	5	5	8	11	8
141	5	11	9	5	5
142	5	5	6	7	7
143	5	5	13	6	5
160	6	9	13	6	5
166	5	5	9	11	8
167	13	24	35	25	36
176	5	5	9	12	8
178	5	5	6	7	5
211	9	21	21	16	21
307	5	7	5	7	9
308	5	6	6	7	5

5.4 Cultivated Vegetation

Cultivated vegetation from a vegetable produce garden (site 195) on Kooragang Wetland Rehabilitation Project (KWRP) land situated 1.5 km south of the smelter is sampled quarterly. The fluoride concentrations in spinach* are at or near background levels as displayed in Table 5.5.

Table 5.5 AVERAGE FLUORIDE CONCENTRATIONS IN CULTIVATED VEGETATION IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER FOR 2016 – 2020

(All results are in micrograms fluoride per gram of dried vegetation)

SITE	SPECIES	2016	2017	2018	2019*	2020
195	SPINACH*	28	11	21	25	20

*There was no spinach available at the produce garden during 2019. The sample taken was lettuce.

6. ECOSYSTEM MONITORING

An ecosystem monitoring program is conducted around the environs of Tomago Aluminium smelter. The program is designed to trace the pathway of fluoride from its initial release point at the smelter through the various layers of the dry sclerophyll forest. The results of this program are assessed annually and are reported via the quarterly reporting system.

Results from the 2020 ecosystem monitoring program continue to confirm that fluoride emissions from the smelter yield very localised effects in vegetation with foliar fluoride concentrations decreasing rapidly with distance.

Fluoride concentrations in the forest layers have remained relatively stable and continue to display a filtering effect through the vegetation layers. The leaf litter contains higher levels of fluoride than the other ecolayers and the transfer of fluoride from the leaf litter to the soil is slow suggesting that the fluoride has been converted to insoluble forms in the leaf absorption processes.

The full report for the 2020 program will appear in the First Quarter 2021 report.

7. WATER

Groundwater, surface water and stormwater are monitored in and around the smelter environs to identify any change in water quality that may have resulted from smelter operations.

7.1 Surface Water

There are twelve surface water monitoring sites, eleven of which have been monitored in 2020, with one site being dry all year.

Due to the large diversity and variability of the water bodies, it is difficult to utilise this data in an assessment of fluoride dispersion, however the results are compared to either EIS predictions or a range of other guidelines. Sites 5 and 6 have naturally elevated levels as they are tidal sites (Hunter River) and site 178 is tap (fluoridated) water (cattle trough). Sites 1, 3 and 4 show some elevation in fluoride levels, with these sites being very shallow swamps in close proximity to the smelter (approximately 0.5 km North and South-East respectively). The results for 2020 are displayed in Table 7.1 and Figure 7.1, and the results for the last 5 years in Table 7.2 and the maximum concentration recorded displayed in Figure 7.2. The concentrations have remained relatively stable with the exception of Site 3 where samples were only able to be taken in August and September. Most of the shallow swamps were only able to be sampled sporadically during 2020 due to the water table remaining low.

The fluoride levels at Site 1 and 3 are above the prediction made in the smelter's original EIS. The Site 1 swamp is a large, shallow wetland areas with variable terrain and vegetation cover as well as diffuse boundaries. The sampling point for Site 1 is on the southern edge of the swamp, which is now very close to the smelter following the 1991 expansion. Site 3 is a very small and shallow swamp directly to the East. Sites 1, 2 and 3 were dry for much of the year. All other site fluoride levels remain below the relevant criteria.

Table 7.1 SURFACE WATER MONITORING IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER FOR 2020

(All results are expressed as milligrams fluoride per litre of water)

SITE	Site Type[1]	Applicable Guideline Value	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	swp	3.65[2]	DRY	DRY	DRY	DRY	DRY	DRY	2.3	3.7	DRY	6.0	DRY	DRY
2	swp	3.65[2]	DRY	DRY	DRY	DRY	DRY	DRY	0.79	DRY	DRY	DRY	DRY	DRY
3	swp	3.65[2]	DRY	DRY	DRY	DRY	DRY	DRY	DRY	8.4	3.1	DRY	DRY	DRY
4	swp	3.65[2]	3.2	2.5	2.2	1.9	2.6	2.2	2.5	2.4	2.1	2.6	2.3	2.9
5	riv	1.8[3]/5[4]	1.4	0.28	0.60	0.74	0.85	0.81	0.43	0.39	0.74	0.45	0.34	0.92
6	riv	1.8[3]/5[4]	1.4	0.16	0.46	0.61	0.63	0.60	0.41	0.27	0.74	0.60	0.33	0.76
7	dra	1.5[5]	1.4	0.97	1.4	0.83	0.75	0.65	0.86	0.80	0.83	0.63	0.96	1.3
9	dam	1.5[5]	0.33	0.22	0.31	0.18	0.10	0.36	0.40	0.20	0.61	0.25	0.18	0.33
11	swp	1.5[5]	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
17	drk	1.5[6]	q	0.20	q	q	0.10	q	q	0.20	q	q	0.19	q
34	lwp	2[7]	0.21	DRY	DRY	0.29	0.1	0.10	0.27	0.22	0.12	DRY	0.10	0.15
178	lwp	2[7]	0.34	0.30	0.73	0.60	0.58	0.50	0.56	0.74	DRY	0.89	0.97	1.14

q = sampled quarterly

DRY = no result available due to site having no water present

[1] swp = swamp, riv = Hunter River, dra = drain, dam = dam, drk = drinking water supply, lwp = livestock watering point

[2] EIS prediction for adjacent small freshwater lagoons

[3] EIS prediction for Hunter River outside stormwater mixing zone

[4] Derived guideline value for 95% protection of marine organisms by The National Institute of Water and Atmospheric Research, New Zealand (NIWA)

[5] NSW Clean Water Regulation 1972 (Repealed)

[6] NHMRC/ NRMMC 2004 Drinking Water Guideline

[7] Recommended water quality trigger value (low risk) for livestock drinking water (ANZECC Guidelines 2000)

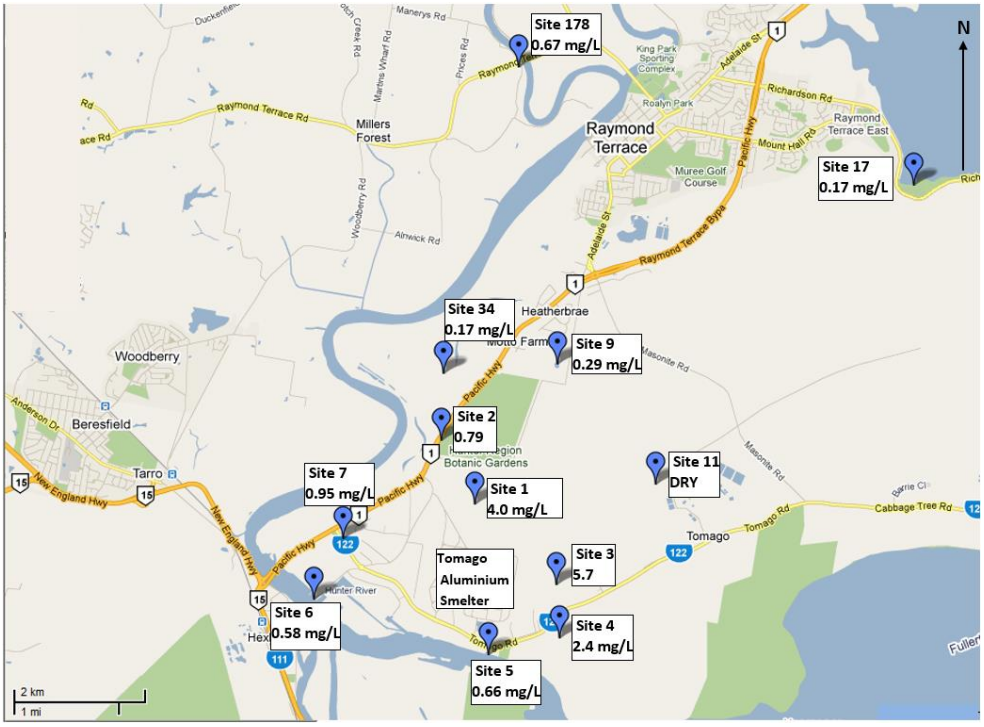


Figure 7.1 Surface Water Sites Average Fluoride Levels 2020

Table 7.2 **SURFACE WATER MONITORING IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER FOR 2016 – 2020**

(All results are expressed as milligrams fluoride per litre of water)

SITE	2016		2017		2018		2019		2020	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
1	3.9	4.5	4.6	6.0	5.0	6.9	7.2	7.6	4.0	6.0
2	0.90	1.1	0.72	0.88	0.59	0.71	DRY	DRY	0.79	0.79
3	2.0	3.5	2.9	3.8	3.2	3.4	DRY	DRY	5.7	8.4
4	1.9	3.1	2.2	2.7	2.4	4.4	2.0	2.5	2.4	3.2
5	0.79	1.2	1.1	1.4	1.0	1.4	1.2	1.4	0.66	1.4
6	0.66	1.0	0.96	1.2	0.92	1.4	1.1	1.4	0.58	1.4
7	0.70	1.0	1.0	1.3	0.89	1.5	1.0	2.0	0.95	1.4
9	0.25	0.38	0.28	0.38	0.22	0.31	0.29	1.2	0.29	0.61
11	0.32	0.48	0.39	0.46	0.29	0.36	0.37	0.72	DRY	DRY
17	0.19	0.25	0.28	0.54	0.20	0.24	0.23	0.29	0.17	0.20
34	0.13	0.19	0.12	0.26	0.12	0.19	0.16	0.29	0.17	0.29
178	0.79	1.2	0.76	0.98	0.91	1.2	1.2	2.0	0.67	1.1

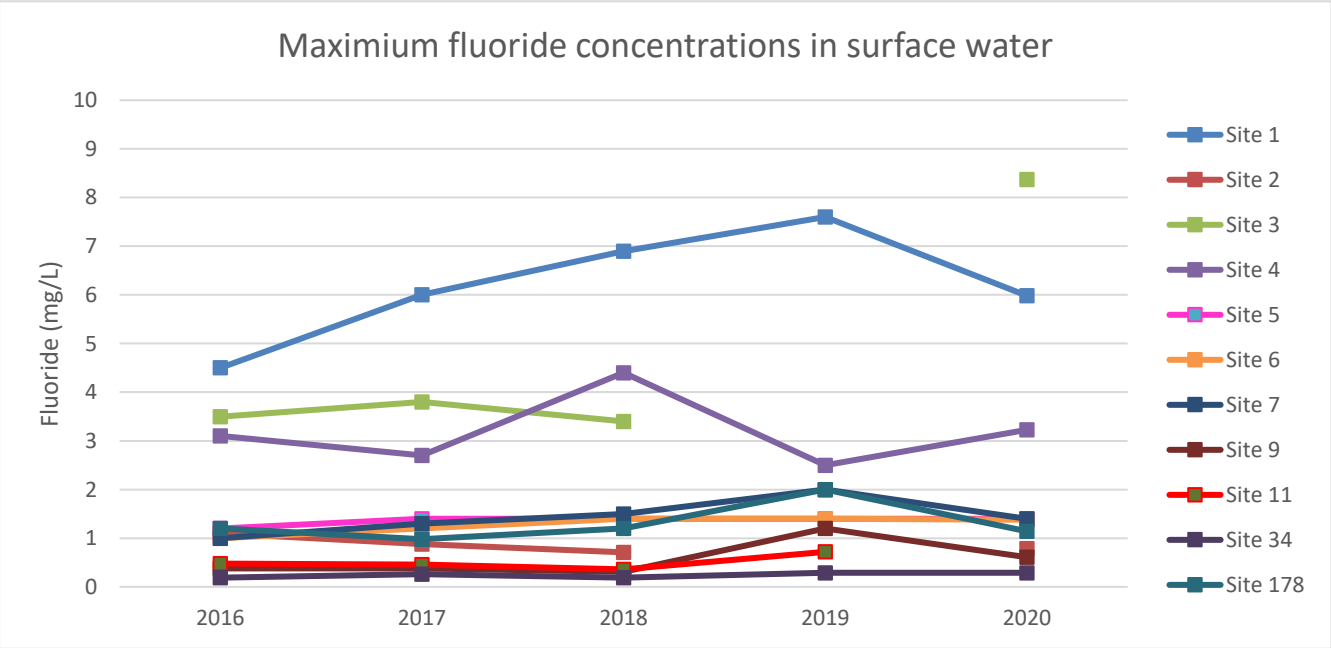


Figure 7.2 **MAXIMIUM FLUORIDE CONCENTRATIONS IN SURFACE WATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER FOR 2016-2020**

7.2 Groundwater Monitoring

7.2.1 Groundwater Monitoring General

Groundwater monitoring includes sites monitored by the Hunter Water Corporation and Tomago Aluminium (refer Appendix 1, Maps 5 & 6). Groundwater in the area generally has a low pH level (less than 6.5) and generally low salinity (<200 mg/L) (Coffey Report E110/1-AC). Boreholes on and around the smelter site are monitored monthly or quarterly and analysed for soluble fluoride, electrical conductivity and pH.
The water level in the bores is also monitored at the time of sampling. The results of the monitoring are displayed in Figures 7.3 to 7.6 and Tables 7.3A to 7.3F and 7.4. Groundwater flow direction is indicated in Figure 7.7 for the site and in Figure 7.8 for the broader area.
Groundwater bores in the vicinity of the sewerage treatment plant are also analysed annually for E-coli, there was none detected in 2020 (Table 7.3E).

7.2.2 Assessment of Groundwater Monitoring Data

The groundwater monitoring data sampled by Hunter Water in the groundwater reserve known as “Tomago Sandbeds” indicate that fluoride concentrations remain at background levels (Figure 7.3).
The contours of the groundwater depth beneath the smelter site show that the local flow of groundwater is to the south-south-east, away from the catchment of the main Tomago Sandbeds (Figure 7.7). A groundwater divide is present north of the site where the groundwater gradient is then towards the north-west (Figure 7.8).

There are no applicable limits for onsite groundwater fluoride levels and the groundwater monitoring data trends are used in the assessment of data. 2020 data continues to confirm that increases in fluoride concentration over the smelter site are localised.

- The Southern site bores that are situated closest down-gradient of the stormwater retention pond have shown some increase from 2019 levels.
- The average fluoride levels in the monitoring bores situated on the northern side of the smelter (Bores 219, 220, 221, 237 and 310) is 2.1 mg/L. Monitoring bores 220 and 221 which are situated very close to potline 3 have an average of 4.9 mg/L, with the other three bores in this group (closest to the northern boundary) averaging 0.3 mg/L.
- Eastern boundary bores have also slightly increased from 2019. Monitoring bore 311 remains the highest in this group.
- Southern off site bores (all downstream of site) remain well below 1 mg/L.
- Western Boundary Bores are mostly either stable or showing a downward trend. The extra bores that were established to investigate migration in this area are displayed in Figure 7.5.
- Central Plant and South-West site bores remain relatively stable with the exception of bores 233 and 243.

The higher fluoride concentrations in groundwater measured on the smelter site become dissipated with distance from the smelter, as evidenced by the background levels measured at the Southern Offsite Bores, which are in the direction of the local flow of groundwater to the south-south-east of the smelter.
The impact fluoride concentrations in the stormwater retention pond are having on groundwater in the Southern Boundary Bores was subject of a Pollution Reduction Program on the site's Environment Protection Licence, and resulted in the dredging of historical sediment from the stormwater pond in late 2015, as well as ongoing mitigation projects in this area.
Tomago Aluminium Company commissioned Coffey Environments Australia to undertake an assessment of the significance of fluoride recorded in groundwater within the vicinity of the southern stormwater pond. This body of work assessed the potential fluoride concentrations that may have the potential to enter the Hunter River via the groundwater. The following conclusions were drawn regarding the migration of fluoride contaminated groundwater:

The model predicts the migration of fluoride contaminated groundwater will result in only marginal increases in fluoride levels at the groundwater/river interface. When the effects of adsorption are considered within modelling based on reference and field data derived from pond sediment, the modelling predicts that the fluoride plume would not break through at the groundwater/river interface within the next 100 years.
An appraisal of the net flow of the Hunter River indicates the river would provide significant dilution potential. In the context of the marginal increase in fluoride concentrations predicted to discharge into the river, it is assessed that the increase in fluoride levels within the river would not be detectable.

Coffey Environments
ENAURHOD04246AA-R02v2
23 November 2012

Figure 7.3 Fluoride Levels in Groundwater at Sites Monitored by Hunter Water 2020

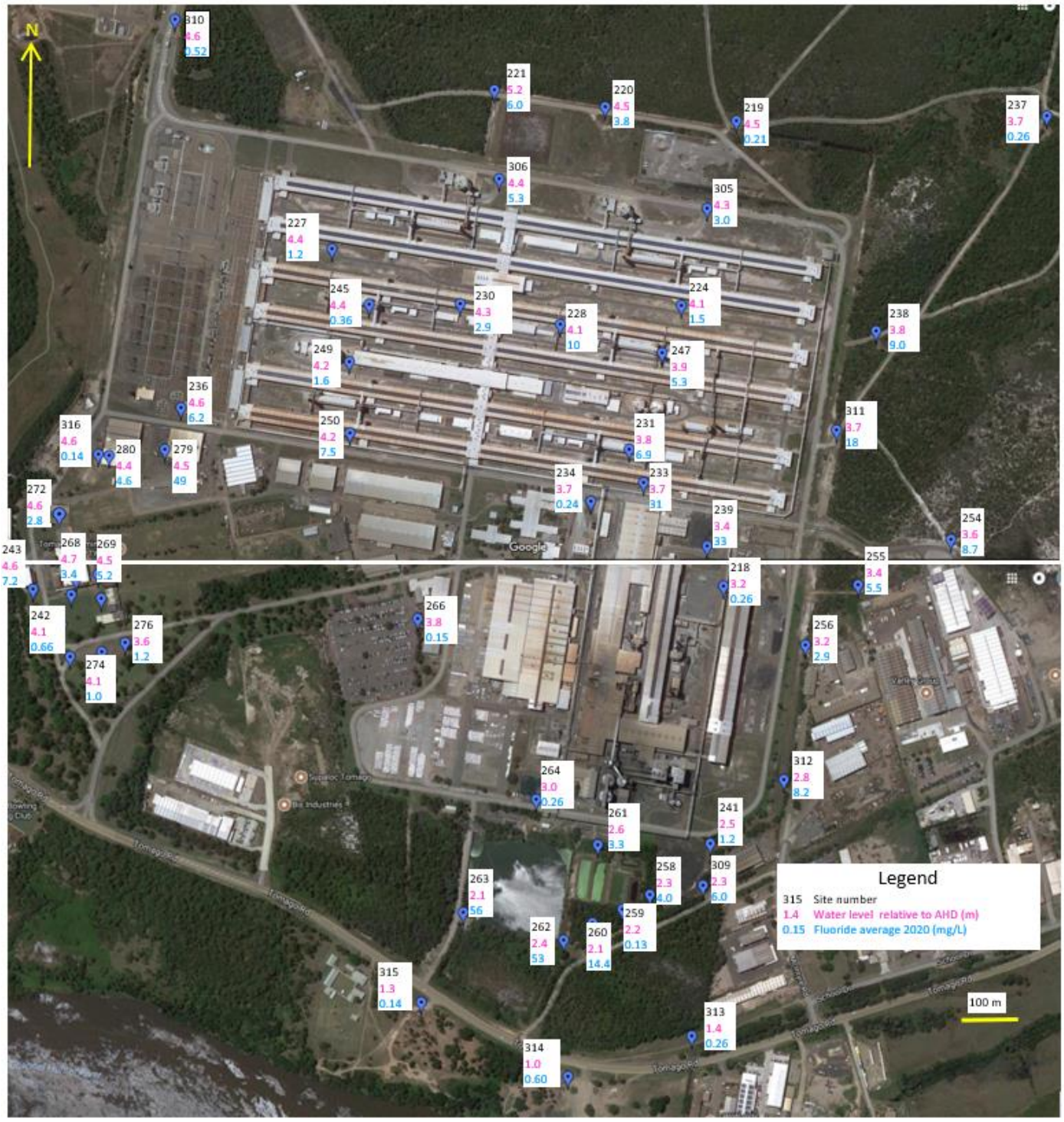


Figure 7.4 Annual Fluoride and Water Level Monitoring of Plant Groundwater Sites 2020

Table 7.3A: FLUORIDE CONCENTRATIONS IN GROUNDWATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER 2020

(All results are expressed as milligrams fluoride per litre of water)

Bore number	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
254	8.2	7.7	8.8	8.2	7.2	7.3	8.4	9.3	9.8	9.9	9.1	10.6
255	4.5	4.4	6.4	5.0	3.1	4.7	5.5	8.3	6.6	6.6	5.0	6.4
256	1.9	2.1	2.0	2.6	1.7	1.8	5.4	3.8	4.5	3.2	2.8	2.8
258	3.5	3.5	3.7	3.3	3.1	3.7	8.9	3.7	3.7	4.3	3.5	3.2
259	0.10	<0.10	0.19	<0.10	<0.10	0.12	0.22	0.13	0.11	<0.10	<0.10	0.15
260	8.3	11	11	13	13	15	23	18	15	17	14	15
261	0.90	1.6	2.0	2.5	2.9	2.3	2.7	10.7	8.8	1.9	1.6	1.5
262	59	49	55	53	51	48	55	56	53	55	52	54
263	59	53	58	55	52	49	55	59	56	56	58	56
264	0.20	0.17	0.42	0.35	0.10	0.20	0.29	0.31	0.28	0.28	0.19	0.32
266	q	-0.10	q	q	-0.10	q	q	0.25	q	q	0.16	q
268	2.3	2.0	2.0	2.1	2.5	3.2	5.5	5.1	5.5	4.2	2.4	4.5
218	0.10	0.11	0.10	0.12	0.10	0.10	0.16	0.11	0.15	0.10	1.67	0.24
219	0.35	0.15	0.16	0.15	0.11	0.18	0.31	0.29	0.24	0.14	0.26	0.20
220	3.7	4.1	2.8	3.1	3.1	3.7	4.5	3.6	3.5	4.2	4.7	4.6
221	5.4	6.8	4.9	5.0	4.0	5.4	7.2	6.4	8.2	6.4	6.2	5.5
224	q	1.3	q	q	0.8	q	q	2.9	q	q	1.1	q
227	q	0.75	q	q	0.22	q	q	0.80	q	q	2.9	q
228	q	7.9	q	q	5.9	q	q	14	q	q	15	q
230	q	1.5	q	q	5.9	q	q	2.2	q	q	1.9	q
231	q	6.4	q	q	6.5	q	q	7.7	q	q	6.9	q
233	q	19	q	q	22	q	q	29	q	q	54	q
234	q	0.31	q	q	0.10	q	q	0.31	q	q	0.22	q
236	6.2	5.8	5.9	5.8	5.4	5.9	6.9	6.5	6.1	6.8	6.9	6.8
237	0.40	0.23	0.22	0.18	0.10	0.10	0.38	0.27	0.37	0.27	0.23	0.35
238	4.6	13	3.7	5.5	4.9	14	16	7.4	7.4	13	9.0	9.3
239	29	36	31	28	29	27	31	40	39	38	32	32
241	1.4	1.1	1.1	1.1	1.1	1.1	1.8	1.4	1.0	1.0	1.0	1.0
242	0.44	0.69	0.54	0.78	0.46	0.67	0.72	0.79	0.68	0.83	0.54	0.77
243	6.1	5.6	5.2	5.4	4.9	5.4	4.5	6.7	9.8	7.4	14	11
245	q	0.45	q	q	0.13	q	q	0.41	q	q	0.45	q
247	q	1.8	q	q	0.13	q	q	5.2	q	q	14	q
249	q	2.0	q	q	0.10	q	q	2.1	q	q	2.4	q
250	q	6.4	q	q	7.5	q	q	5.4	q	q	11	q
269	5.9	4.9	5.4	4.8	5.0	4.3	5.7	5.6	4.9	4.9	5.2	5.8
272	2.1	3.5	2.3	2.4	2.2	2.4	3.6	2.5	3.0	3.1	3.0	3.0
274	0.83	2.1	1.1	0.54	0.85	1.4	1.1	0.77	1.0	0.65	0.76	0.83
276	0.81	0.90	2.7	0.90	0.95	1.5	1.6	1.0	1.2	0.31	1.1	0.96
279	46	45	52	51	nra	nra	nra	nra	33	50	57	56
280	1.5	5.8	2.8	1.0	1.3	4.4	4.8	8.7	8.0	6.1	4.6	6.3
305	q	3.6	q	q	2.7	q	q	2.9	q	q	2.8	q
306	q	4.6	q	q	4.4	q	q	5.8	q	q	6.6	q
309	5.2	3.8	4.9	5.7	5.2	4.5	4.6	5.1	11	6.2	5.4	10
310	1.2	0.54	0.43	0.52	0.56	0.35	0.40	0.56	0.57	0.10	0.15	0.86
311	23	15	22	21	22	17	10	14	15	18	16	19
312	8.5	8.1	9.2	7.1	8.6	6.0	11	7.7	7.0	9.9	7.7	7.8
313	0.37	0.26	0.40	0.27	0.20	0.18	0.34	0.21	0.28	0.25	0.20	0.15
314	0.70	0.56	0.57	0.57	0.43	0.41	0.80	0.67	0.61	0.63	0.64	0.64
315	0.10	0.11	0.13	0.11	0.10	0.10	0.33	0.10	0.16	0.10	0.14	0.16
316	0.10	0.10	0.15	0.10	0.10	0.10	0.41	0.11	0.15	0.10	0.11	0.12

q = sampled quarterly
nra = no result available

Table 7.3B: WATER LEVEL RELATIVE TO AHD OF GROUNDWATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER 2020

(All results are expressed in meters)

Bore number	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
254	3.3	3.5	3.4	3.4	3.3	3.5	3.9	3.8	3.9	3.7	3.8	3.7
255	3.1	3.4	3.3	3.2	3.2	3.3	3.7	3.6	3.5	3.6	3.6	3.5
256	3.0	3.1	3.1	3.0	3.0	3.1	3.5	3.3	3.2	3.4	3.3	3.3
258	2.2	2.3	2.3	2.2	2.2	2.2	2.6	2.3	2.3	2.4	2.3	2.3
259	2.1	2.2	2.2	2.1	2.1	2.1	2.5	2.2	2.2	2.3	2.2	2.2
260	2.1	2.1	2.2	2.1	2.1	2.1	2.3	2.1	2.1	2.2	2.1	2.1
261	2.6	2.6	2.6	2.5	2.5	2.5	2.9	2.6	2.6	2.7	2.6	2.6
262	2.4	2.4	2.4	2.3	2.3	2.3	2.5	2.3	2.3	2.4	2.3	2.4
263	2.1	2.1	2.2	2.0	2.1	2.1	2.4	2.1	2.0	2.2	2.1	2.2
264	2.8	2.9	2.9	2.8	2.8	2.8	3.2	2.9	4.0	3.0	2.9	2.9
266	q	3.7	q	q	3.6	q	q	3.9	q	q	3.9	q
268	4.1	4.5	4.4	4.3	4.3	4.4	5.1	5.1	4.9	4.9	5.0	4.9
218	3.1	3.2	3.2	3.1	3.1	3.1	3.3	3.3	3.3	3.3	3.4	3.3
219	4.2	4.4	4.3	4.3	4.2	4.3	4.7	4.7	4.7	4.7	4.7	4.6
220	4.2	4.5	4.3	4.2	4.2	4.2	4.8	4.6	4.6	4.7	4.6	4.6
221	5.0	5.2	5.0	4.9	4.9	4.9	5.6	5.3	5.3	5.4	5.3	5.3
224	q	4.0	q	q	3.9	q	q	4.2	q	q	4.3	q
227	q	4.4	q	q	4.3	q	q	4.5	q	q	4.2	q
228	q	4.0	q	q	3.9	q	q	4.1	q	q	4.2	q
230	q	4.3	q	q	4.1	q	q	4.3	q	q	4.4	q
231	q	3.7	q	q	3.6	q	q	3.8	q	q	3.9	q
233	q	3.7	q	q	3.5	q	q	3.8	q	q	3.9	q
234	q	3.6	q	q	3.5	q	q	3.7	q	q	3.8	q
236	4.3	4.6	4.5	4.5	4.4	4.4	4.7	4.7	4.7	4.7	4.8	4.7
237	3.4	3.6	3.5	3.3	3.4	3.4	3.9	4.0	3.9	3.9	4.0	3.9
238	3.5	3.7	3.7	3.6	3.6	3.6	4.1	4.0	4.0	4.0	4.0	3.9
239	3.2	3.3	3.3	3.3	3.2	3.3	3.4	3.5	3.5	3.5	3.5	3.5
241	2.3	2.4	2.4	2.4	2.4	2.4	2.8	2.5	2.4	2.6	2.5	2.5
242	3.5	3.9	3.8	3.7	3.7	3.8	4.6	4.6	4.4	4.3	4.3	4.2
243	4.0	4.5	4.4	4.2	4.2	4.3	5.4	5.2	4.9	4.8	5.0	4.8
245	q	4.4	q	q	4.2	q	q	4.4	q	q	4.5	q
247	q	3.9	q	q	3.7	q	q	4.1	q	q	4.0	q
249	q	4.2	q	q	4.1	q	q	4.3	q	q	4.4	q
250	q	4.1	q	q	4.0	q	q	4.2	q	q	4.3	q
269	4.0	4.3	4.3	4.2	4.2	4.2	4.9	4.9	4.7	4.7	4.8	4.8
272	4.0	4.5	4.4	4.2	4.1	4.4	5.0	5.0	4.7	4.7	4.9	4.7
274	3.6	4.0	3.8	3.8	3.8	3.9	4.6	4.5	4.4	4.4	4.4	4.3
276	3.2	2.5	3.4	3.3	3.3	3.5	4.1	4.0	3.8	3.9	3.9	3.8
279	4.2	4.5	4.4	4.3	nra	nra	nra	nra	4.6	4.6	4.7	4.6
280	4.1	4.3	4.2	4.2	4.1	4.2	4.6	4.6	4.6	4.5	4.7	4.6
305	q	4.2	q	q	4.0	q	q	4.4	q	q	4.4	q
306	q	4.4	q	q	4.2	q	q	4.5	q	q	4.6	q
309	2.1	2.3	2.3	2.2	2.2	2.2	2.7	2.4	2.2	2.5	2.3	2.4
310	4.1	4.5	4.8	4.5	4.5	4.6	5.2	4.8	4.7	4.4	4.9	4.8
311	3.5	3.6	3.6	3.5	3.5	3.6	4.0	3.9	3.8	3.9	3.9	3.8
312	2.6	2.7	2.8	2.6	2.7	2.7	3.2	2.8	2.7	3.0	2.8	3.0
313	1.4	1.4	1.5	1.4	1.4	1.3	1.6	1.4	1.3	1.5	1.4	1.5
314	0.91	1.0	1.1	0.97	1.1	1.0	1.4	1.0	0.94	1.2	1.0	0.4
315	1.2	1.3	1.3	1.2	1.3	1.3	1.8	1.4	1.2	1.4	1.3	1.3
316	4.2	4.4	4.4	4.4	4.3	4.4	4.8	4.8	4.7	4.8	4.8	4.8

q = sampled quarterly nra = no result available

Table 7.3C: pH OF GROUNDWATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER 2020

Bore number	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
254	4.9	5.0	5.1	4.9	4.4	4.9	4.9	5.1	4.2	5.1	4.4	5.1
255	5.3	5.3	5.3	5.3	4.7	5.6	5.3	5.3	5.2	5.6	5.3	5.6
256	6.3	6.3	6.4	6.4	5.7	6.4	6.3	6.4	6.3	6.4	6.4	6.2
258	5.5	5.5	5.6	5.5	5.4	5.6	5.4	5.6	5.2	5.5	5.7	5.5
259	5.3	5.4	5.4	5.4	5.1	5.4	5.3	5.4	4.9	5.3	4.9	5.3
260	5.9	5.9	5.9	6.0	5.5	6.0	5.9	6.1	5.8	6.0	5.5	6.0
261	5.5	5.6	5.5	5.4	4.9	5.3	5.5	6.1	5.2	5.5	5.8	5.6
262	6.3	6.3	6.5	6.4	5.9	6.3	6.2	6.4	6.3	6.4	6.2	6.4
263	6.4	6.5	6.6	6.4	6.1	6.4	5.9	6.4	6.5	6.5	6.2	6.5
264	5.7	5.7	5.8	5.8	5.5	5.8	5.2	6.0	5.3	5.7	5.8	5.7
266	5.8	q	5.8	q	q	5.8	q	q	5.3	q	q	6.1
268	6.5	6.7	6.1	6.6	6.1	6.8	6.8	6.8	6.6	6.6	6.4	6.2
218	5.8	5.8	5.8	5.8	5.6	5.9	5.8	5.9	5.3	5.9	5.9	5.9
219	4.4	4.4	4.4	4.4	4.3	4.5	4.5	4.5	3.7	4.4	4.6	4.5
220	5.3	5.4	5.5	5.1	5.2	5.5	5.6	5.6	4.7	5.5	5.1	5.4
221	5.1	5.2	5.4	4.4	4.7	5.3	5.1	5.4	4.4	5.5	4.8	5.4
224	5.8	q	5.7	q	q	5.8	q	q	5.8	q	q	5.8
227	5.8	q	5.6	q	q	5.8	q	q	5.8	q	q	5.8
228	5.7	q	5.7	q	q	5.8	q	q	5.4	q	q	5.7
230	6.1	q	6.3	q	q	6.3	q	q	5.9	q	q	6.0
231	6.0	q	6.0	q	q	6.0	q	q	5.9	q	q	5.9
233	5.9	q	5.8	q	q	5.9	q	q	5.7	q	q	6.0
234	5.6	q	5.6	q	q	5.8	q	q	5.2	q	q	5.8
236	5.6	5.7	5.6	5.6	5.3	5.6	5.7	5.8	5.1	5.4	5.3	5.8
237	5.6	5.7	5.7	5.7	5.1	5.6	5.7	5.7	5.2	5.8	5.1	5.8
238	5.0	5.0	5.2	5.0	4.9	5.0	5.3	5.6	4.7	4.8	4.6	5.0
239	6.1	6.0	6.2	6.2	6.0	6.1	5.9	6.2	5.7	6.3	6.4	6.3
241	5.6	5.5	6.1	5.5	5.2	5.6	5.5	5.5	5.7	5.7	5.0	5.7
242	6.3	6.3	6.2	6.1	6.4	6.3	6.3	6.3	6.3	6.3	6.4	6.2
243	5.9	5.6	5.7	5.8	5.1	6.0	5.9	6.0	6.0	6.7	5.7	6.5
245	5.6	q	5.6	q	q	5.7	q	q	5.6	q	q	5.6
247	5.7	q	5.7	q	q	5.8	q	q	5.7	q	q	5.7
249	6.0	q	6.0	q	q	6.0	q	q	5.9	q	q	5.9
250	5.7	q	5.8	q	q	5.9	q	q	5.3	q	q	5.8
269	6.1	6.2	6.1	5.9	5.6	5.8	6.0	6.3	6.2	6.0	6.1	6.3
272	4.9	5.2	4.7	4.9	4.9	4.8	4.9	4.8	4.3	5.1	4.8	5.1
274	6.4	6.3	6.3	6.4	6.3	6.5	6.4	6.3	6.4	6.5	6.4	6.3
276	6.2	6.0	6.0	5.7	6.1	6.2	6.4	6.3	6.2	6.2	6.3	6.3
279	6.8	6.9	6.9	6.9	6.6	nra	nra	nra	nra	6.7	6.7	7.0
280	6.0	5.8	6.0	5.8	5.6	5.8	6.0	5.9	5.8	6.2	5.9	6.6
305	5.5	q	5.5	q	q	5.6	q	q	5.3	q	q	5.5
306	5.7	q	5.9	q	q	5.8	q	q	5.4	q	q	5.7
309	5.4	5.5	5.7	5.5	5.5	5.6	5.4	5.6	5.7	5.2	4.7	5.6
310	4.4	4.1	4.5	4.3	4.3	4.3	4.4	4.7	4.2	4.3	4.6	4.3
311	5.5	5.2	5.6	5.5	5.3	5.4	5.4	6.0	5.0	5.7	5.7	5.5
312	5.9	5.7	5.9	5.9	5.3	6.0	5.9	6.2	6.0	6.0	5.8	6.0
313	5.7	5.8	6.2	5.8	5.2	5.9	5.7	5.8	5.7	5.9	5.2	5.9
314	6.4	6.3	6.5	6.5	6.0	6.6	6.4	6.6	6.7	6.5	6.6	6.4
315	5.4	5.4	5.4	5.6	4.9	5.5	5.5	5.6	5.3	5.6	5.6	5.6
316	5.2	5.2	5.2	5.3	5.1	5.3	5.3	5.5	4.9	5.2	5.0	5.4

q = sampled quarterly nra = no result available

Table 7.3D: CONDUCTIVITY OF GROUNDWATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER 2020

(All results are expressed in micro Siemens per centimetre)

Bore number	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
254	136	137	140	127	125	121	134	134	147	148	130	136
255	342	340	360	365	395	385	412	344	365	359	423	408
256	794	850	758	772	747	652	664	751	781	650	602	695
258	623	559	530	536	438	599	465	605	662	668	6.29	540
259	317	322	314	314	322	320	310	345	334	329	332	345
260	285	247	256	274	253	223	252	255	225	244	249	251
261	367	392	494	685	809	805	636	594	410	541	471	533
262	340	345	337	451	462	439	382	363	328	316	328	323
263	303	307	343	421	372	380	350	360	337	310	306	306
264	278	276	282	286	273	261	732	329	315	313	397	325
266	q	292	q	q	275	q	q	270	q	q	245	q
268	501	523	466	574	674	636	574	531	664	646	389	540
218	371	357	353	384	380	361	369	350	338	376	372	370
219	178	190	175	177	172	184	177	168	173	177	178	179
220	185	214	120	166	186	181	174	123	199	205	194	158
221	158	158	159	167	159	174	159	181	197	179	159	157
224	q	241	q	q	248	q	q	295	q	q	257	q
227	q	411	q	q	430	q	q	397	q	q	442	q
228	q	327	q	q	276	q	q	287	q	q	297	q
230	q	330	q	q	343	q	q	319	q	q	348	q
231	q	334	q	q	246	q	q	328	q	q	333	q
233	q	369	q	q	390	q	q	382	q	q	379	q
234	q	296	q	q	320	q	q	330	q	q	287	q
236	182	154	180	167	171	181	186	143	148	184	156	149
237	244	243	243	246	240	258	203	218	218	213	227	253
238	876	568	693	744	648	444	89	605	766	129	652	745
239	692	630	655	666	668	663	550	635	676	675	593	573
241	338	318	284	303	228	203	191	175	217	215	185	173
242	596	737	711	462	725	846	755	710	567	575	667	660
243	284	285	220	239	218	210	192	220	252	194	304	287
245	q	290	q	q	308	q	q	283	q	q	293	q
247	q	280	q	q	240	q	q	309	q	q	325	q
249	q	340	q	q	307	q	q	331	q	q	318	q
250	q	389	q	q	407	q	q	358	q	q	318	q
269	347	306	680	758	419	775	317	277	355	398	488	409
272	325	335	305	326	332	349	349	292	314	297	328	299
274	350	624	680	815	635	700	721	701	615	956	835	860
276	843	910	479	840	980	715	503	551	760	938	801	772
279	1176	1121	1120	1129	nra	nra	nra	nra	881	1318	1261	1205
280	907	739	935	1085	1181	923	858	551	460	475	375	352
305	q	252	q	q	203	q	q	211	q	q	242	q
306	q	194	q	q	241	q	q	268	q	q	236	q
309	64	550	76	75	77	76	96	76	94	151	96	147
310	1282	3090	6900	911	10180	5900	3790	647	9430	3960	8480	1235
311	707	363	352	490	523	334	171	164	208	317	315	392
312	317	306	211	185	144	123	68	184	212	124	202	120
313	118	217	214	192	313	323	354	341	329	328	329	311
314	384	231	269	220	310	315	288	136	182	162	159	258
315	255	250	191	231	201	199	172	166	160	188	166	150
316	134	971	1026	1030	1103	932	780	1023	975	1087	1032	1077

q = sampled quarterly nra = no result available

Table 7.3E: ECOLI IN GROUNDWATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER 2020

(All results are expressed in E. Coli counts per 100 millilitres)

Bore number	June 2020
258	0
259	0
260	0
261	0
262	0

Figure 7.5: Annual fluoride and water level monitoring, Site West Investigation Area 2020

Table 7.4: AVERAGE AND MAXIMUM FLUORIDE CONCENTRATIONS IN GROUNDWATER IN THE VICINITY OF TOMAGO ALUMINIUM SMELTER 2016 – 2020

(All results are expressed as milligrams fluoride per litre of water)

Bore Number	2016		2017		2018		2019		2020	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
254	6.5	7.2	6.4	7.2	7.0	8.2	7.7	8.4	8.7	11
255	4.7	5.9	6.4	7.9	5.4	6.3	4.3	5.3	5.5	8.3
256	2.8	4.3	1.6	2.0	1.6	2.2	1.3	2.0	2.9	5.4
258	11	14	7	9	5	6	3.5	4.2	4.0	8.9
259	0.14	0.30	0.12	0.25	0.02	0.29	0.12	0.24	0.13	0.22
260	2.9	3.8	5.7	7.7	8.5	11.5	9.8	14	14	23
261	0.58	0.76	0.76	1.18	1.12	1.7	1.5	2.1	3.3	11
262	37	41	37	41	42	48	51	56	53	59
263	37	42	40	45	45	50	55	60	56	59
264	0.28	0.44	0.26	0.35	0.17	0.38	0.22	0.39	0.26	0.42
266	0.13	0.25	0.12	0.21	0.02	0.16	0.11	0.29	0.15	0.25
268	0.82	1.1	0.87	1.5	0.79	1.0	1.0	1.9	3.5	5.5
218	0.15	0.27	0.12	0.18	0.13	0.45	0.19	0.56	0.26	1.7
219	0.15	0.27	0.17	0.61	0.16	0.50	0.25	0.65	0.21	0.35
220	2.8	3.7	3.2	4.2	3.6	4.6	3.2	4.0	3.8	4.7
221	6.1	6.9	4.4	5.9	4.6	6.5	5.1	7.2	6.0	8.2
224	3.6	6.3	1.8	2.0	1.5	1.6	1.3	1.5	1.5	2.9
227	0.51	0.74	0.40	0.54	0.73	2.0	1.5	3.4	1.2	2.9
228	2.7	4.0	3.0	3.9	6.4	11.2	4.5	6.7	11	15
230	4.0	5.6	6.8	10.4	5.5	11.1	3.6	7.4	2.9	5.9
231	13	15	15	21	10	13	9.3	13	6.9	7.7
233	18	22	31	62	25	32	23	30	31	54
234	0.96	2.4	0.26	0.40	0.17	0.3	0.41	0.67	0.24	0.31
236	6.8	7.9	6.7	7.8	7.0	7.7	6.8	7.8	6.2	6.9
237	0.23	0.31	0.35	0.49	0.67	5.61	0.21	0.58	0.26	0.40
238	2.2	3.3	3.9	12	5.4	13	7.1	13	9.0	16
239	26	36	24	31	25	31	24	29	33	40
241	2.2	3.5	3.3	5.1	1.7	2.0	1.3	1.4	1.2	1.8
242	0.33	0.45	0.39	0.82	0.59	0.81	0.41	0.79	0.66	0.83
243	5.7	6.3	5.7	6.8	5.6	6.6	5.9	6.3	7.2	14
245	1.4	2.4	0.5	0.7	0.49	0.7	0.53	0.78	0.36	0.45
247	0.23	0.33	0.58	0.93	2.92	9.0	3.2	9.8	5.3	14
249	2.2	2.8	2.1	2.2	2.1	2.2	2.2	2.6	1.6	2.4
250	6.9	7.8	8.2	9.2	8.3	9.6	8.5	11	7.5	11
269	4.2	4.7	4.6	4.9	5.8	6.8	5.7	6.3	5.2	5.9
272	3.0	4.5	2.5	3.7	2.7	3.4	2.5	3.0	2.8	3.6
274	0.94	1.2	0.83	1.2	0.71	1.0	1.2	1.8	1.0	2.1
276	0.80	1.0	0.70	1.0	1.15	1.9	1.2	2.0	1.2	2.7
279	64	79	50	64	53	59	48	54	49	57
280	14	22	9	14	9	13	3.9	7.2	4.6	8.7
305	6.6	7.3	7.0	8.0	4.9	5.1	3.7	4.0	3.0	3.6
306	7.3	8.2	9.8	10.6	7.8	8.7	5.2	6.7	5.3	6.6
309	5.8	8.3	6.1	10	6.8	12	5.9	8.4	6.0	11
310	1.1	1.8	0.9	1.7	1.2	8.2	0.79	1.7	0.52	1.2
311	12	14	14	16	14	18	15	24	18	23
312	8.7	13	8.0	16	6.9	14	7.5	15	8.2	11
313	0.21	0.36	0.19	0.33	0.19	0.57	0.19	0.32	0.26	0.40
314	0.78	0.98	0.64	0.82	0.58	0.77	0.54	0.62	0.60	0.80
315	0.15	0.26	0.11	0.15	0.12	0.22	0.12	0.31	0.14	0.33
316	0.13	0.18	0.13	0.33	0.11	0.22	0.11	0.23	0.14	0.41

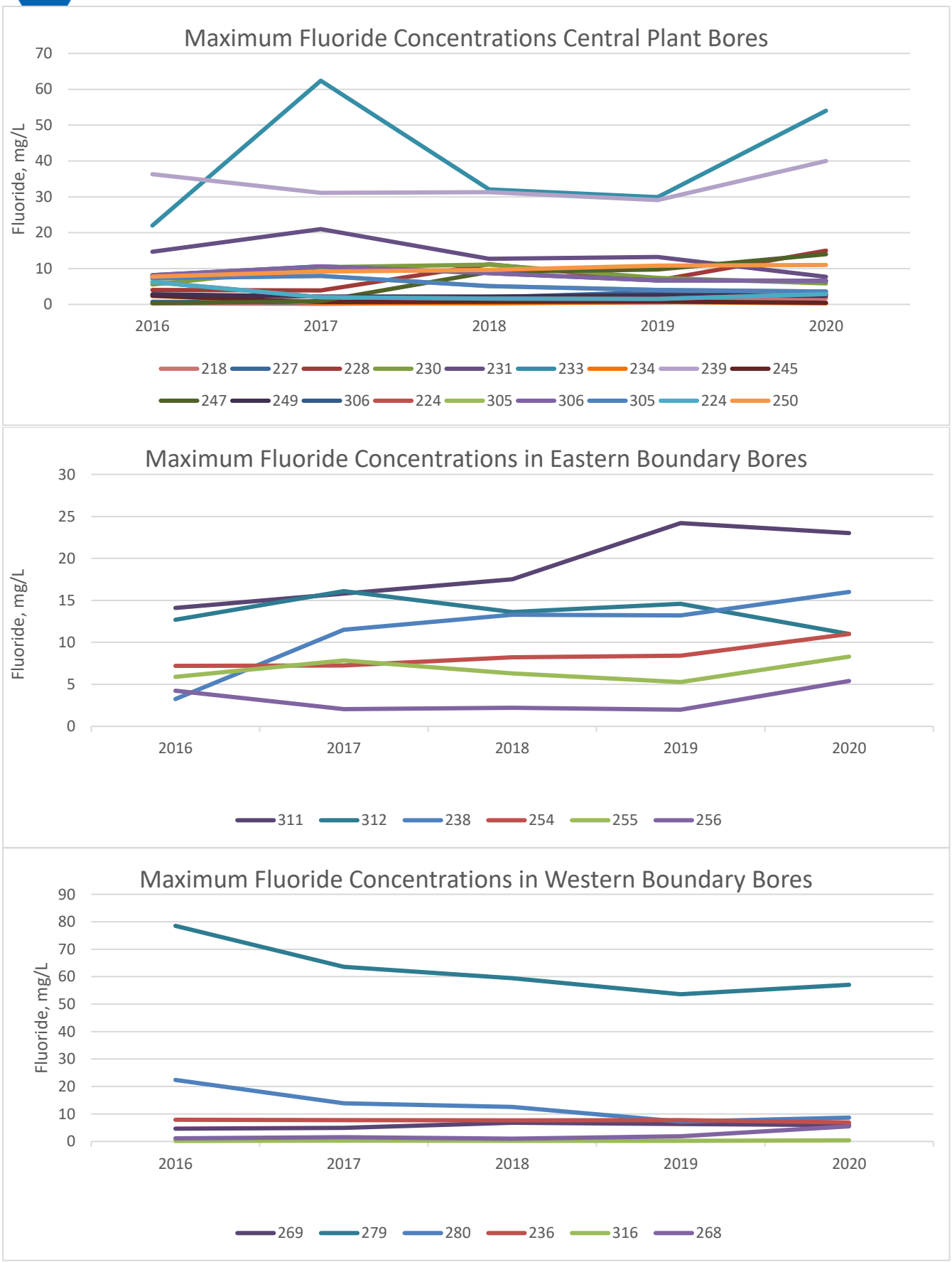
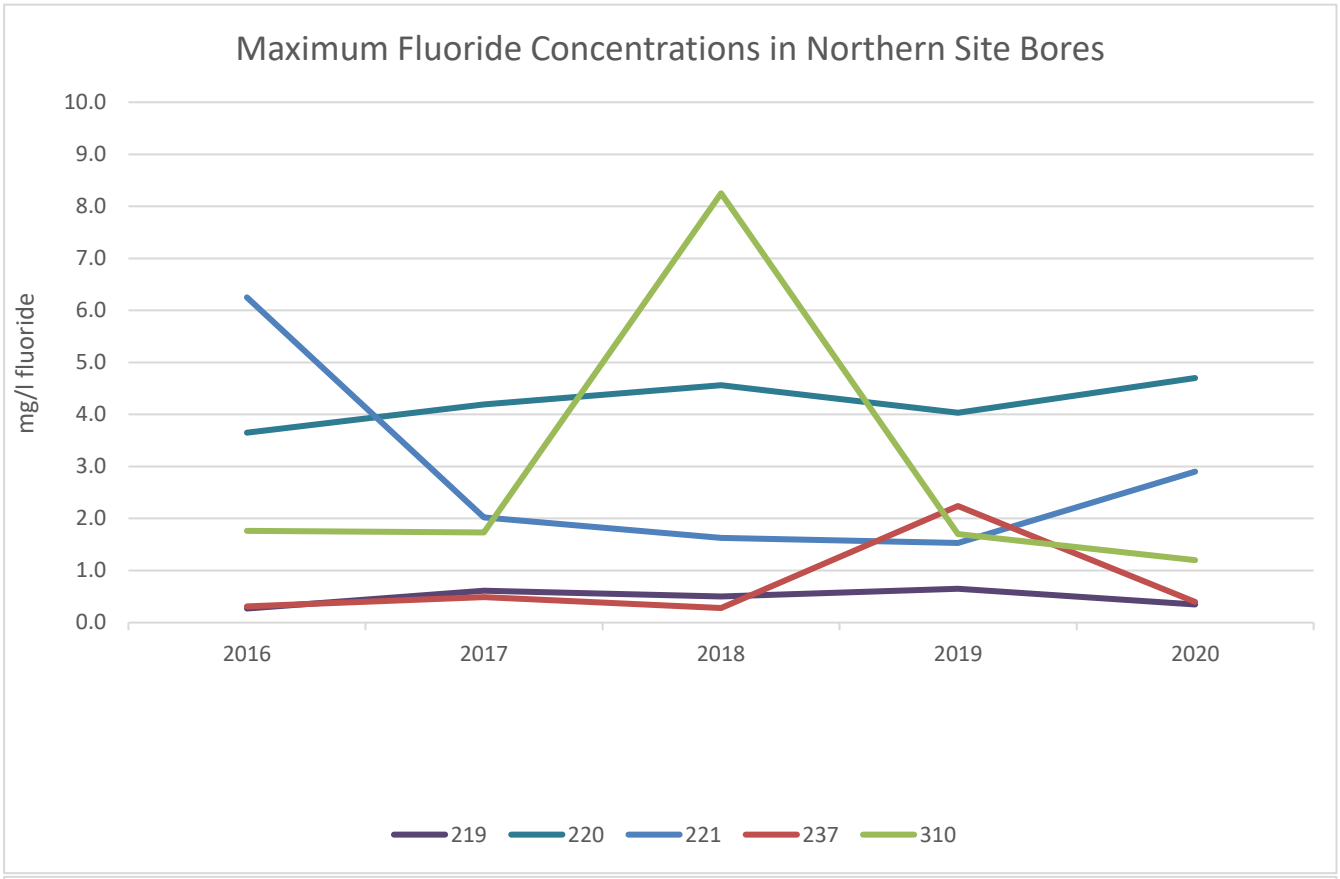
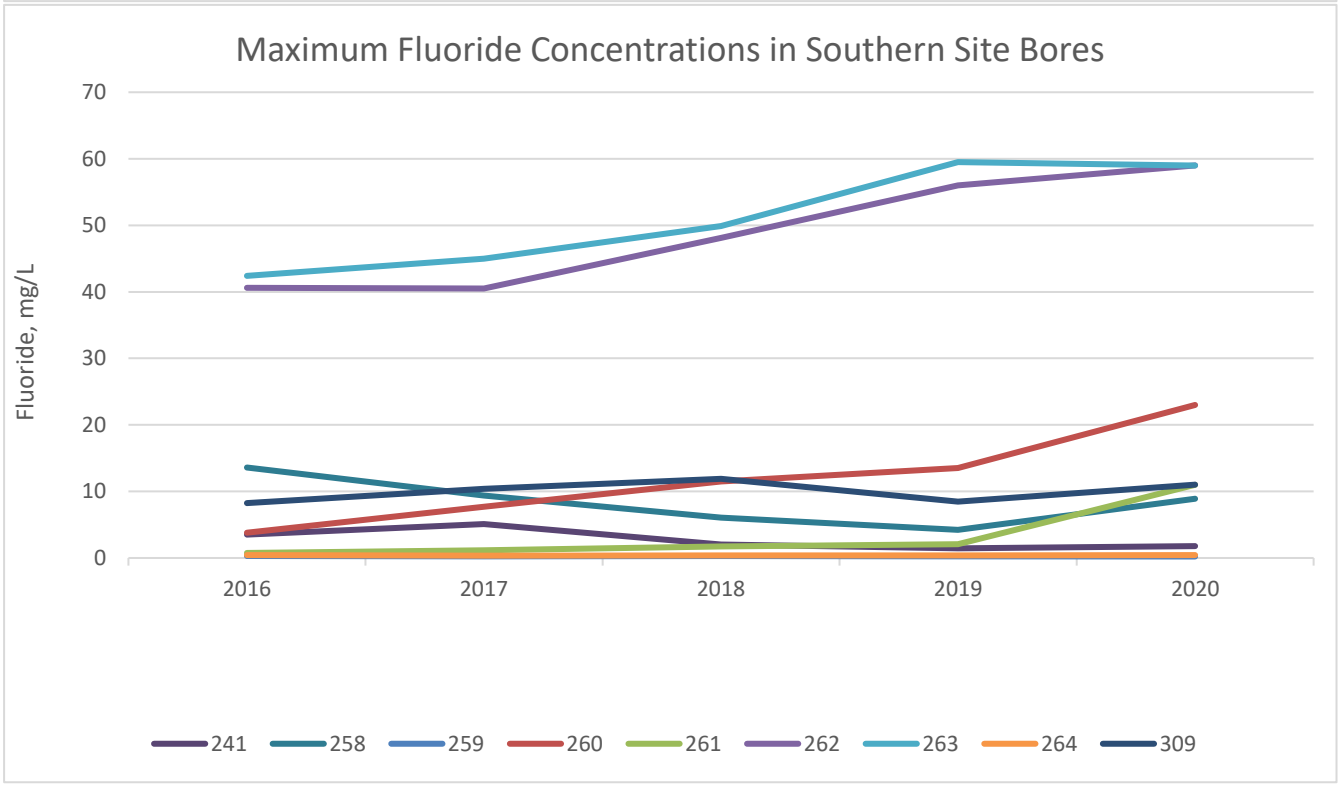


Figure 7.6 : Maximum fluoride concentrations measured 2016-2020


Maximum Fluoride Concentrations in Northern Site Bores
mg/l fluoride
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2016
2017
2018
2019
2020
219
220
221
237
310


Maximum Fluoride Concentrations in Southern Site Bores
Fluoride, mg/L
70
60
50
40
30
20
10
0
2016
2017
2018
2019
2020
241
258
259
260
261
262
263
264
309

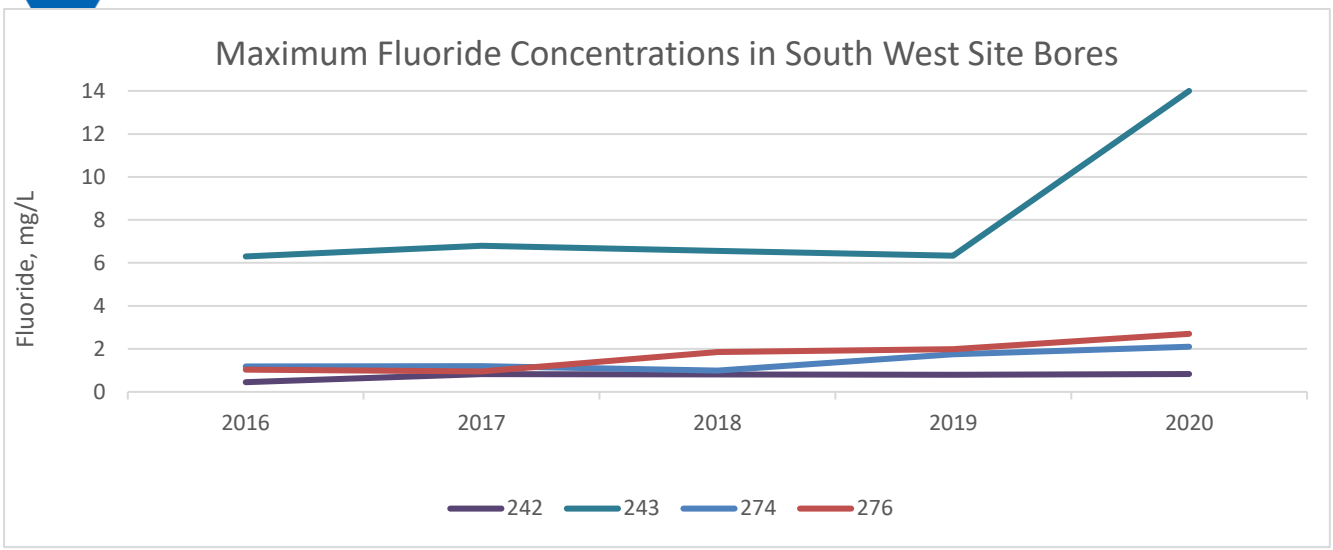


Figure 7.6 : Maximum fluoride concentrations measured 2016-2020

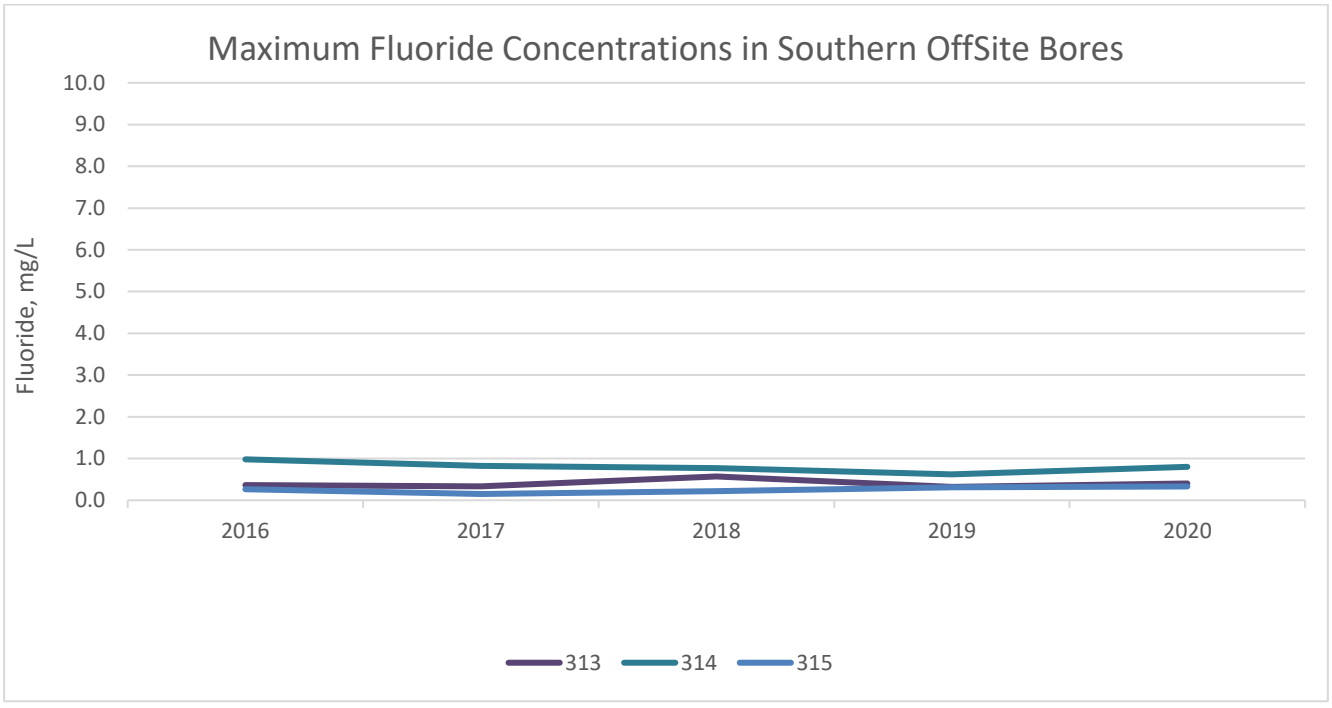


Figure 7.6 : Maximum fluoride concentrations measured 2016-2020

7.2.3 Piezometry and Groundwater Flow

Contours of the groundwater table beneath the smelter site are shown in Figure 7.7. It can be seen that the local flow of groundwater is to the south-south-east, away from the catchment of the main Tomago Sandbeds. Water levels are between 0.1 and 0.4 m lower than in 2019 due to the ongoing legacy of the drought.

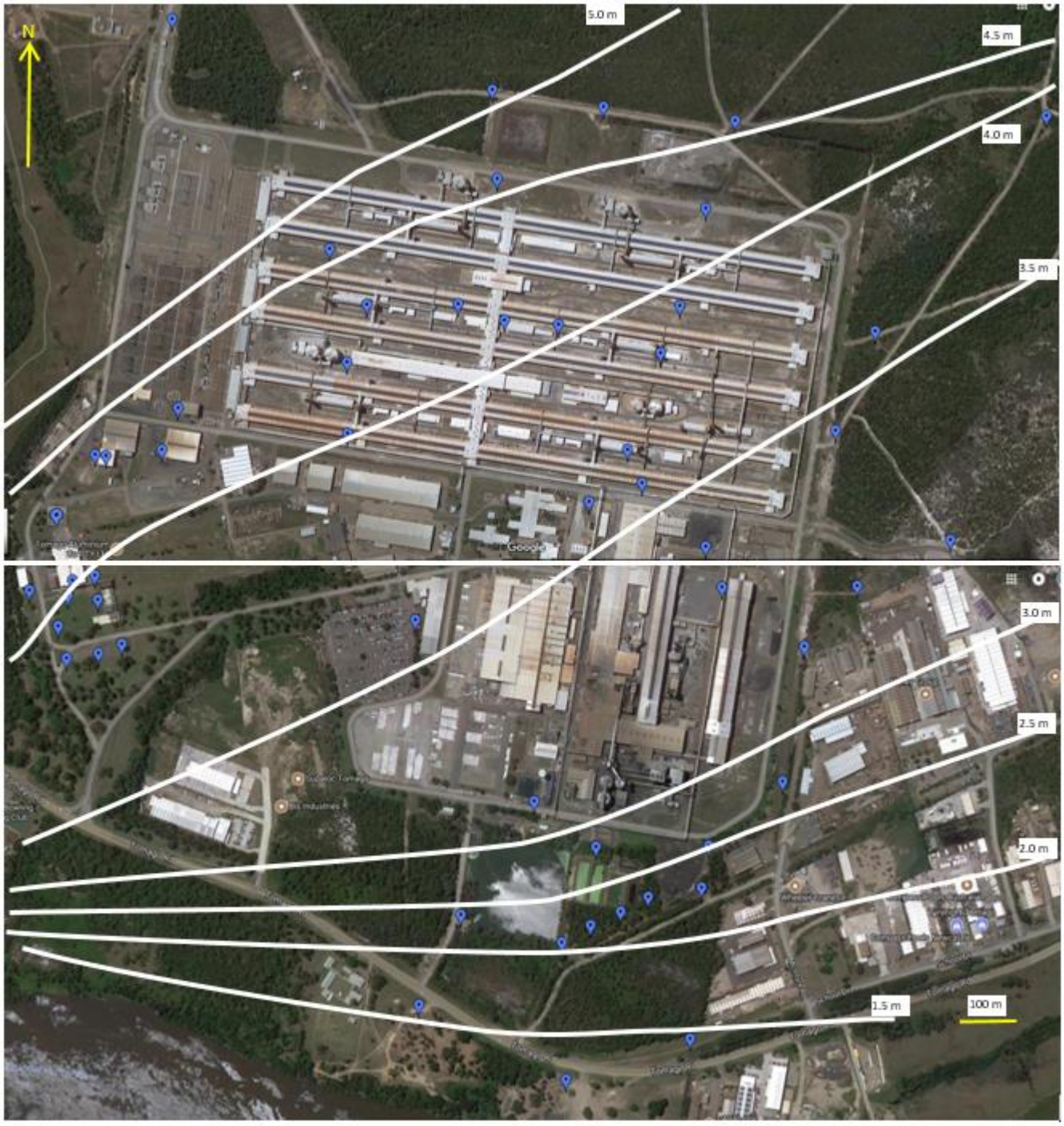


Figure 7.7: Groundwater Levels relative to AHD– 2020

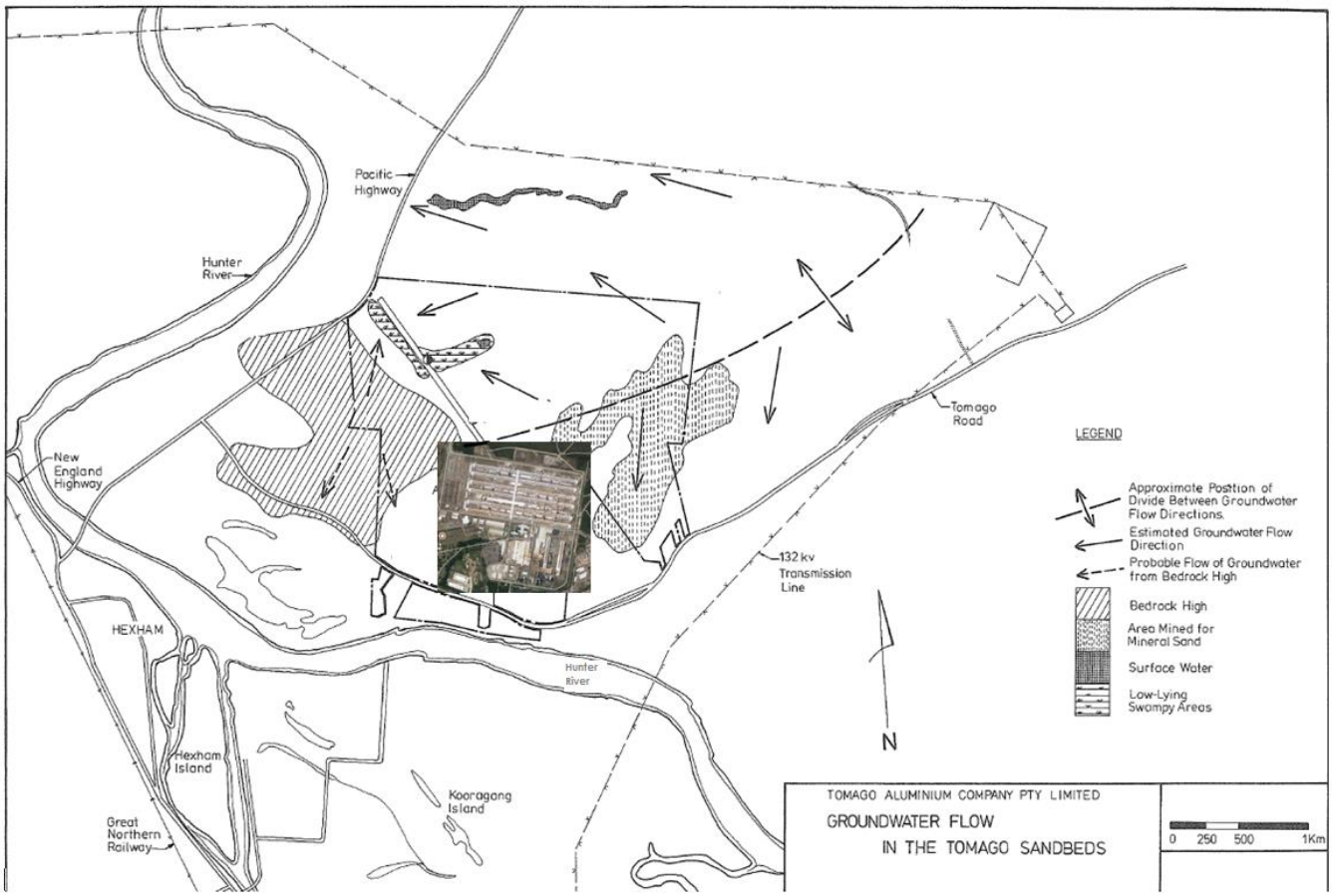


Figure 7.8 Groundwater Flow in the Tomago Sandbeds

7.3 Stormwater

Stormwater from the site is collected in a stormwater pond after passing through a sedimentation basin. The stormwater pond is designed to be managed so that the pond has the capacity to retain the "first flush". After the pond fills with the "first flush", water then discharges to the Hunter River via a weir in the sedimentation basin.
Water quality monitoring is conducted at the weir of the sedimentation basin (EPA Monitoring Point 35). The water quality results at the weir for 2020 are displayed in Tables 7.6 and Table 7.7. Results for the last 5 years are displayed in Tables 7.8 and 7.9.

To allow for the collection of 'first flush' stormwater originating from the site, stormwater pond capacity is designed to be maintained by discharging water from the stormwater pond to the Hunter River under controlled conditions during dry weather. Water samples are taken daily during the discharge. A summary of sample results for 2020 are presented in Table 7.5.
Lawson and Treloar conducted modelling of stormwater discharged from the site, concluding that the fluoride concentrations in the Hunter River are not adversely influenced by stormwater discharge. As a result of the study, the EPA placed controlled stormwater **controlled discharge** limits of:

Soluble fluoride	40 mg/L
Total Suspended Solids	50 mg/L
Kilolitres per day	4320

TAC conducted additional investigations in 2012 in order to validate this conclusion in accordance with the Pollution Reduction Program included in POEO Licence 6163. This involved an extensive ecological study of the Hunter River in the vicinity of the stormwater discharge point.

Efforts are ongoing at the site to improve stormwater quality. The ongoing legacy of the prolonged dry conditions meant there was little opportunity for first flush dilution during 2020.

The controlled discharge limits contained in EPL 6163 were complied with during 2020.

Table 7.5: Stormwater controlled discharge results – 2020

Month	Total Discharge (ML)	Ave pH	Ave Fluoride (mg/L)	Ave Conductivity (uS/cm)	Ave Suspended Solids (mg/L)	Ave PAH (mg/L)	Ave TRH (mg/L)
JAN	NMR	NMR	NMR	NMR	NMR	NMR	NMR
FEB	1.4	6.7	40	195	10	<0.001	<0.1
MAR	NMR	NMR	NMR	NMR	NMR	NMR	NMR
APR	NMR	NMR	NMR	NMR	NMR	NMR	NMR
MAY	NMR	NMR	NMR	NMR	NMR	NMR	NMR
JUN	NMR	NMR	NMR	NMR	NMR	NMR	NMR
JUL	3.0	6.8	34	157	10	<0.001	0.4
AUG	1.0	6.8	39	175	8	NMR	NMR
SEP	NMR	NMR	NMR	NMR	NMR	NMR	NMR
OCT	NMR	NMR	NMR	NMR	NMR	NMR	NMR
NOV	NMR	NMR	NMR	NMR	NMR	NMR	NMR
DEC	3.1	6.6	38	160	8	<0.001	<0.1

NMR= No Monitoring Requirement due to no discharge

Table 7.6: Average fluoride, pH and conductivity monitoring data for stormwater during days of weir overflow at the Tomago Aluminium Smelter for 2020

Weir V-notch To Hunter River (EPA Point 35)						
Month	**Total Discharge (ML)**	**Ave pH**	**Ave Fluoride (mg/L)**	**Ave Conductivity (uS/cm)**	**Ave PAH (mg/L)**	**Ave TRH (mg/L)**
JAN	25.3	5.8	46	511	<0.001	<0.1
FEB	101.8	5.9	42	326	<0.001	<0.1
MAR	54.6	6.1	49	452	<0.001	<0.1
APR	28.0	6.1	52	444	0.001	0.1
MAY	33.1	6.1	47	288	<0.001	0.3
JUN	51.4	6.4	41	251	0.001	0.3
JUL	172.1	6.0	39	371	0.001	0.4
AUG	2.0	6.2	51	480	<0.001	<0.1
SEP	0.0	NMR	NMR	NMR	NMR	NMR
OCT	105.0	6.4	37	506	0.004	<0.1
NOV	40.0	6.3	46	430	<0.001	<0.1
DEC	111.2	6.1	41	362	<0.001	<0.1

NMR= No Monitoring Requirement due to no discharge

Table 7.7: *Metal monitoring data for stormwater – 2020

	Total Fe	Total Ag	Total Al	Total As	Total Be	Total Cd	Total Co	Total Cr	Total Cu	Total Mn	Total Ni	Total Pb	Total Sb	Total Se	Total Tl	Total Zn	Total Hg	Free CN
	Results expressed in mg/L																	
January																		
Mean	1.1	<0.005	12	0.013	0.002	0.0010	0.002	0.003	0.013	0.11	0.22	0.004	0.006	0.002	<0.005	2.0	<0.0001	<0.01
Maximum	1.1	<0.005	12	0.013	0.002	0.0010	0.002	0.003	0.013	0.11	0.22	0.004	0.006	0.002	<0.005	2.0	<0.0001	<0.01
February																		
Mean	0.97	<0.005	14	0.007	0.003	0.0010	0.002	0.002	0.009	0.13	0.18	0.002	0.004	<0.001	<0.005	1.5	<0.0001	<0.005
Maximum	1.4	<0.005	15	0.007	0.003	0.0010	0.002	0.004	0.010	0.15	0.20	0.003	0.007	<0.001	<0.005	1.6	<0.0001	<0.005
March																		
Mean	0.65	<0.005	17	0.006	0.002	0.0009	<0.001	0.002	0.011	0.070	0.15	0.001	0.005	<0.001	<0.005	1.0	<0.0001	<0.005
Maximum	1.7	<0.005	20	0.013	0.003	0.0011	0.002	0.004	0.013	0.080	0.18	0.004	0.006	<0.001	<0.005	1.6	<0.0001	<0.005
April																		
Mean	0.93	<0.005	15	0.008	0.003	0.0011	0.001	0.002	0.010	0.069	0.18	0.002	0.005	<0.001	<0.005	1.3	<0.0001	<0.005
Maximum	1.3	<0.005	20	0.012	0.003	0.0012	0.002	0.002	0.014	0.086	0.25	0.003	0.007	<0.001	<0.005	1.5	<0.0001	<0.005
May																		
Mean	0.66	<0.005	21	0.006	0.002	0.0013	0.002	0.004	0.041	0.089	0.29	0.002	0.006	0.002	<0.005	1.4	<0.0001	<0.005
Maximum	0.66	<0.005	21	0.006	0.002	0.0013	0.002	0.004	0.041	0.089	0.29	0.002	0.006	0.002	<0.005	1.4	<0.0001	<0.005
June																		
Mean	1.2	<0.005	13	0.009	0.002	0.0010	0.001	0.003	0.008	0.075	0.16	0.003	0.006	<0.001	<0.005	1.1	<0.0001	<0.005
Maximum	1.2	<0.005	13	0.009	0.002	0.0010	0.001	0.003	0.008	0.075	0.16	0.003	0.006	<0.001	<0.005	1.1	<0.0001	<0.005
July																		
Mean	0.68	<0.005	14	0.007	0.002	0.0013	0.001	0.003	0.010	0.059	0.20	0.004	0.006	<0.001	<0.005	1.4	<0.0001	<0.005
Maximum	0.69	<0.005	18	0.010	0.003	0.0016	0.002	0.003	0.013	0.088	0.31	0.007	0.009	<0.001	<0.005	2.0	<0.0001	<0.005
August																		
Mean	1.7	<0.005	16	0.013	0.002	0.0020	0.002	0.004	0.010	0.095	0.25	0.004	0.010	<0.001	<0.005	2.0	<0.0001	<0.005
Maximum	1.7	<0.005	16	0.013	0.002	0.0020	0.002	0.004	0.010	0.095	0.25	0.004	0.010	<0.001	<0.005	2.0	<0.0001	<0.005
September																		
Mean	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR
Maximum	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR	NMR
October																		
Mean	1.3	<0.005	8.2	0.014	<0.001	0.0007	<0.001	0.002	0.006	0.044	0.11	0.003	<0.005	<0.001	<0.005	0.87	<0.0001	<0.005
Maximum	1.3	<0.005	8.2	0.014	<0.001	0.0007	<0.001	0.002	0.006	0.044	0.11	0.003	<0.005	<0.001	<0.005	0.87	<0.0001	<0.005
November																		
Mean	0.45	<0.005	18	0.008	0.002	0.0009	0.002	0.002	0.011	0.13	0.18	<0.001	<0.005	<0.001	<0.005	1.0	<0.0001	<0.005
Maximum	0.48	<0.005	20	0.008	0.002	0.0010	0.002	0.002	0.012	0.13	0.18	<0.001	0.005	<0.001	<0.005	1.1	<0.0001	<0.005
December																		
Mean	0.55	<0.005	16	0.008	0.002	0.0011	0.001	0.002	0.015	0.13	0.19	<0.001	0.006	0.001	<0.005	1.2	<0.0001	<0.005
Maximum	0.67	<0.005	18	0.009	0.003	0.0011	0.002	0.002	0.018	0.14	0.20	<0.001	0.006	0.001	<0.005	1.3	<0.0001	<0.005

Note: Heavy metals samples are collected and analysed once during each overflow event.
NMR = No monitoring required due to no flow
*Analysis performed by Eurofins I mgt, NATA accreditation No. 1261

Table 7.8: Annual Average and monthly maximum fluoride, pH and conductivity monitoring data for stormwater to Hunter River via weir (EPA Point 35) at the Tomago Aluminium Smelter for 2016 - 2020

	2016		2017		2018		2019		2020	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
pH	6.3	6.5	6.2	6.5	5.8	6.2	6.2	6.3	6.1	6.4
Conductivity uS/cm	503	907	287	380	845	1910	385	558	402	511
Fluoride mg/L	37	44	38	50	38	55	39	49	45	52
PAH mg/L	NMR	NMR	NMR	NMR	0.004	0.016	<0.001	<0.001	0.001	0.004
TRH mg/L	NMR	NMR	NMR	NMR	0.1	0.2	<0.1	<0.1	0.1	0.4

NMR= No Monitoring Requirement

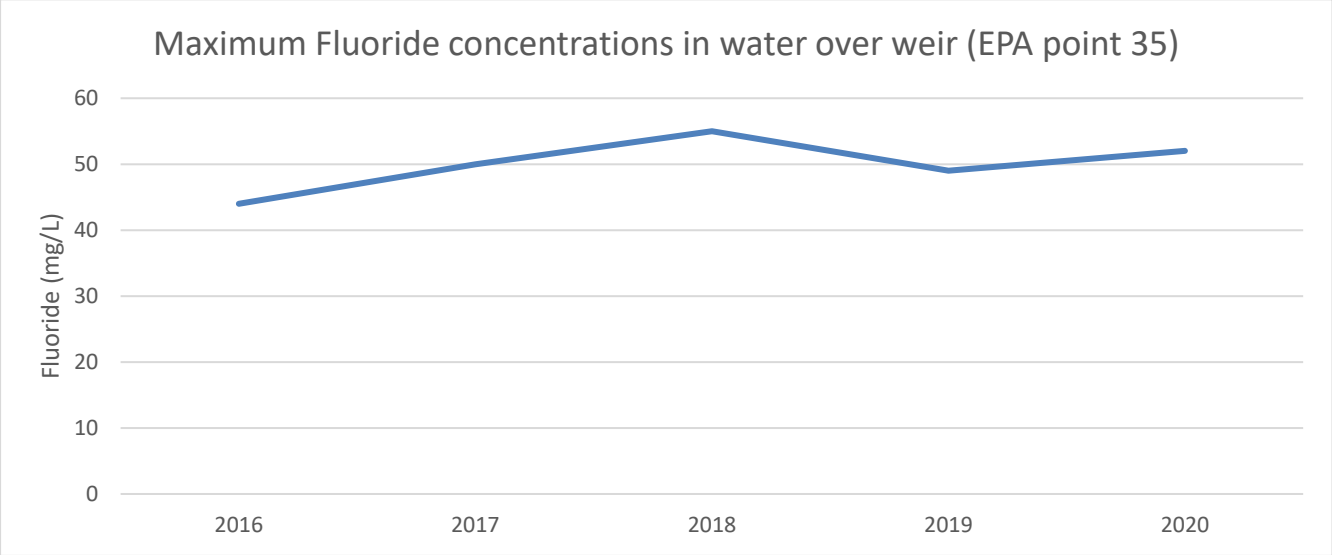


Figure 7.9 : Maximum fluoride concentrations EPA Point 35 2016-2020

Table 7.9: Average and maximum metal monitoring data for stormwater 2016 – 2020

mg/L	2016		2017		2018		2019*		2020*	
	Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Fe	0.82	2.4	1.3	4.0	2.7	12	0.92	2.1	0.80	1.7
Ag	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Al	15	38	18	32	22	39	14	17	16	21
As	0.003	0.009	0.006	0.018	0.008	0.027	0.004	0.008	0.008	0.014
Be	0.003	0.005	0.004	0.008	0.004	0.009	0.003	0.004	0.002	0.003
Cd	0.0022	0.039	0.0014	0.0057	0.0035	0.041	0.0011	0.0015	0.001	0.002
Co	0.001	0.002	0.002	0.004	0.002	0.006	0.001	0.002	0.001	0.002
Cr	0.004	0.014	0.006	0.026	0.006	0.015	0.003	0.006	0.002	0.004
Cu	0.025	0.067	0.032	0.092	0.062	0.35	0.011	0.016	0.012	0.041
Mn	0.10	0.19	0.12	0.31	0.15	0.56	0.087	0.11	0.091	0.15
Ni	0.14	0.23	0.20	0.50	0.24	0.46	0.16	0.21	0.18	0.31
Pb	0.003	0.011	0.003	0.013	0.007	0.044	0.003	0.006	0.002	0.005
Sb	0.005	0.020	0.009	0.022	0.008	0.030	<0.005	0.007	0.006	0.010
Se	<0.001	0.001	0.001	0.006	0.001	0.003	<0.001	0.007	<0.001	0.002
Tl	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zn	1.1	1.9	1.2	1.8	1.5	3.0	1.3	2.0	1.3	2.0
Hg	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	0.0002	<0.0001	0.0001	<0.0001	<0.0001
CN	<0.005	0.025	0.010	0.074	0.017	0.14	<0.005	<0.005	<0.005	<0.005

*In 2019 the sampling regime was changed from continuous monitoring of metals to sampling only when there is overflow from the weir in an attempt to better quantify actual concentrations being discharged.

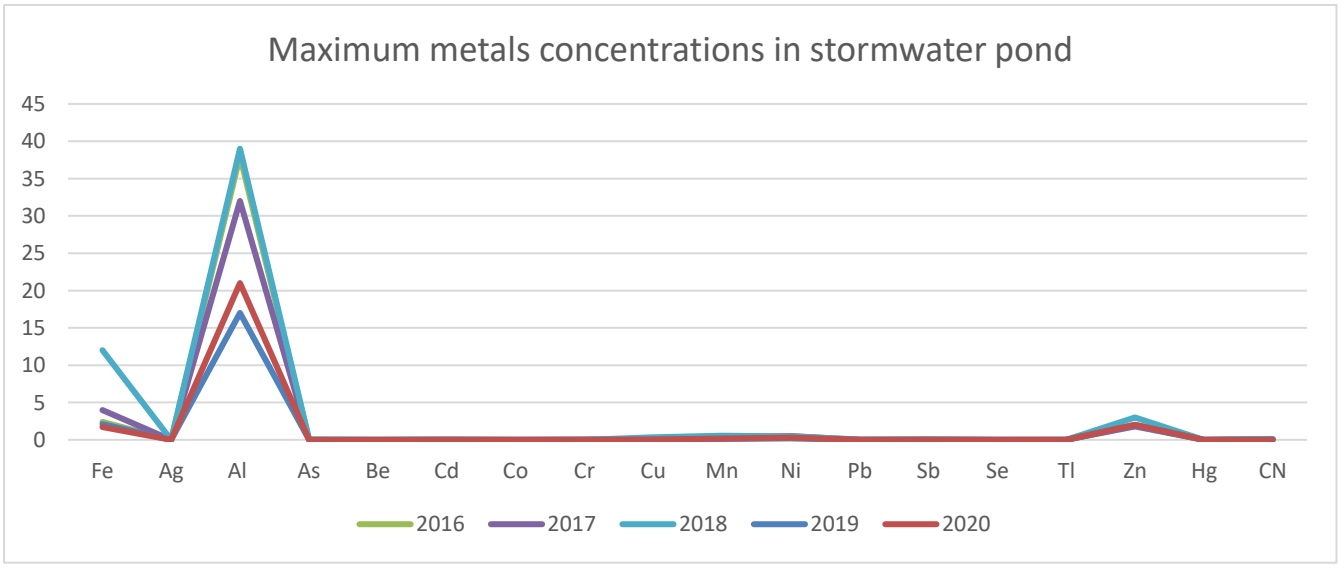


Figure 7.10 : Maximum metals concentrations stormwater pond 2016-2020

7.4 Hunter River Monitoring

In 2018 TAC commenced routine (quarterly) sampling of the Hunter River for metals (500m upstream and 500m downstream). For comparison purposes, some background levels were established by sampling the river at four different tide points (low, mid tide rising, high, mid tide falling) following a 10 day period with no discharge from TAC. Results for 2020 are displayed in Table 7.10. In 2020 there were some higher concentrations for many elements than in the background data set (2018). It is believed this may be due to the higher rainfall totals during 2020 than for several years prior, as there was no stormwater discharge from TAC on any of the river sampling days in 2020. In 2021, TAC plans to take a comparison sample further upstream at Raymond Terrace in an effort to better understand this data.

Table 7.10: Average and maximum metal monitoring data for Hunter River – 2020

mg/L	Background results	2020 Upstream		2020 Downstream		Guideline Value*
		Avg	Max	Avg	Max	
Al	0.50	5.4	10	1.8	3.7	
Sb	<0.005	<0.005	<0.005	<0.005	<0.005	0.50**
As	0.002	0.003	0.004	0.002	0.002	0.05**
Be	<0.001	<0.001	<0.001	<0.001	<0.001	
Cd	<0.0002	<0.002	<0.002	<0.002	<0.002	0.036*
Cr	0.001	0.012	0.021	<0.001	<0.001	0.091*
Co	<0.001	0.005	<0.001	<0.001	<0.001	0.15*
Cu	0.004	0.008	0.017	0.004	0.005	0.008*
Fe	0.80	7.2	14	2.2	4.4	
Pb	<0.001	0.003	0.005	<0.001	<0.001	0.012*
Mn	0.067	0.17	0.33	0.065	0.087	
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0014*
Ni	0.005	0.018	0.047	0.009	0.021	0.56*
Se	<0.001	<0.001	<0.001	<0.001	<0.001	0.071**
Ag	<0.005	<0.005	<0.005	<0.005	<0.005	0.0026*
Tl	<0.005	<0.005	<0.005	<0.005	<0.005	0.020**
Zn	0.009	0.032	0.088	0.008	0.010	0.043*

* Australian Water Quality Guidelines for Fresh and Marine Waters (2000), revised 2018 (Australian and New Zealand Environment and Conservation Council), 80% species protection value.
**Australian Water Quality Guidelines for Fresh and Marine Waters, National Water Quality Management Strategy, November 1992 (Australian and New Zealand Environment and Conservation Council), used where the above were not available.

7.5 Bio-Accumulation Program

An oyster and sediment monitoring program is conducted in the Hunter River. This program allows a database to be established on the water and sediment quality in the Hunter River.
Sediment samples are collected 500 metres upstream, 500m downstream and adjacent to the outlet of the company's stormwater discharge point. The results (on a dried basis) for 2020 and the last 5 years are displayed in Tables 7.11 and 7.12. Results are also compared to ANZECC sediment quality guidelines. As can be seen that there is considerable variation in concentrations from the same site, and the highest concentrations were detected upstream. This would suggest that in regards to metals there are other influences on the analyte levels. Recent studies* suggest the lower Hunter River has a high presence of metals (including copper, zinc and nickel) from an historical industrial past. The only analyte tested that was above Default Guideline Value is nickel, with results reasonably consistent across all three sampling sites, with the exception of fluoride which is marginally higher at the outlet sampling location.

*Lower Hunter River Health Monitoring Program
http://www.environment.nsw.gov.au/research/lower-hunter-river-health-monitoring-program.htm

Oysters are no longer farmed in the Hunter River, so from 2012 wild oysters have been sampled annually along the riverbank at the same locations as the sediment samples. A range of metals and fluoride are determined on these samples. Results are compared to the Food Standards Australia and New Zealand Standard 1.4.1, Contaminants and Natural Toxicants, however it must be noted that because TAC's monitoring is done on a dried basis whereas the food standard is expressed "in natural form", the limits have been adjusted accordingly based on a moisture figure of 85% (Bernard, 1974). Arsenic concentration at the Outlet sampling point was slightly above the Food standard (under the assumption that all arsenic detected was inorganic). The guideline limit is very close to the limit of detection for this analyte. The results for 2020 are displayed in Tables 7.13 and 7.14.

Table 7.11 Sediment monitoring results for 2020

All results in mg/kg (dry basis)												
		Sb*	Ag*	As*	Cd*	Cr*	Cu*	Pb*	Ni*	Zn*	Hg*	F
Sediment Quality Guidelines**	DGV	2	1	20	1.5	80	65	50	21	200	0.15	500***
	GV-high	25	4	70	10	370	270	220	52	410	1.0	
Upstream	n	4	4	4	4	4	4	4	4	4	4	4
	Mean	<5	<2	5	<1	75	25	10	45	87	<0.1	168
	Max	<5	<2	8	<1	100	36	18	55	154	<0.1	225
	S. Dev	0	0	3	0	17	11	6	13	55	0	67
Downstream	n	4	4	4	4	4	4	4	4	4	4	4
	Mean	<5	<2	6	<1	57	30	15	46	134	<0.1	215
	Max	<5	<2	9	<1	74	38	20	64	168	<0.1	265
	S. Dev	0	0	3	0	14	8	5	14	43	0	39
Stormwater Outlet	n	4	4	4	4	4	4	4	4	4	4	4
	Mean	<5	<2	8	<1	67	37	17	56	162	<0.1	306
	Max	<5	<2	10	<1	78	38	21	71	184	<0.1	410
	S. Dev	0	0	2	0	12	2	4	11	32	0	71

DGV = Default Guideline Value
GV-high = Upper Guideline Value

*Analysis performed by ALS Environmental, NATA accreditation No. 825
** Toxicant default guideline values for sediment quality http://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants
******* Sediment fluoride effects threshold identified by visual inspection of biota response relationships The National Institute of Water and Atmospheric Research, New Zealand (NIWA)

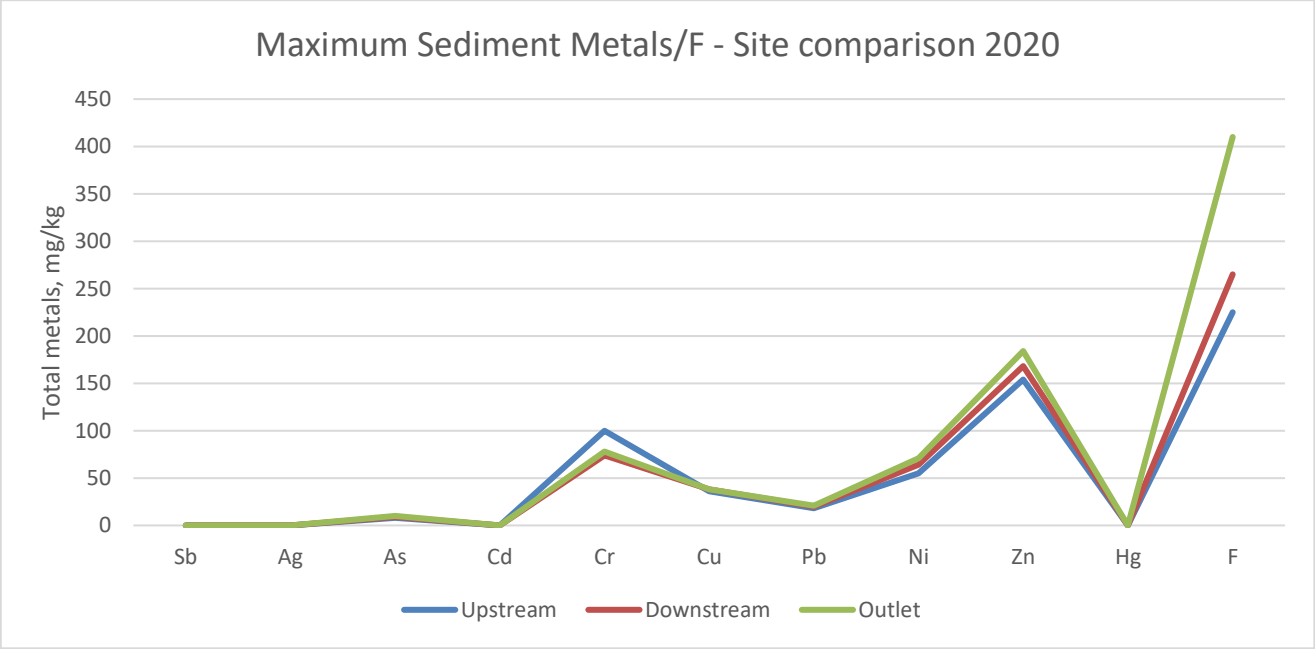


Figure 7.11: Maximum metals/F concentrations in sediment by site 2020

Table 7.12: Sediment monitoring annual average and sample maximum results for 2016 – 2020

Upstream											
Analyte	Unit	2016		2017		2018		2019		2020	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Antimony	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Silver	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Arsenic	mg/kg	<5	5	5	7	<5	10	<5	9	5	8
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	34	45	66	120	35	53	29	43	75	100
Copper	mg/kg	13	18	21	27	20	28	18	30	25	36
Lead	mg/kg	8	11	12	18	21	37	13	21	10	18
Nickel	mg/kg	18	21	31	42	27	41	21	36	45	55
Zinc	mg/kg	64	91	103	153	112	200	119	199	87	154
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	mg/kg	164	265	168	257	198	275	126	160	168	225

Downstream											
Analyte	Unit	2016		2017		2018		2019		2020	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Antimony	mg/kg	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Silver	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Arsenic	mg/kg	7	10	7	12	8	9	9	10	6	9
Cadmium	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	mg/kg	51	57	82	150	48	55	49	52	57	74
Copper	mg/kg	27	30	29	36	26	29	29	33	30	38
Lead	mg/kg	16	18	20	25	20	26	22	25	15	20
Nickel	mg/kg	30	36	36	50	32	36	34	39	46	64
Zinc	mg/kg	153	187	205	297	194	215	353	769	134	168
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	mg/kg	194	245	173	265	239	260	208	240	215	265

Outlet**											
Analyte	Unit	2016		2017		2018		2019		2020	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Antimony	mg/kg					<5	<5	<5	<5	<5	<5
Silver	mg/kg					<2	<2	<2	<2	<2	<2
Arsenic	mg/kg					7	12	11	11	8	10
Cadmium	mg/kg					1	2	<1	<1	<1	<1
Chromium	mg/kg					57	70	54	55	67	78
Copper	mg/kg					22	33	35	36	37	38
Lead	mg/kg					16	23	24	25	17	21
Nickel	mg/kg					34	48	44	46	56	71
Zinc	mg/kg					151	220	224	237	162	184
Mercury	mg/kg					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	mg/kg					248	320	278	325	306	410

*Analysis performed by ALS Environmental, NATA accreditation No. 825
**Monitoring commenced at the outlet in 2018.

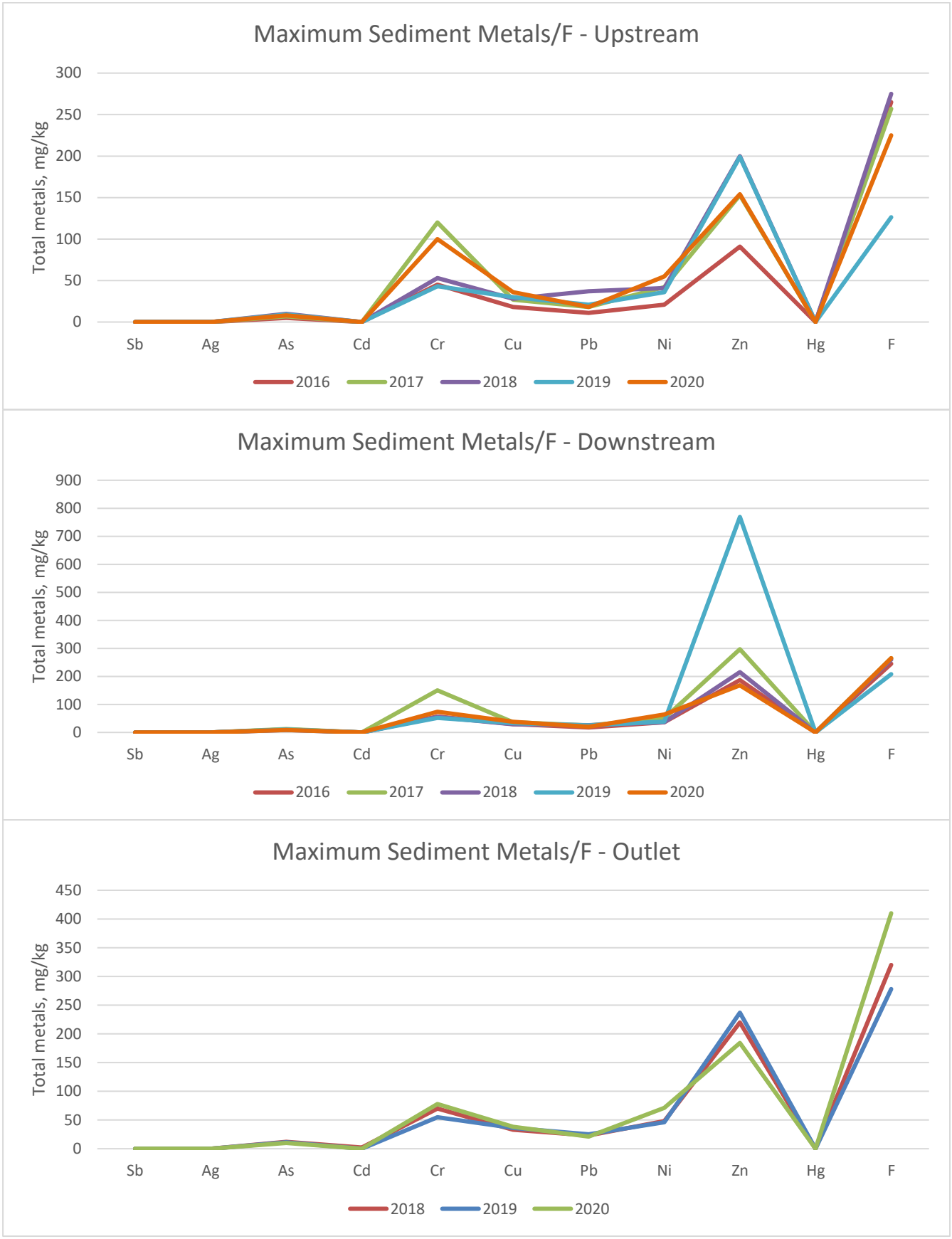


Figure 7.12: Maximum metals/F concentrations in sediment 2016 - 2020

Table 7.13: *Oyster monitoring results for 2020

Analyte	Unit	500m upstream from outlet	500m downstream from outlet	At outlet	Food Standards Code maximum levels (assuming water content of 85%)
Aluminium	mg/kg	150	290	520	
Arsenic	mg/kg	6	7	8	7 (inorganic)
Beryllium	mg/kg	<1	<1	<1	
Cadmium	mg/kg	2	2	2	13
Chromium	mg/kg	<2	<2	<2	
Cobalt	mg/kg	<2	<2	<2	
Copper	mg/kg	346	351	358	
Iron	mg/kg	320	510	840	
Lead	mg/kg	<5	<5	<5	13
Manganese	mg/kg	19	27	40	
Nickel	mg/kg	<2	<2	2	
Selenium	mg/kg	5	<5	5	
Zinc	mg/kg	4660	3430	5950	
Mercury	mg/kg	<0.1	<0.1	0.1	3.3
Fluoride	mg/kg	10	10	20	

***Analysis performed by ALS Environmental, NATA accreditation No. 825**

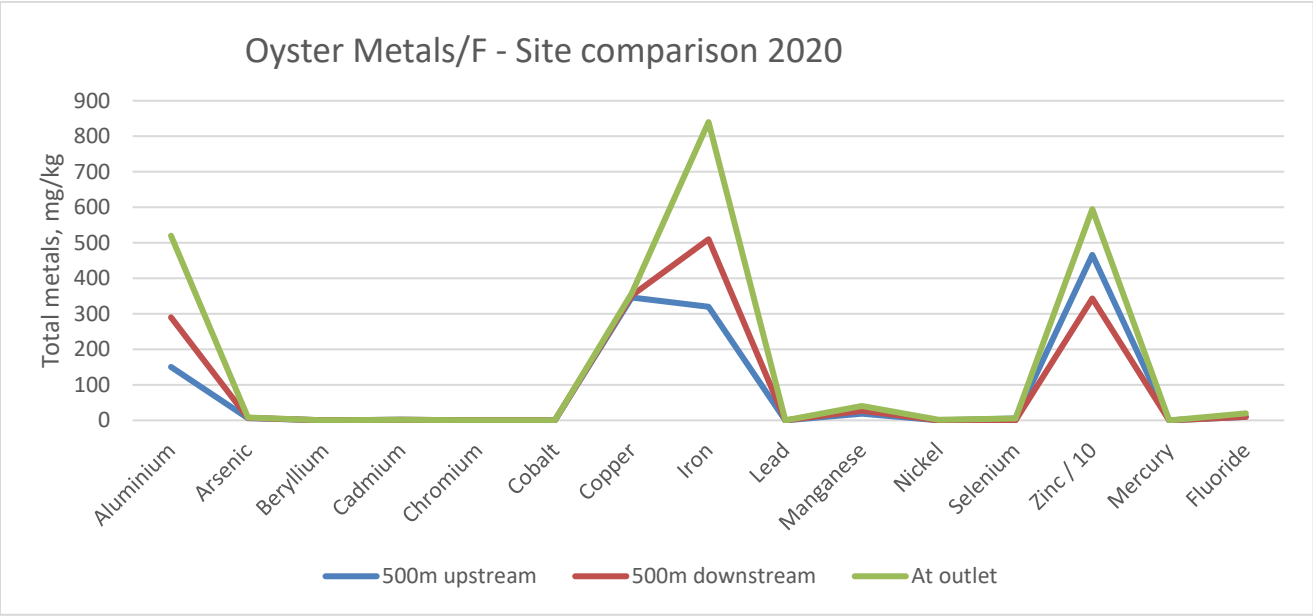


Figure 7.11 : Metals/F concentrations in oysters by site 2020

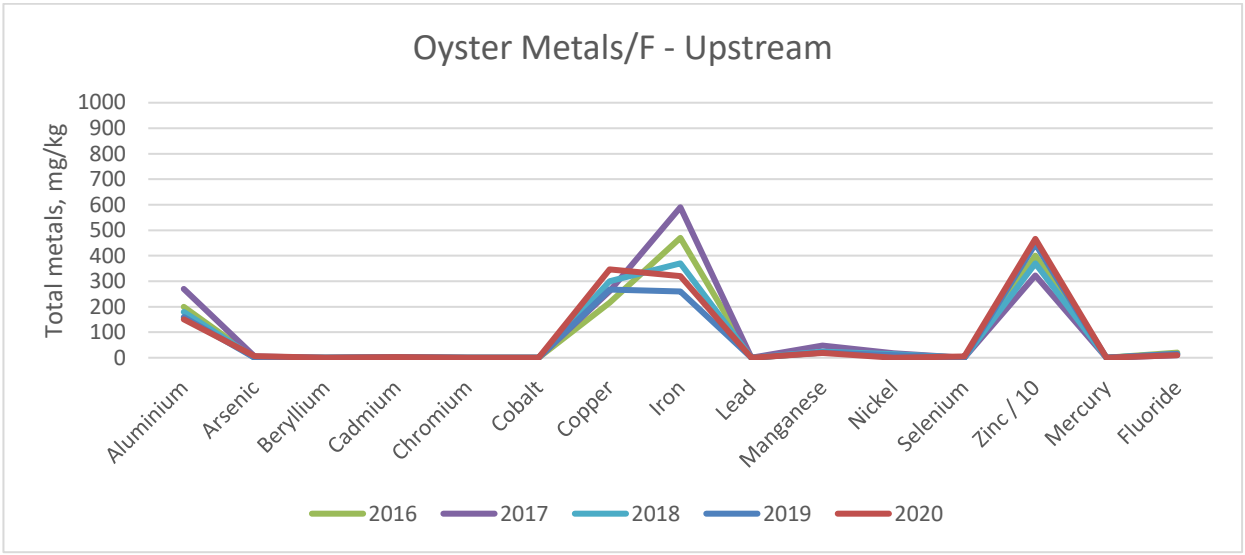
(Note: Zinc results have been divided by 10 for display purposes)

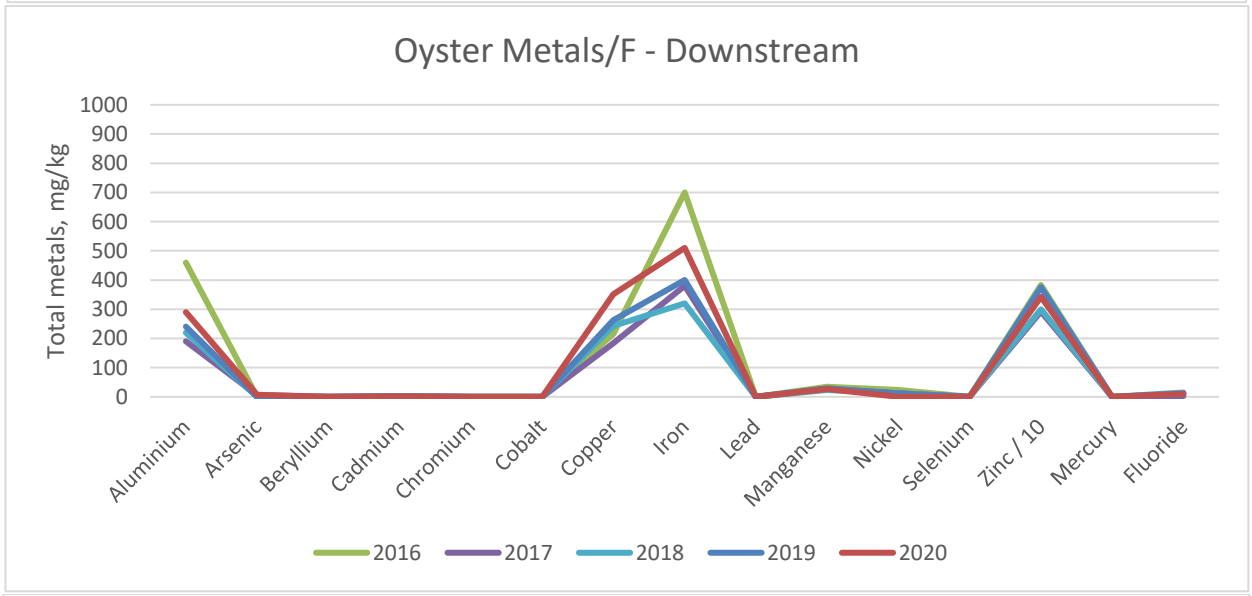
Table 7.14: *Oyster monitoring results for 2016 – 2020

Analyte	Unit	2016	2017	2018	2019	2020
		500m upstream				
Aluminium	mg/kg	200	270	180	160	150
Arsenic	mg/kg	<5	5	<5	<5	6
Beryllium	mg/kg	<1	<1	<1	<1	<1
Cadmium	mg/kg	1	2	1	1	2
Chromium	mg/kg	<2	<2	<2	<2	<2
Cobalt	mg/kg	<2	<2	<2	<2	<2
Copper	mg/kg	216	261	300	267	346
Iron	mg/kg	470	590	370	260	320
Lead	mg/kg	<5	<5	<5	<5	<5
Manganese	mg/kg	20	48	24	20	19
Nickel	mg/kg	12	18	14	10	<2
Selenium	mg/kg	<5	<5	<5	<5	5
Zinc	mg/kg	4000	3220	3700	4460	4660
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	mg/kg	20	10	15	15	10
		500m downstream				
Aluminium	mg/kg	460	190	220	240	290
Arsenic	mg/kg	<5	6	<5	<5	7
Beryllium	mg/kg	<1	<1	<1	<1	<1
Cadmium	mg/kg	1	1	1	1	2
Chromium	mg/kg	<2	<2	<2	<2	<2
Cobalt	mg/kg	<2	<2	<2	<2	<2
Copper	mg/kg	215	184	243	263	351
Iron	mg/kg	700	380	320	400	510
Lead	mg/kg	<5	<5	<5	<5	<5
Manganese	mg/kg	34	27	24	29	27
Nickel	mg/kg	24	12	11	11	<2
Selenium	mg/kg	<5	<5	<5	<5	<5
Zinc	mg/kg	3830	2920	3000	3750	3430
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	mg/kg	10	<5	15	10	10
		At Outlet				
Aluminium	mg/kg	480	390	250	230	520
Arsenic	mg/kg	<5	6	<5	<5	8
Beryllium	mg/kg	<1	<1	<1	<1	<1
Cadmium	mg/kg	2	3	2	1	2
Chromium	mg/kg	<2	<2	<2	<2	<2
Cobalt	mg/kg	<2	<2	<2	<2	<2
Copper	mg/kg	237	263	244	259	358
Iron	mg/kg	700	610	310	450	840
Lead	mg/kg	<5	<5	<5	<5	<5
Manganese	mg/kg	29	37	15	20	40
Nickel	mg/kg	23	25	13	9	2
Selenium	mg/kg	<5	<5	<5	<5	5
Zinc	mg/kg	5300	6730	4110	4240	5950
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1
Fluoride	mg/kg	25	10	25	<5	20

*Analysis performed by ALS Environmental, NATA accreditation No. 825

Note: Results reported on a dried basis





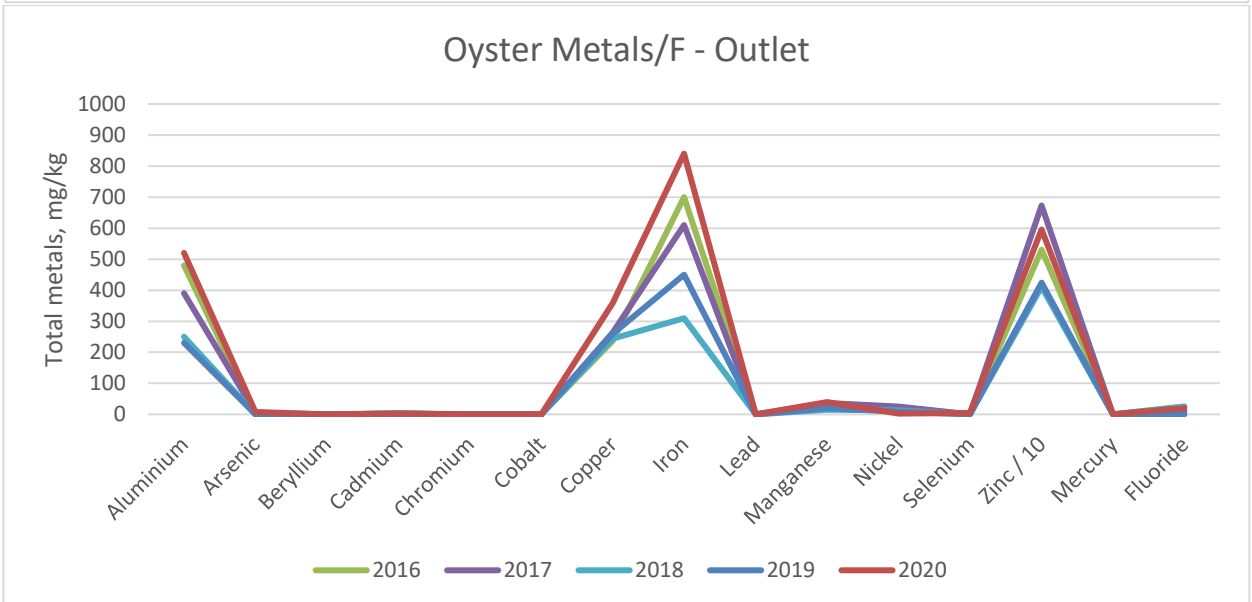


Figure 7.14 : Metals/F concentrations in oysters 2016 - 2020

(Note: Zinc results have been divided by 10 for display purposes)

8. ENERGY

Tomago Aluminium is a participant in NSW Energy Saving Scheme (ESS), under which the company has a Recognised Energy Saving Activity.
The improvement in smelting electrical efficiency since 2013 in MW/ tonne of aluminium produced is displayed in Table 8.

TABLE 8: Smelter electrical efficiencies

Year	2013	2014	2015	2016	2017	2018	2019	2020
MW / t Al	14.57	14.36	14.33	14.35	14.29	14.20	14.17	14.17

In 2020, smelter electrical efficiency remained stable. A new design pot continued to be rolled out.

9. WASTE MANAGEMENT

9.1 Aluminium Smelter Waste

All Spent Potlining (SPL) is stored undercover on the TAC site. On-site storage of SPL as at the end of December 2020 was 11866 tonnes. 9000 tonnes of SPL was generated in 2020 and Regain processed and dispatched 6350 tonnes of SPL based product for reuse in the cement industry during 2020, which was below target due to various factors with catch up planned for Q1 2021.
Fluorinated waste generated in the Rod Shop is also recycled via Regain.
Dross material generated in the casthouse is recycled via Weston Aluminium.
SPL and dross waste monthly generation and processing rates for 2020 are displayed in Table 9.1A below.
Other restricted waste stored on site is shown in Table 9.1B.
Other products for reintroduction to the process stored on site are shown in Table 9.1C.

TABLE 9.1A: Spent Pot Lining and Dross waste generation and processing rates, 2020

2020	SPL generated (tonnes)	SPL recycled via Regain	SPL stored (tonnes)	Dross generated and recycled (tonnes)
Jan	840	1333	9466	563
Feb	720	698	9488	492
Mar	960	1792	8656	554
Apr	540		9196	580
May	480		9676	550
Jun	540	509	9706	511
Jul	840		10546	525
Aug	780	821	10505	502
Sep	840	912	10433	484
Oct	780		11213	525
Nov	780	284	10966*	473
Dec	900		11866	534

*A stock adjustment of -743 tonnes SPL stored was made in November due to the annual volumetric survey undertaken

TABLE 9.1B: Waste stored on site 2020

Waste stream	Waste classification	Generated in 2020 (tonnes)	Removed in 2020 (tonnes)	Stored (tonnes)
Stormwater pond sediment	Restricted (SIA2019-S-07)	NIL	1482	NIL
Bake Ovens Refractory bricks	General (Tomago Aluminium Refractory Brick Exemption 2019)	5500	3672	1050

TABLE 9.1C: Other products stored for reuse on site 2020

	End 2018	End 2019	End 2020
Green anodes rejects inventory (anodes)	132	1170	3007
Bath in warehouse 3 (tonnes)	5012	5439	5078
Baked scraps (tonnes)	3120	4672	4546

9.2 Waste Generation Rates

All fluorinated waste from the Potlines (apart from SPL) is recycled back into the process. As mentioned in 9.1 spent potlining material is being processed via Regain for re-use, and dross material generated in the casthouse is also recycled via Weston Aluminium. The waste generation rates / recycle rates for the last 5 years are summarised in Table 9.2 below.

TABLE 9.2: Annual waste generation / recycling rates

	2016	2017	2018	2019	2020
Restricted Waste – landfilled[1] (tonnes)	134	11.5	58	16	1492*
Restricted Waste – recycled[2] (tonnes)	126	108	44	77	53
General solid waste – landfilled[3] (tonnes)	1138	1391	1348	1114	1419
General solid waste – recycled[4] (tonnes)	7407	8222	9462	10000	7822
Dross generated (100 % recycled, tonnes)	6371	5635	6196	6430	6294
SPL generated (tonnes)	3808	6936	9112	9656	9000
SPL recycled (tonnes)	10091	13294	6804	4834	6350
SPL stored (tonnes)	6827	2829	5137	9959	11866

[1]Restricted waste – landfilled primarily included used filter bags, disposed of at the SUEZ facility at Kemps Creek. *In 2020, 1482 tonnes stormwater pond sediment was disposed of.

[2]Restricted waste – recycled primarily included waste oil, oily water and oil filters by Veolia Environmental Services.

[3]General solid waste is usually disposed of at the SUEZ facility at Raymond Terrace.

[4]General solid waste – recycled primarily consisted of aluminium swarf (Weston Aluminium), bake ovens refractory brick (under the *Tomago Aluminium refractory brick exemption 2019* to SCE), fluorinated waste ex Rod Shop (to Regain Services), ferrous and non-ferrous scrap metal including used cathode bars (to Sell & Parker), and timber and paper (to Veolia Environmental Services).

9.3 Wallaroo Waste Disposal Facility

Tomago Aluminium Company operates a secure landfill facility at Wallaroo, 20 km north of the smelter. “Approved Smelter Waste” (leachable fluoride <150 mg/L) was disposed of at this site between 1987 and 1999 on a 5,000 tonne / 2 year campaign basis. No further waste has been landfilled at the site since 1999.

The Wallaroo site operates with two licences issued by the Environment Protection Authority, under the Environmentally Hazardous Chemicals Act and the Protection of Environment Operations Act (POEO Licence 6048).

The topography of the disposal area within the site results in there being very little runoff other than from rainfall directly onto the area. The disposal pits are clay lined and capped, and vee drains are formed around the perimeter of the pits in order to divert any water away from the pits. These controls prevent any surface water from mixing with waste, and on-site surface water runoff is directed to a retention dam to prevent sediment from being carried off the landfill site. This dam is designed to overflow periodically during significant rain events.

The Environmental Impact Statement for the Wallaroo landfill was prepared with the intention that the site would be used for disposal of Spent Pot Lining (SPL) waste and that if the site dam results for fluoride and cyanide are unacceptable this water would need to be treated. The site has never received any SPL waste and only Approved Smelter Waste has been disposed of at the site. The site dam results remain at background levels for all parameters including metals, thus the dam is allowed to overflow to the natural drainage lines as required (Tables 9.3 and 9.5). The EIS predicted there would be no effect on the surrounding environment and the monitoring data supports this.

The company monitors the quality of groundwater and surface water at and adjacent to the site on a quarterly basis, (See Appendix 1, Maps 8 and 9 for monitoring locations).

Monitoring results for 2020 (Tables 9.3 to 9.5) indicate that there has been no change in water quality from background levels. Surface water fluorides were all lower thn 2019, a likely reflection of the elevation in rainfall totals when compared to the years prior. Most groundwater sites were unable to be sampled at various times throughout the year due to the ongoing legacy of prolonged drought conditions. With water table levels not yet back to normal, only a single sample at Site 901 was able to be obtained and as such, no conclusions have been drawn from this.

Table 9.3A: Surface water monitoring in the vicinity of the Wallaroo Landfill Facility for 2020

SITE	TEST	Q1 2020	Q2 2020	Q3 2020	Q4 2020
801	pH	7.6	6.9	7.1	7.2
	Conductivity (uS/cm)	36	50	36	34
	Soluble Fluoride (mg/L)	0.12	0.11	0.23	0.44
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02
802	pH	6.0	5.1	6.3	nra
	Conductivity (uS/cm)	47	71	81	nra
	Soluble Fluoride (mg/L)	<0.10	<0.10	0.13	nra
	Cyanide (mg/L)	<0.02	<0.02	<0.02	nra
803	pH	6.4	5.5	5.8	6.2
	Conductivity (uS/cm)	190	130	350	230
	Soluble Fluoride (mg/L)	<0.10	<0.10	0.11	0.17
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02
804	pH	6.5	6.5	6.8	6.8
	Conductivity (uS/cm)	3400	6800	16000	25000
	Soluble Fluoride (mg/L)	<0.10	<0.10	0.31	0.61
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02
805	pH	6.4	6.3	6.2	6.5
	Conductivity (uS/cm)	7600	2200	1100	17200
	Soluble Fluoride (mg/L)	0.25	<0.10	0.11	0.41
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02
807	pH	7.4	7.4	8.0	7.8
	Conductivity (uS/cm)	40000	46000	46600	49000
	Soluble Fluoride (mg/L)	1.1	1.2	1.2	1.4
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02

nra = no result available (dry)

Table 9.3B: Surface Water Monitoring in the Vicinity of the Wallaroo Landfill Facility for 2016 – 2020

SITE	TEST	2016 Mean	2016 Max	2017 Mean	2017 Max	2018 Mean	2018 Max	2019 Mean	2019 Max	2020 Mean	2020 Max
801	pH	5.5	5.8	5.7	5.9	5.8	6.3	6.9	8.5	7.2	7.6
	Conductivity (uS/cm)	41	54	614	2300	52	70	46	52	39	50
	Soluble Fluoride (mg/L)	0.11	0.18	0.20	0.25	0.20	0.35	0.25	0.63	0.23	0.44
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
802	pH	5.8	6.2	5.4	6.3	5.6	6.2	nra	nra	5.8	6.3
	Conductivity (uS/cm)	107	130	347	820	63	110	nra	nra	66	81
	Soluble Fluoride (mg/L)	0.10	0.18	0.16	0.24	<0.10	0.13	nra	nra	0.11	0.13
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	nra	nra	<0.02	<0.02
803	pH	6.1	6.6	6.1	6.9	5.9	6.2	6.6	7.0	6	6.4
	Conductivity (uS/cm)	228	300	195	290	243	340	167	190	225	350
	Soluble Fluoride (mg/L)	0.19	0.37	0.26	0.37	<0.10	0.20	0.33	0.52	0.12	0.17
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
804	pH	6.7	6.8	6.8	7.1	6.8	7.1	7.2	7.4	6.7	6.8
	Conductivity (uS/cm)	30250	41000	37000	50000	32800	49000	41500	48000	12800	25000
	Soluble Fluoride (mg/L)	0.65	0.95	0.83	1.2	0.74	1.1	1.0	1.2	0.28	0.61
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
805	pH	6.4	6.6	6.3	6.7	6.7	7.0	7.1	7.4	6.4	6.5
	Conductivity (uS/cm)	26125	40000	30500	43000	26675	49000	40750	47000	7025	17200
	Soluble Fluoride (mg/L)	0.55	0.90	0.69	1.1	0.60	1.1	1.0	1.2	0.22	0.41
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
807	pH	7.5	7.7	7.3	7.6	7.5	8.0	7.8	8.0	7.7	8
	Conductivity (uS/cm)	51050	56000	53000	57000	50000	53000	54750	58000	45400	49000
	Soluble Fluoride (mg/L)	1.3	1.6	1.4	1.6	1.4	1.4	1.5	1.6	1.2	1.4
	Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

Notes: Site 802 was dry for all the site visits in 2019
Sites 804, 805 and 807 are tidal (influenced by salt water).

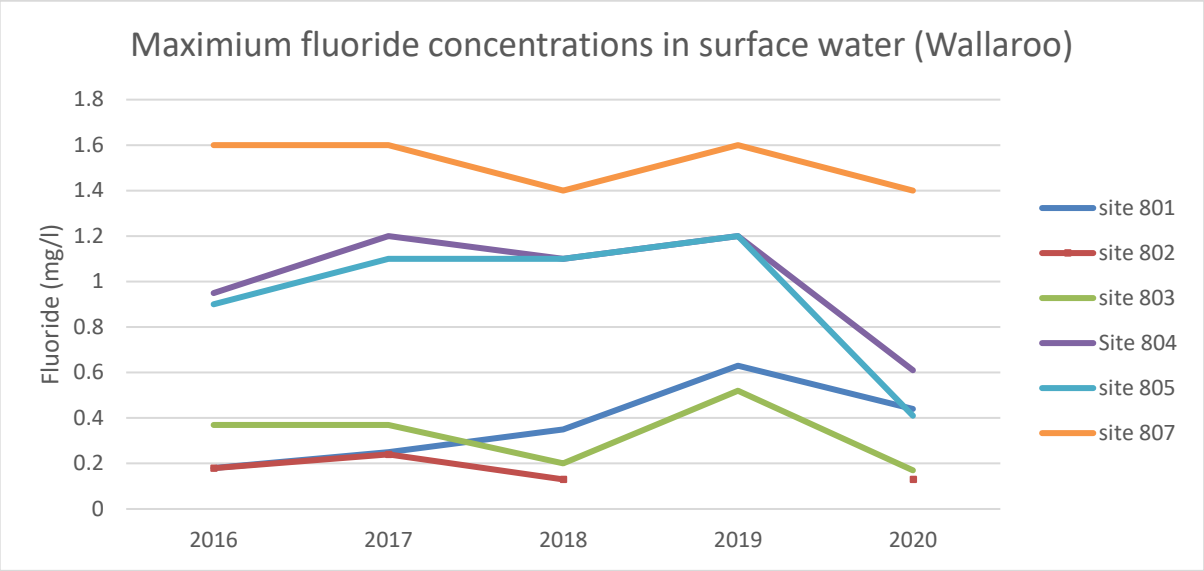


Figure 9.1 Maximum Fluoride Concentrations in Surface Water in the Vicinity of the Wallaroo Landfill facility (2016-2020)

Table 9.4A: Groundwater monitoring in the vicinity of the Wallaroo Landfill cells for 2020

SITE	TEST	Q1 2020	Q2 2020	Q3 2020	Q4 2020
901	Depth	nra	24.2	nra	nra
	pH	nra	5.7	nra	nra
	Conductivity (uS/cm)	nra	400	nra	nra
	Soluble Fluoride (mg/L)	nra	0.77	nra	nra
	Total Cyanide (mg/L)	nra	<0.02	nra	nra
902	Depth (m)	nra	nra	nra	nra
	pH	nra	nra	nra	nra
	Conductivity (uS/cm)	nra	nra	nra	nra
	Soluble Fluoride (mg/L)	nra	nra	nra	nra
	Total Cyanide (mg/L)	nra	nra	nra	nra
903	Depth (m)	nra	nra	nra	nra
	pH	nra	nra	nra	nra
	Conductivity (uS/cm)	nra	nra	nra	nra
	Soluble Fluoride (mg/L)	nra	nra	nra	nra
	Total Cyanide (mg/L)	nra	nra	nra	nra
904	Depth (m)	nra	nra	nra	nra
	pH	nra	nra	nra	nra
	Conductivity (uS/cm)	nra	nra	nra	nra
	Soluble Fluoride (mg/L)	nra	nra	nra	nra
	Total Cyanide (mg/L)	nra	nra	nra	nra

nra = samples unable to be taken as the wells were dry

Table 9.4B: Groundwater monitoring in the vicinity of the Wallaroo Landfill cells for 2016-2020

SITE	TEST	2016 Mean	2016 Max	2017 Mean	2017 Max	2018 Mean	2018 Max	2019 Mean	2019 Max	2020 Mean	2020 Max
901	Depth	20.8	21.4	22.1	22.4	23.2	24.0	23.5	23.7	24.2	24.2
	pH	5.0	5.4	5.3	5.6	5.1	5.4	4.7	4.8	5.7	5.7
	Conductivity (uS/cm)	205	240	210	260	210	260	190	190	400	400
	Soluble Fluoride (mg/L)	<0.10	<0.10	0.11	0.20	<0.10	<0.10	0.12	0.26	0.77	0.77
	Total Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
902	Depth (m)	22.1	22.7	23.4	23.8	24.3	24.5	24.9	25.0	Dry	Dry
	pH	4.6	5	5.0	5.2	4.7	5.1	4.5	4.6	Dry	Dry
	Conductivity (uS/cm)	173	180	170	170	163	170	163	170	Dry	Dry
	Soluble Fluoride (mg/L)	<0.10	<0.10	<0.10	0.13	<0.10	<0.10	0.10	0.19	Dry	Dry
	Total Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	Dry	Dry
903	Depth (m)	13.4	14.1	14.7	15.0	15.5	15.6	15.9	15.9	Dry	Dry
	pH	4.5	4.7	4.5	4.6	4.4	4.4	5.8	5.8	Dry	Dry
	Conductivity (uS/cm)	248	260	223	240	200	210	290	290	Dry	Dry
	Soluble Fluoride (mg/L)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.05	0.05	Dry	Dry
	Total Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	Dry	Dry
904	Depth (m)	24.2	24.9	25.7	26.0	Dry	Dry	Dry	Dry	Dry	Dry
	pH	4.2	4.5	4.1	4.3	Dry	Dry	Dry	Dry	Dry	Dry
	Conductivity (uS/cm)	478	760	773	1500	Dry	Dry	Dry	Dry	Dry	Dry
	Soluble Fluoride (mg/L)	0.16	0.39	0.17	0.35	Dry	Dry	Dry	Dry	Dry	Dry
	Total Cyanide (mg/L)	<0.02	<0.02	<0.02	<0.02	Dry	Dry	Dry	Dry	Dry	Dry

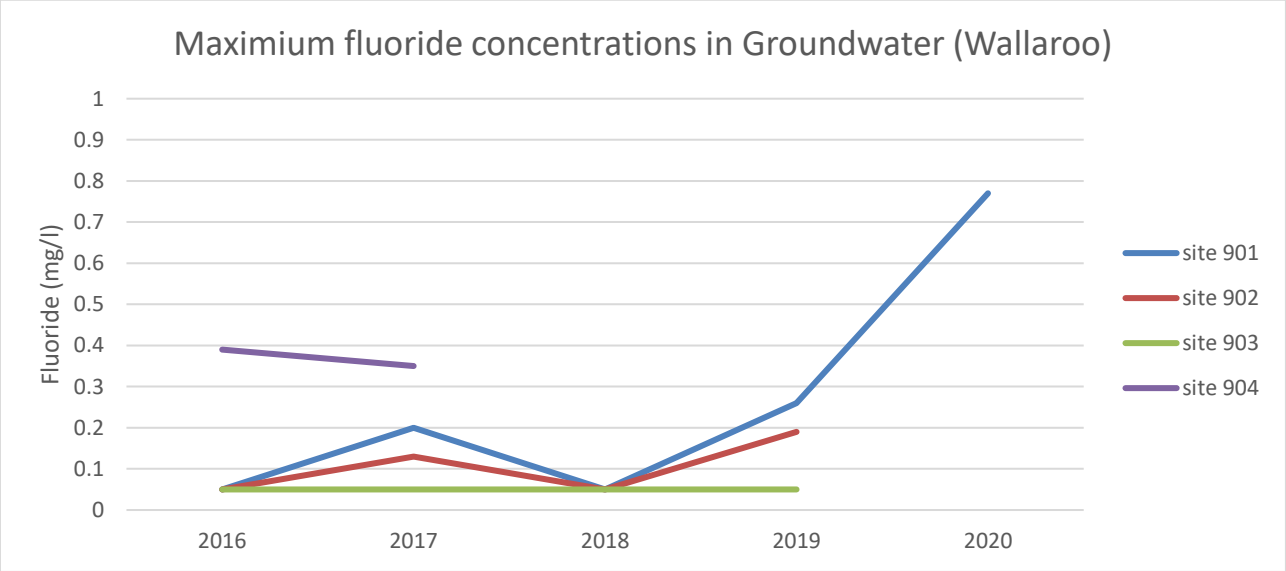


Figure 9.2 Maximum Fluoride Concentrations in Groundwater at the Wallaroo Landfill Facility (2016-2020)

Table 9.5A: *Metal monitoring data for stormwater retention dam (Site 801) at Wallaroo Waste Facility 2020

Analyte mg/L	Q1 2020	Q2 2020	Q3 2020	Q4 2020
Aluminium	0.07	0.28	0.55	0.28
Antimony	<0.005	<0.005	<0.005	<0.005
Arsenic	<0.001	<0.001	<0.001	<0.001
Beryllium	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	<0.001	<0.001	0.001	0.001
Copper	<0.001	0.002	0.003	<0.001
Iron	0.15	0.24	0.40	0.51
Lead	<0.001	<0.001	<0.001	<0.001
Mercury	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	<0.001	0.8	0.071	0.006
Selenium	<0.001	<0.001	<0.001	<0.001
Thallium	<0005	<0.005	<0.005	<0.005
Zinc	<0.005	0.0130	0.012	0.010

Table 9.5B: *Metal monitoring data for stormwater retention dam (Site 801) at Wallaroo Waste Facility 2016– 2020

Analyte mg/L	2016 Avg	2016 Max	2017 Avg	2017 Max	2018 Avg	2018 Max	2019 Avg	2019 Max	2020 Avg	2020 Max
Aluminium	0.21	0.25	0.22	0.45	0.14	0.24	0.11	0.15	0.30	0.55
Antimony	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001
Copper	<0.001	0.002	<0.001	0.001	0.003	0.007	0.003	0.004	0.002	0.003
Iron	0.22	0.30	0.34	0.62	0.31	0.42	0.39	0.98	0.33	0.51
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.002	0.004	0.005	0.013	0.067	0.24	0.011	0.024	0.29	0.80
Selenium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Thallium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	0.013	0.027	0.006	0.013	0.024	0.025	0.014	0.036	0.012	0.013

*Analysis performed by Eurofins I mgt, NATA accreditation No. 1261

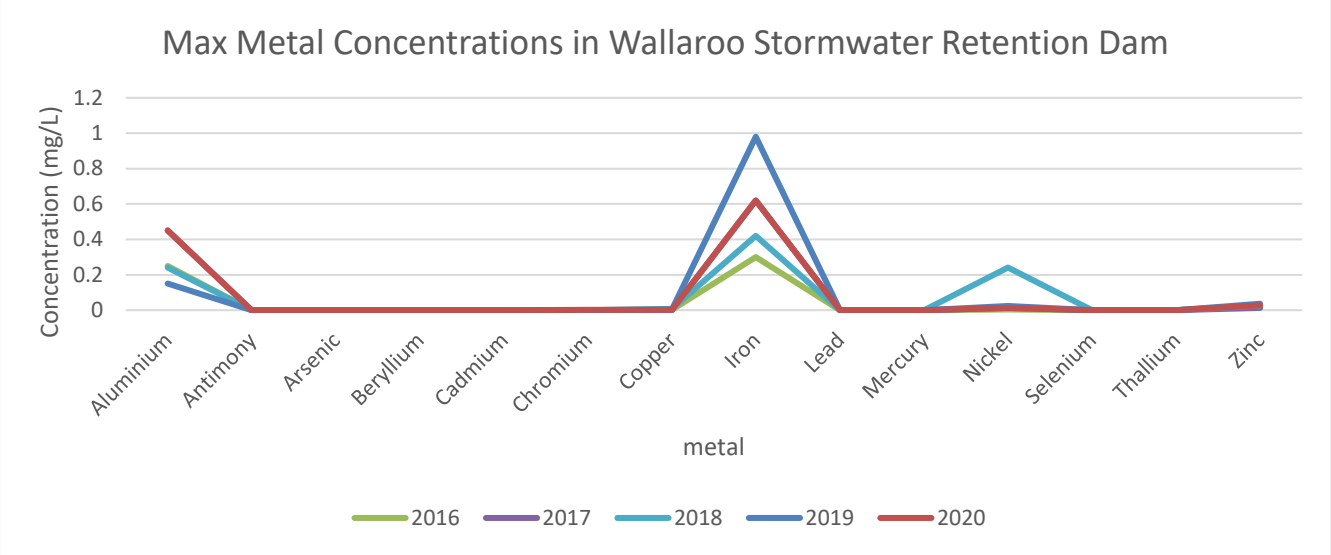


Figure 9.3 Maximum metal concentrations in Stormwater retention dam at Wallaroo Landfill Facility (2016-2020)

10 NOISE

The existing acoustic environment around the site consists mainly of industrial noise from industrial land uses which include warehousing facilities, various metal fabrication works and a gas storage facility.

TAC currently undertakes attended Noise Monitoring at three locations surrounding the site, Old Punt Road (rear of Tomago Caravan Park), Tomago Correctional Services Training Facility and 47 School Drive (unoccupied TAC owned property) on a six monthly basis. The monitoring locations are detailed in Figure 10.1, and the 2020 monitoring data is presented in Tables 10.1 and 10.2. A comparison of 2020 and previous year's data to Noise Goals in presented in Table 10.3. Figure 10.2 compares the monitoring data from April and November 2020 against the noise model prepared for the Potline No 3 EIS study (1990).

Figure 10.1: Environment Noise Monitoring Sites

Table 10.1 Measured Noise Levels April 2020

Location	Start Date And Time	LAmax (dB)	LA1 (dB)	LA10 (dB)	LAeq (dB)	TAC attrib. LAeq (dB)	LA90 dB
Old Punt Road (L1)	27/04/2020 22:50	58	55	53	51	50	49
Corrective Services (L2)	27/04/2020 22:25	57	55	54	53	53	34
School Drive (L3)	27/04/2020 22:01	62	50	43	41	35	52

Table 10.2 Measured Noise Levels November 2020

Location	Start Date And Time	LAmax (dB)	LA1 (dB)	LA10 (dB)	LAeq (dB)	TAC attrib. LAeq (dB)	LA90 dB
Old Punt Road (L1)	19/10/2020 22:00	63	60	54	52	NM	50
Corrective Services (L2)	19/10/2020 22:57	51	49	47	45	44	43
School Drive (L3)	19/10/2020 22:25	60	55	44	44	38	37

Table 10.3 Average Measured Noise Levels with Goal Comparison

Old Punt Road (L1)							
	Noise Goal (night)	1997 - 1999	2016	2017	2018	2019	2020
L_{A90} (dB)	45	48	47	42	48	49	50
L_{A10} (dB)		60	52	50	52	52	54
L_{Aeq} (dB)	50	58	50	48	50	50	52
L_{Aeq} (dB) TAC attrib.			50	47/NM	NM/47	50	50/NM

Corrective Services (L2)							
	Noise Goal (night)	1997 - 1999	2016	2017	2018	2019	2020
L_{A90} (dB)	45	51	52	50	53	52	38
L_{A10} (dB)		61	53	52	55	57	50
L_{Aeq} (dB)	50	63	52	51	54	55	49
L_{Aeq} (dB) TAC attrib.			52	51	54	54	48

School Drive (L3)							
	Noise Goal (night)	1997 - 1999	2016	2017	2018	2019	2020
L_{A90} (dB)	45	44	39	38	38	39	44
L_{A10} (dB)		51	42	42	55	48	44
L_{Aeq} (dB)	50	56	40	40	52	46	42
L_{Aeq} (dB) TAC attrib.			40	40	39	30/NM	36

Note : NM = Not Measurable

The land use criteria around the Tomago Aluminium Smelter has changed significantly over the last 15-20 years to be now largely dominated by industrial facilities. Noise levels measured at the monitoring sites are conservatively compared to night time urban / industrial interface amenity criteria of 50 LAeq dB(a) detailed in Table 2.1 of the NSW Industrial Noise Policy and EPA recommended maximum acceptable background noise level (LA90) of 45dB(A) at night. The night time noise goal was exceeded both the Old Punt Road site in 2020.

No noise complaints have been received by the Tomago Aluminium smelter in the last ten years.

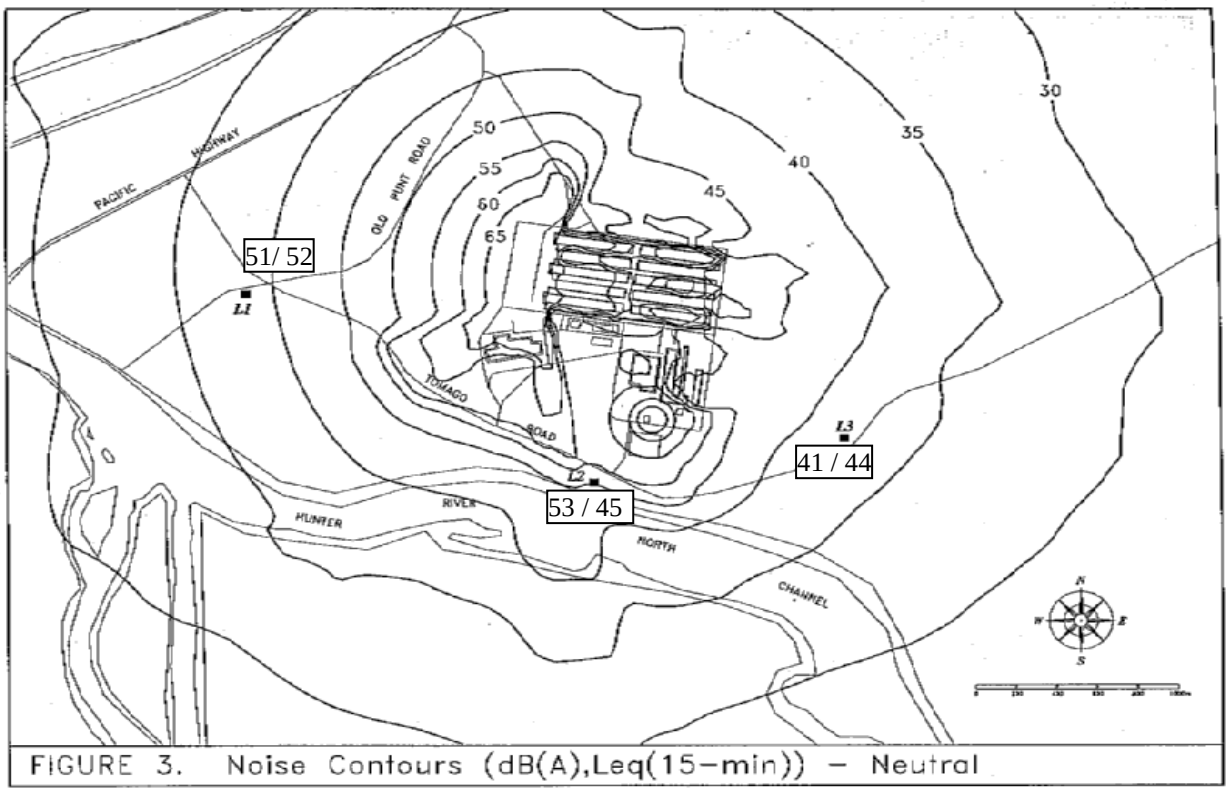


Figure 10.3: Comparison of noise measurements to predicted EIS modelled concentrations.

11 INDEPENDENT AUDITS

In mid 2020 a Hazard Audit of the smelter site was carried out by Riskcon Engineering as prescribed in NSW DPIE Hazardous Industry Planning Advisory Paper No.5, Hazard Audit Guidelines. There were no corrective actions and two recommendations received.

In February 2020 a surveillance audit and subsequent recertification audit in November 2020 on the Tomago Aluminium Environment Management System were conducted by Quality Control Services (Environmental) against the requirements of ISO 14001:2015.

There were no non-compliances identified during these audits.

The Independent Environment Audit of compliance of the Tomago Aluminium Smelter that was conducted in August 2018 has all actions now closed.

12 REFERENCES

Australian Water Quality Guidelines for Fresh and Marine Waters (2000), revised 2018 Australian and New Zealand Environment and Conservation Council. http://www.waterquality.gov.au/guidelines/anz-fresh-marine

Environmental Impact Statement for an Aluminium Smelter at Tomago, NSW. James B Croft & Associates, Newcastle

Environment Impact Statement. Proposed Expansion (Potline 3) of the Tomago Aluminium Smelter, NSW. Crooks Mitchell Peacock Stewart Pty Ltd 1990.

Dispersion modelling of controlled discharge of stormwater runoff from Tomago Aluminium Smelter. Lawson and Treloar Pty Ltd. September 1992.

Statement of Environmental Effects, Proposed Production Capacity Increase (AP22), HLA-Envirosciences Pty Ltd, April 2001.

National Goals for Fluoride in Ambient Air and Forage (1990) Australian and New Zealand Environment and Council.

Food Standards Australia and New Zealand, Standard 1.4.1, Contaminants and Natural Toxicants.

NHMRC / NRMMC 2004 Drinking Water Guidelines

National Environment Protection Measure for Ambient Air (NEPM) Air Quality Goals

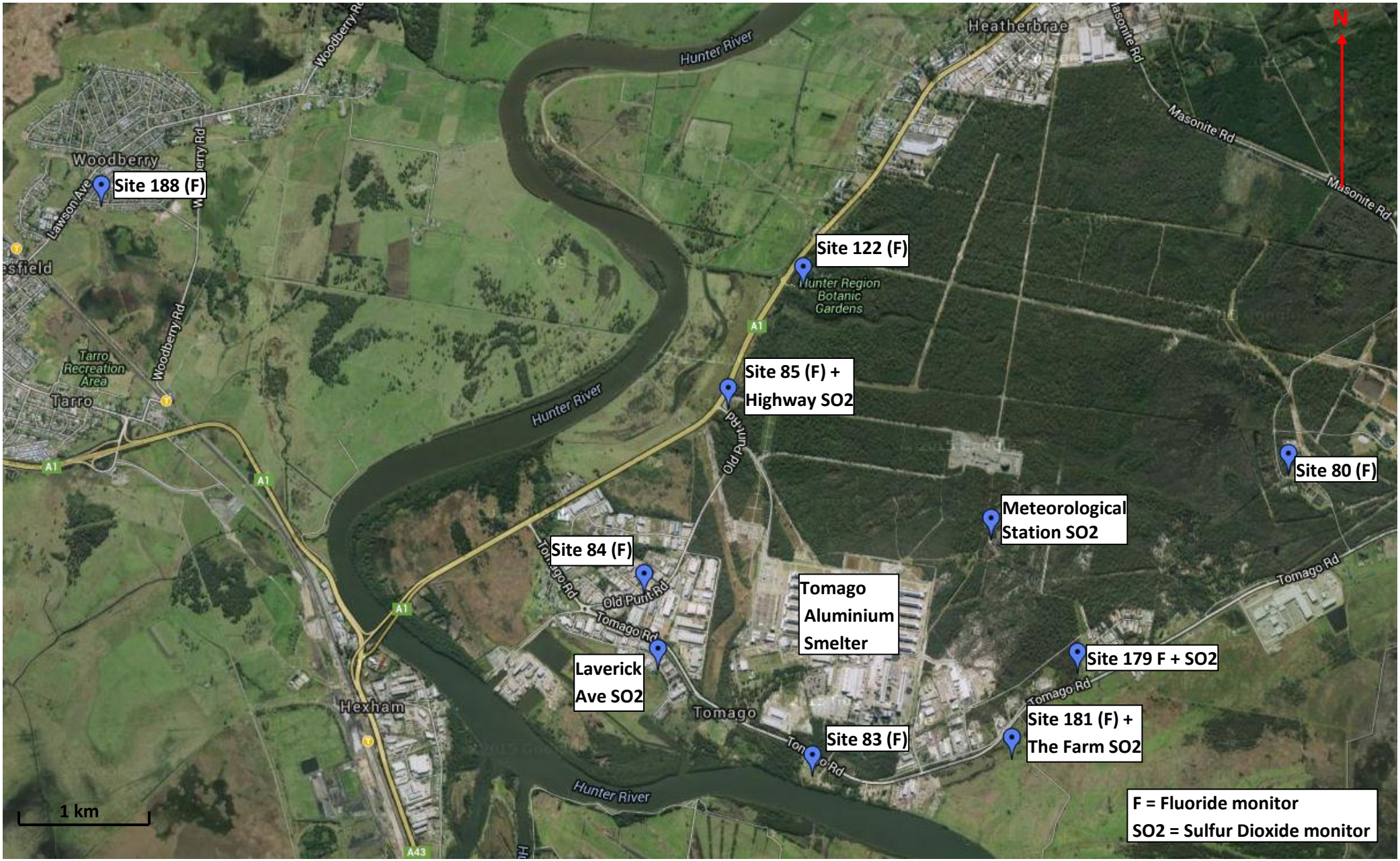
Reports 17097_R01 (April 2017) and 17431_R01 (October 2017)
Global Acoustics Pty Ltd

Landfill of Aluminium Smelter Waste at Wallaroo, NSW, Australia. Sullivan & Knight 1990.
Review of Fluoride toxicity in relation to Ravensbourne Discharge to Otago Harbour. C.W Hickey 2004.

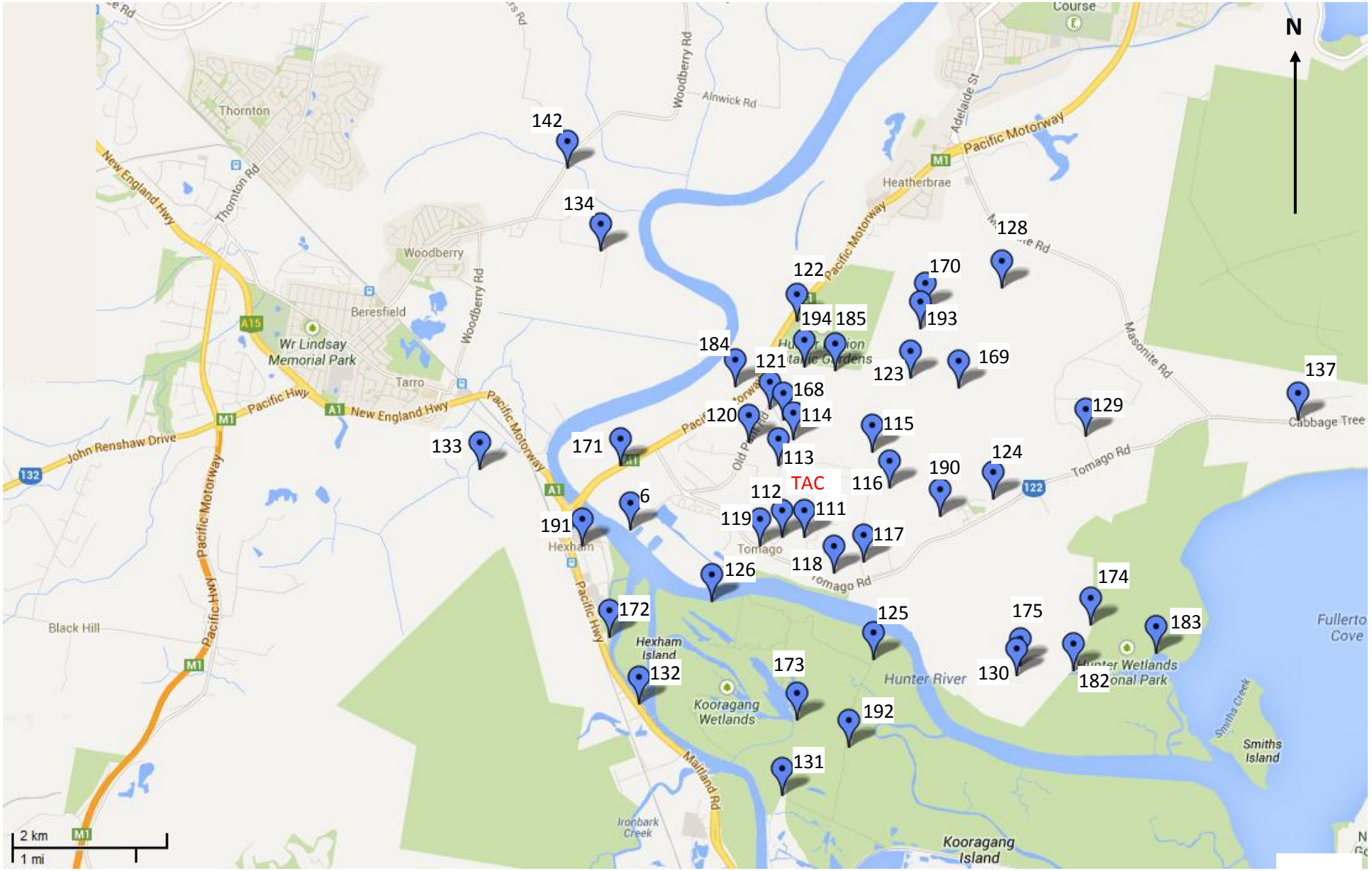
APPENDIX 1 -

SAMPLING SITE LOCATIONS

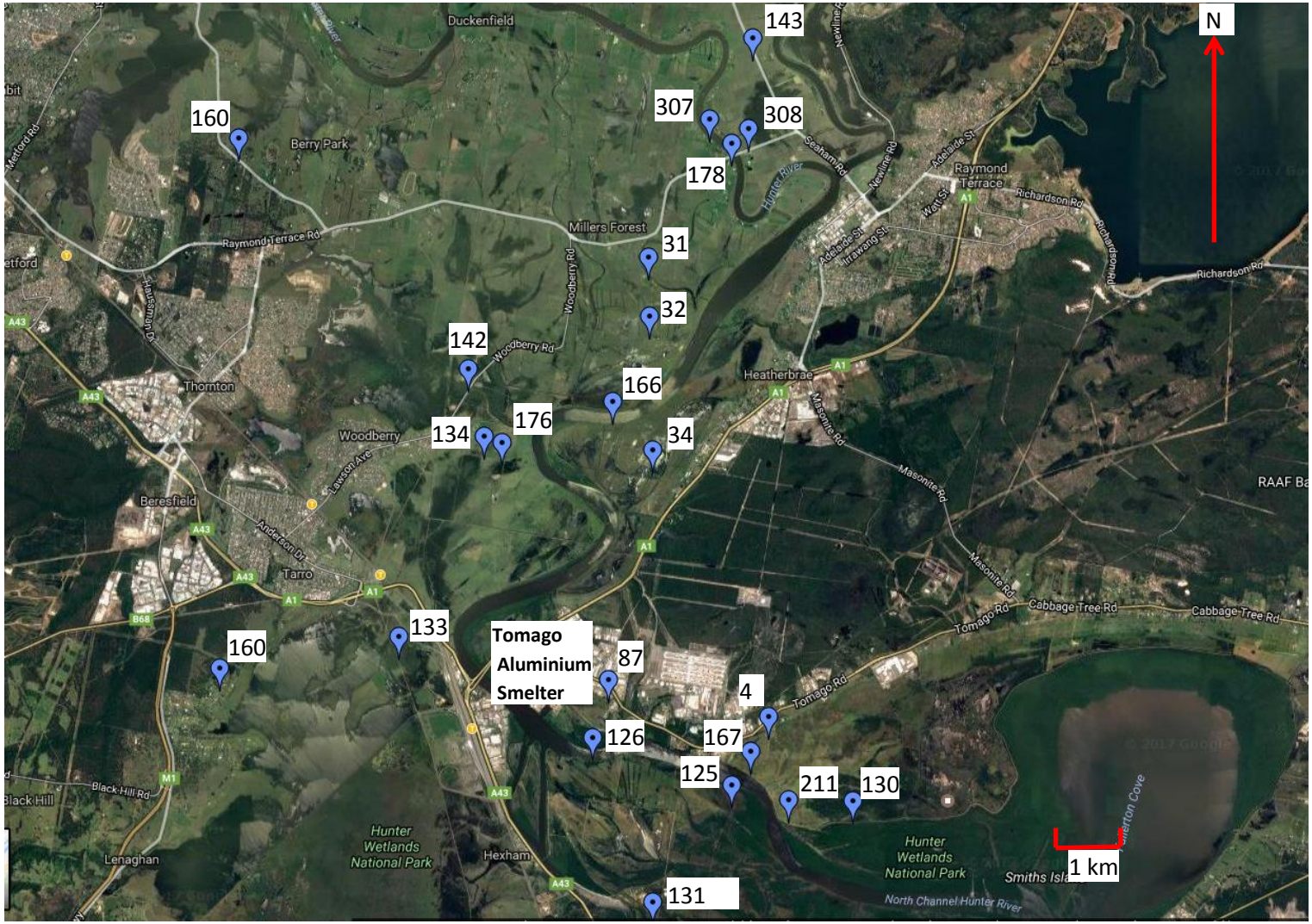
Map 1 Ambient Air Monitoring Sites



Map 2 Overstorey Sites



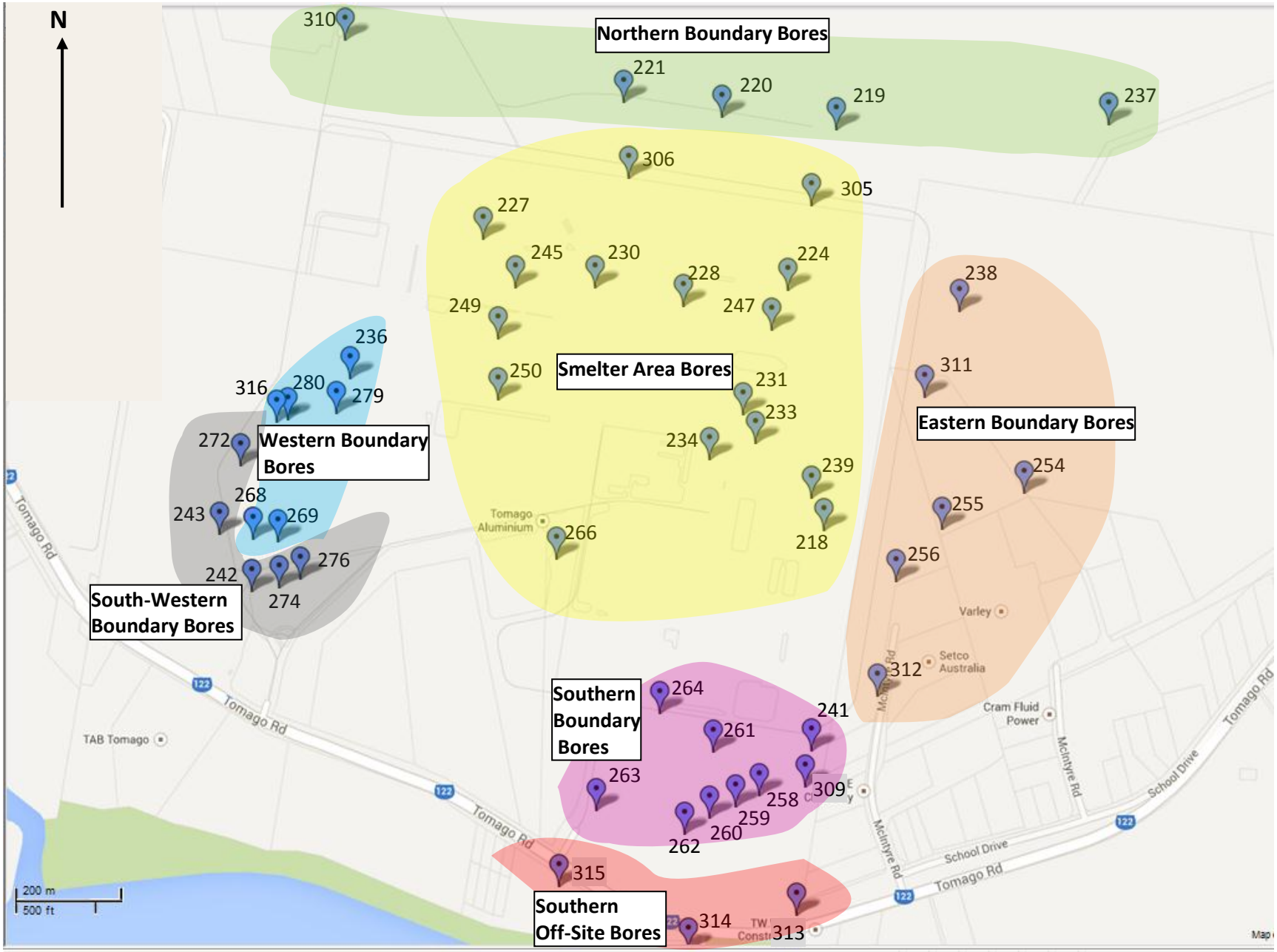
Map 3 Forage Sites



Map 4 Surface Water Sites

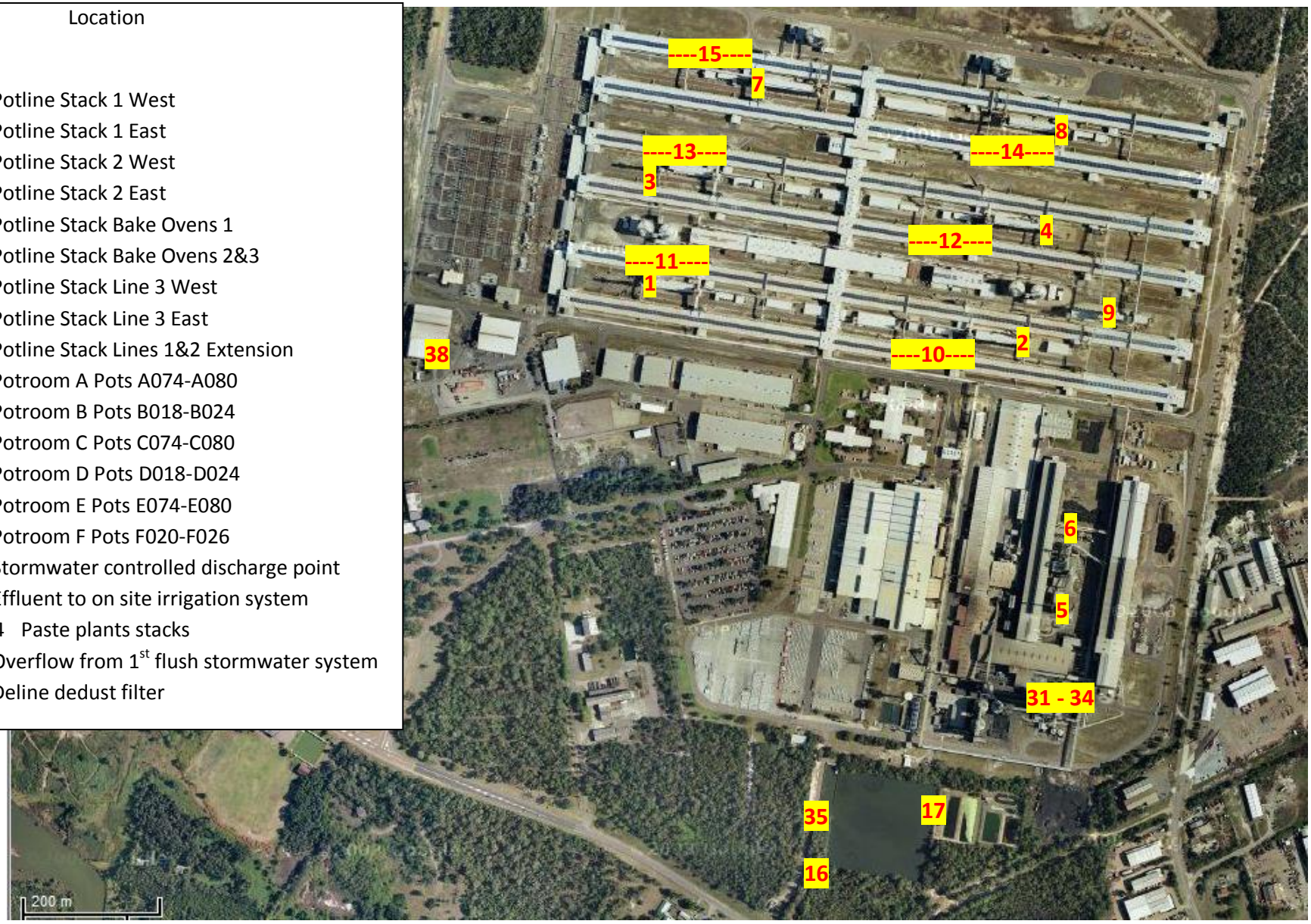
Map 5 Groundwater Sites Monitored by Hunter Water

Map 6 Plant Groundwater Sites



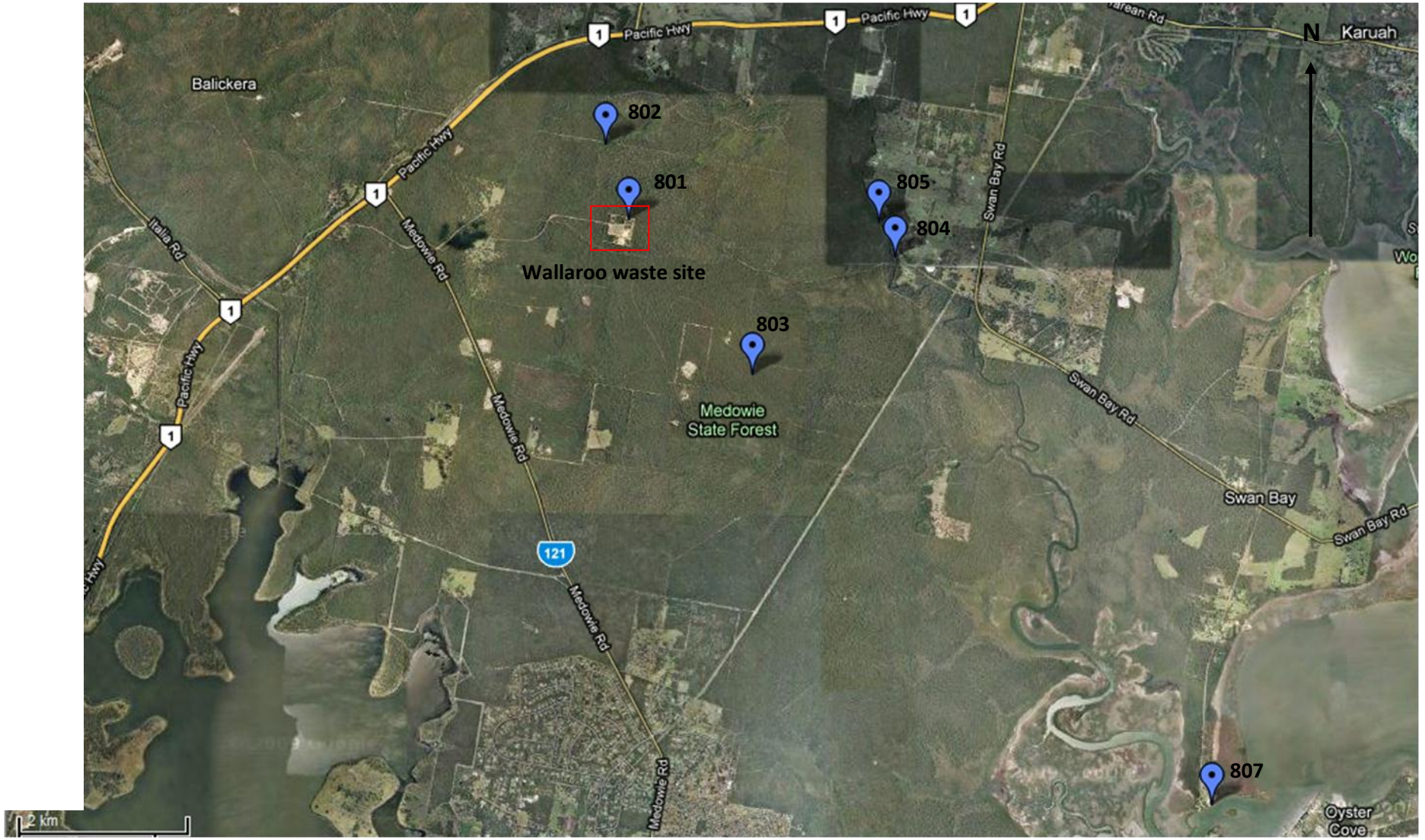
Map 7: TAC Source Monitoring Locations

EPA Point	Location
1	Potline Stack 1 West
2	Potline Stack 1 East
3	Potline Stack 2 West
4	Potline Stack 2 East
5	Potline Stack Bake Ovens 1
6	Potline Stack Bake Ovens 2&3
7	Potline Stack Line 3 West
8	Potline Stack Line 3 East
9	Potline Stack Lines 1&2 Extension
10	Potroom A Pots A074-A080
11	Potroom B Pots B018-B024
12	Potroom C Pots C074-C080
13	Potroom D Pots D018-D024
14	Potroom E Pots E074-E080
15	Potroom F Pots F020-F026
16	Stormwater controlled discharge point
17	Effluent to on site irrigation system
31 -34	Paste plants stacks
35	Overflow from 1st flush stormwater system
38	Deline dedust filter



Map 8 Wallaroo Bore Sites

Map 9 Wallaroo Surface Water Sites



APPENDIX 2 -

SAMPLING PROCEDURES

The following procedures have been used by Tomago Aluminium for the sampling and/or analysis data contained in this report:

Stack Fluoride	ES.ESM.0001
Roof Vent fluoride	ES.ESM.0002
Stack Sulfur Dioxide	ES.ESM.0011
Continuous stack gaseous fluoride	ES.ESM.0003/ES.ESM.0024
Ambient Fluoride	ES.ESM.0004
Stormwater monitoring	ES.ESM.0009/ES.ESM.0019
Vegetation	ES.ESM.0010
Groundwater	ES.ESM.0014
Surface Water	ES.ESM.0008
***Meteorological monitoring	ES.ESM.0023
Ambient Sulfur Dioxide	ES.ESM.0031
Oysters and Sediments	ES.ESM.0016
Wallaroo Waste Site	ES.ESM.0006

NATA Accreditation No. 1904

*** NATA accreditation does not cover the performance of this service

APPENDIX 3 -

EPL 6163
TOMAGO ALUMINIUM SITE

Environment Protection Licence

Licence - 6163

Licence Details	
Number:	6163
Anniversary Date:	29-October

Licensee

TOMAGO ALUMINIUM COMPANY PTY LTD

PO BOX 405

RAYMOND TERRACE NSW 2324

Premises

TOMAGO ALUMINIUM COMPANY

576-638 TOMAGO ROAD

TOMAGO NSW 2322

Scheduled Activity

Metallurgical activities

Waste processing (non-thermal treatment)

Waste storage

Fee Based Activity	Scale
Aluminium production (alumina)	Any capacity
Metal waste generation	> 100 T annual volume of waste generated or stored
Non-thermal treatment of hazardous and other waste	Any annual processing capacity
Waste storage - hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	Any listed waste type stored

Region

Metropolitan North - Newcastle

Ground Floor, NSW Govt Offices, 117 Bull Street

NEWCASTLE WEST NSW 2302

Phone: (02) 4908 6800

Fax: (02) 4908 6810

PO Box 488G

NEWCASTLE NSW 2300

Environment Protection Licence

Licence - 6163

Environment Protection Licence

Licence - 6163

Environment Protection Licence

Licence - 6163

Information about this licence

Dictionary

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

Responsibilities of licensee

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

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

Variation of licence conditions

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

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

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

Duration of licence

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

Licence review

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

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

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

Environment Protection Licence

Licence - 6163

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

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

Transfer of licence

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

Public register and access to monitoring data

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

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

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

This licence is issued to:

TOMAGO ALUMINIUM COMPANY PTY LTD
PO BOX 405
RAYMOND TERRACE NSW 2324

subject to the conditions which follow.

Environment Protection Licence

Licence - 6163

1 Administrative Conditions

A1 What the licence authorises and regulates

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

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

Scheduled Activity	Fee Based Activity	Scale
Metallurgical activities	Aluminium production (alumina)	Any capacity
Metallurgical activities	Metal waste generation	> 100 T annual volume of waste generated or stored
Waste processing (non-thermal treatment)	Non-thermal treatment of hazardous and other waste	Any annual processing capacity
Waste storage	Waste storage - hazardous, restricted solid, liquid, clinical and related waste and asbestos waste	Any listed waste type stored

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
TOMAGO ALUMINIUM COMPANY
576-638 TOMAGO ROAD
TOMAGO
NSW 2322
LOT 3232 DP 618103, LOT 301 DP 634536, LOT 3 DP 808004, LOT 104 DP 1125747, LOT 202 DP 1173564
EXCLUDES AREA LEASED TO REGAIN SERVICES PTY LTD SHOWN ON THE PLAN TITLED "SITE LAYOUT AND SERVICES", DRAWING NUMBER 0010M22-001 (ON EPA FILE LIC07/2263-06).

A3 Other activities

A3.1 This licence applies to all other activities carried on at the premises, including:

Ancillary Activity
Sewage Treatment Systems

A4 Information supplied to the EPA

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

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

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

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

Air

EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Line 1 West
2	Discharge to Air Air emissions monitoring	Discharge to Air Air emissions monitoring	Dry scrubber stack - Line 1 East
3	Discharge to Air Air emissions monitoring	Discharge to Air Air emissions monitoring	Dry scrubber stack - Line 2 West
4	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Line 2 East
5	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Anode Plant 1
6	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Anode Plants 2 & 3
7	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Line 3 West
8	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Line 3 East
9	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Dry scrubber stack - Line 1 & 2 Extension
10	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Roof vent - Potroom A Manifold
11	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Roof vent - Potroom B Manifold
12	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Roof vent - Potroom C Manifold

Environment Protection Licence

Licence - 6163

13	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Roof vent - Potroom D Manifold
14	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Roof vent - Potroom E Manifold
15	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Roof vent - Potroom F Manifold
18	Ambient air monitoring Weather monitoring		Sulphur dioxide monitoring and meteorological monitoring station at the premises
20	Ambient air monitoring		Ambient fluoride monitor identified as Site 80 - HWC Offices
21	Ambient air monitoring		Ambient fluoride monitor identified as Site 84 - 6 Old Punt Road Tomago, 1.25km West of the smelter
22	Ambient air monitoring		Ambient fluoride and sulphur dioxide monitors identified as Site 179 - Lot D Tomago Road (374 Tomago Road, Tomago) 1.75km East of the smelter
23	Ambient air monitoring		Ambient fluoride monitor identified as Site 188 - Woodbury, 5km Northwest of the smelter
24	Ambient air monitoring		Ambient fluoride and sulphur dioxide monitors identified as Site 181 - The Farm, 1.5km Southeast of the smelter
25	Ambient air monitoring		Ambient fluoride monitor identified as Site 122 - Botanic Gardens, 2.5km North of the smelter
26	Ambient air monitoring		Ambient fluoride monitor identified as Site 83 - Detention Centre, 1km South of the smelter
27	Ambient air monitoring		Ambient fluoride and sulphur dioxide monitor identified as Site 85 - Pacific Highway Tomago, 1.5km Northwest of the smelter
30	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Total smelter emissions, sum of point sources
31	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission from the pitch circuit stack of No. 1 Paste Plant
32	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emissions form the proportioning circuit stack of the No. 1 Paste Plant
33	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission from the pitch circuit stack of No. 2 Paste Plant
34	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emissions form the proportioning circuit stack of the No. 2 Paste Plant
36	Ambient air monitoring		Ambient sulphur dioxide monitoring at Laverick Avenue, Tomago (378600E 6467200N)
38	Discharge to air Air emission monitoring	Discharge to air Air emission monitoring	Deline/Regain Spent Potliner Dust Filter

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
16	Discharge to waters Discharge quality monitoring Volume monitoring	Discharge to waters Discharge quality monitoring Volume monitoring	The point of discharge to the Hunter River from the stormwater pond ref Drawing 0040 0C0 500
17	Discharge to utilisation area Effluent quality and volume monitoring	Discharge to utilisation area Effluent quality and volume monitoring	Effluent Utilisation Area on the premises.
35	Discharge quality monitoring		Overflow from first flush system

3 Limit Conditions

L1 Pollution of waters

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

L2 Load limits

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

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

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

Assessable Pollutant	Load limit (kg)
Coarse Particulates (Air)	192045.00
Fine Particulates (Air)	174685.00
Fluoride (Air)	298000.00
Lead (Air)	
Nitrogen Oxides (Air)	186620.00
Sulfur Oxides (Air)	11900000.00

Note: On 7 December 2009, the Minister for Planning granted development consent to authorize a continued increase in aluminium production at the smelter from 530,000 tpa to 575,000 tpa. To protect air quality it

was negotiated at this time that the maximum annual Fluoride load limit for the premises must not exceed 298 tpa.

L3 Concentration limits

L3.1 For each monitoring/discharge point or utilisation area specified in the table\s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L3.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L3.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L3.4 Air Concentration Limits

POINT 1,2,3,4,5,6,7,8,9

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Total Solid Particles	milligrams per cubic metre	50	Dry, 273 K, 101.3 kPa		1 hour
Nitrogen Oxides	grams per cubic metre	2.0	Dry, 273 K, 101.3 kPa		1 hour

POINT 5,6

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Total PAHs	milligrams per cubic metre	0.005	Dry, 273 K, 101.3 kPa		1 hour

POINT 30

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Fluoride	kilograms of Fluoride per tonne of Aluminium produced	0.8	Dry, 273 K, 101.3 kPa		1 hour

POINT 31,32,33,34

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Total Solid Particles	milligrams per cubic metre	50	Dry, 273 K, 101.3 kPa		1 hour

Total PAHs	milligrams per cubic metre	0.005	Dry, 273 K, 101.3 kPa	1 hour

POINT 38

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Total Solid Particles	milligrams per cubic metre	20	Dry, 273 K, 101.3 kPa		1 hour
Fine Particulates	milligrams per cubic metre	10	Dry, 273 K, 101.3 kPa		1 hour

L3.5 For the purpose of the table(s) above, Total PAHs means Total PAHs as benzo[a]pyrene equivalent.

L3.6 Water and/or Land Concentration Limits

POINT 16

Pollutant	Units of Measure	50 percentile concentration limit	90 percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Fluoride	milligrams per litre				40
pH	pH				6.5-8.5
Total suspended solids	milligrams per litre				50

L4 Volume and mass limits

L4.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
a) liquids discharged to water; or;
b) solids or liquids applied to the area;
must not exceed the volume/mass limit specified for that discharge point or area.

Point	Unit of Measure	Volume/Mass Limit
16	kilolitres per day	4320
17	millimetres per week	30

L4.2 The discharge limit for Point 16 in condition L4.1 may be exceeded under wet weather conditions provided that all practical measures are taken to minimise additional pollution caused by the wet weather.

L4.3 Total fluoride emissions from the smelter must not exceed:

The equivalent of 0.8 kilogram of total fluoride per tonne of aluminium produced as a monthly average.

The equivalent of 0.56 kilograms of total fluoride per tonne of aluminium produced as an annual average.

and

The equivalent of 0.6 kilograms of total fluoride per tonne of aluminium produced, as an annual average, for more than one year out of every five years.

L5 Waste

L5.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Dross		Metallurgical Activities	NA
NA	Spent Pot Lining		Metallurgical Activities	NA
NA	Oily Water		Metallurgical Activities	NA
NA	Filter Bags		Metallurgical Activities	NA
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005	As specified in each particular resource recovery exemption	NA
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA
NA	Aluminium Casting Waste and By-products		Metallurgical Activities	NA
NA	Aluminium Smelter Maintenance Waste		Metallurgical Activities	NA
NA	Waste Water and Sludges		Metallurgical Activities	NA

NA	Smelter Waste	Smelter waste generated on the premises	Metallurgical Activities	NA
NA	Smelter Waste	Smelter wastes generated on the premises of Hydro Kurri Kurri Smelter Pty Ltd.	Waste processing (non-thermal treatment)	NA
NA	Carbon Dust		Metallurgical Activities	NA
NA	Oil Absorbent Materials		Metallurgical Activities	NA
NA	Pitch Waste		Metallurgical Activities	NA
NA	Iron Contaminated Bath		Metallurgical Activities	NA
NA	Aluminium Potline Wastes and By-products		Metallurgical Activities	NA
NA	Electrode Manufacture Waste and By-products		Metallurgical Activities	NA

L5.2 Asbestos.
The licensee must comply with the conditions as specified in this licence or where no specific conditions are outlined in this licence, the licensee must comply with the Protection of the Environment Operations (Waste) Regulation 2005.

L6 Potentially offensive odour

L6.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

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

L7 Other limit conditions

L7.1 **Polychlorinated Biphenyls (PCBs)**
The licensee must comply with the conditions as specified in this licence or where no specific conditions are outlined in this licence, the licensee must comply with the "Chemical Control Order in Relation to Materials and Wastes Containing Polychlorinated Biphenyl, 1997".

L7.2 **Sulphur Content of Coke**
The sulphur content of the coke used in anode manufacture must not exceed 3.5 % by weight.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

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

O3 Dust

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

O3.2 All operations and activities occurring at the premises must be carried out in a manner that will minimise the emission of dust from the premises.

O3.3 Trucks entering and leaving the premises that are carrying loads of dust generating materials must have their loads covered at all times, except during loading and unloading.

O4 Effluent application to land

O4.1 The quantity of effluent/solids applied to the utilisation area must not exceed the capacity of the area to effectively utilise the effluent/solids.

For the purposes of this condition, 'effectively utilise' includes the use of the effluent/solids for pasture or crop production, as well as the ability of the soil to absorb the nutrient, salt, hydraulic load and organic material.

O4.2 Effluent application to the utilisation area(s) must not occur in a manner that causes surface run-off from the utilisation area(s).

O4.3 Spray from effluent application to the utilisation area(s) must not drift beyond the boundary of the utilisation area(s) to which it has been applied.

O5 Emergency response

O5.1 The licensee must maintain, and implement as necessary, a current Pollution Incident Response Management Plan (PIRMP) for the premises. The PIRMP must be developed in accordance with the requirements in Part 5.7A of the *Protection of the Environment Operations* (POEO) Act 1997 and POEO regulations. The licensee must keep the incident response plan on the premises at all times. The incident

response plan must document systems and procedures to deal with all types of incidents (e.g. spills, explosions or fire) that may occur at the premises or that may be associated with activities that occur at the premises and which are likely to cause harm to the environment. The PIRMP must be tested at least annually or following a pollution incident.

O5.2 The licensee must nominate to the EPA a representative of the licensee that is available at all times and is capable of providing immediate assistance or response during emergencies or any other incidents at the premises. The name of the nominated representative and their contact details, including their telephone number, must be current at all times. The nomination and contact details must be provided to the EPA's Regional Manager- Hunter at hunter.region@epa.nsw.gov.au or to PO Box 488G, Newcastle NSW 2300.

O6 Processes and management

O6.1 All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in place.

O6.2 Bunds must:
a) have walls and floors constructed of impervious materials;
b) be of sufficient capacity to contain 110% of the volume of the tank (or 110% volume of the largest tank where a group of tanks are installed);
c) have floors graded to a collection sump; and
d) not have a drain valve incorporated in the bund structure,

or be constructed and operated in a manner that achieves the same environmental outcome.

O7 Waste management

O7.1 The licensee must ensure that any liquid and/or non liquid waste for generating, processing, storage, resource recovery or disposal at the premises is assessed and classified in accordance with EPA Waste Classification Guidelines as in force from time to time.

O7.2 The licensee must ensure that waste identified for recycling is stored separately from other waste.

O7.3 All above ground tanks containing material that is likely to cause environmental harm must be bunded or have an alternative spill containment system in place.

O7.4 The licensee must ensure that suitable measures (e.g. high/low alarms, control valves with interlock control, one way valves) are installed on all tanks, ponds or clarifiers and associated pipes and hoses to prevent the spillage of waste.

O7.5 a) Aluminium smelter waste containing fluoride and/or cyanide must be kept on the Premises in such a manner that no leachate nor wind borne material can escape from the Premises and in the manner detailed in the Licensee's Environmental Impact Statement of 21 August, 1983.

b) The storage site for the aluminium smelter waste must be maintained in good order and condition.

c) The Premises must be provided with physical security to prevent unauthorised access to the aluminium smelter waste containing leachable fluoride and/or leachable cyanide.

d) No visible dust is to be generated to atmosphere from any storage of aluminium smelter waste containing fluoride or cyanide. To avoid any uncertainty this condition does not apply to waste stored within buildings but does apply to any dust generated from any storage buildings to atmosphere external to the building.

O7.6 a) Aluminium smelter waste containing fluoride and/or cyanide may be processed for the purpose of research into, and development of, environmentally acceptable methods for reducing the levels of leachable fluoride and/or leachable cyanide in such wastes.

b) Aluminium smelter waste containing fluoride and/or cyanide may be processed on the Premises, for the recovery of components, the making of other products or to reduce the leachable fluoride and/or leachable cyanide content.

c) Aluminium smelter waste containing fluoride and/or cyanide may be processed on the Premises, by treatment with any waste, with water, or, other with any material so as to facilitate handling and, except for wastes with leachable fluoride and/or leachable cyanide, to facilitate disposal.

O7.7 Fluoridated smelter wastes deposited at the Tomago Aluminium Company Pty Ltd Solid Waste Class 2 landfill at Wallaroo must be immobilised with gypsum to reduce leachable fluoride to less than 150 mg/l prior to being transported from the premises.

For determining leachable fluoride in approved smelter wastes, distilled water is the approved leachant.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

Environment Protection Licence

Licence - 6163

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

M2.2 Air Monitoring Requirements

POINT 1,2,3,4,7,8,9

Pollutant	Units of measure	Frequency	Sampling Method
Gaseous fluoride	milligrams per cubic metre	Continuous	In line instrumentation
Sulfur dioxide	milligrams per cubic metre	Quarterly	TM-4
Total Fluoride	kilograms of Fluoride per tonne of Aluminium produced	Special Frequency 1	TM-9
Total Solid Particles	milligrams per cubic metre	Yearly	TM-15

POINT 5,6

Pollutant	Units of measure	Frequency	Sampling Method
Gaseous fluoride	milligrams per cubic metre	Continuous	In line instrumentation
Nitrogen Oxides	grams per cubic metre	Yearly	TM-11
Sulfur dioxide	milligrams per cubic metre	Yearly	TM-4
Total Fluoride	kilograms of Fluoride per tonne of Aluminium produced	Special Frequency 1	TM-9
Total PAHs	milligrams per cubic metre	Yearly	OM-6
Total Solid Particles	milligrams per cubic metre	Yearly	TM-15

POINT 10,11,12,13,14,15

Pollutant	Units of measure	Frequency	Sampling Method
Total Fluoride	kilograms of Fluoride per tonne of Aluminium produced	Monthly	TM-10

POINT 18,22,24,27,36

Pollutant	Units of measure	Frequency	Sampling Method
Sulfur dioxide	parts per hundred million	Continuous	AM-20

POINT 20,21,22,23,24,25,26,27

Environment Protection Licence

Licence - 6163

Pollutant	Units of measure	Frequency	Sampling Method
Fluoride	micrograms per cubic metre	Weekly	AM-8

POINT 31,32,33,34

Pollutant	Units of measure	Frequency	Sampling Method
Total PAHs	milligrams per cubic metre	Yearly	OM-6
Total Solid Particles	milligrams per cubic metre	Yearly	TM-15

POINT 38

Pollutant	Units of measure	Frequency	Sampling Method
Fine Particulates	milligrams per cubic metre	Yearly	OM-5
Total Solid Particles	milligrams per cubic metre	Yearly	TM-15

M2.3 For the purpose of the table(s) above, Total PAHs means Total PAHs as benzo[a]pyrene equivalent.

M2.4 Water and/ or Land Monitoring Requirements

POINT 16

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Daily during any discharge	Grab sample
Fluoride	milligrams per litre	Daily during any discharge	Grab sample
pH	pH	Daily during any discharge	Grab sample
Polycyclic aromatic hydrocarbons	milligrams per litre	Each overflow event	Grab sample
Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample
TRH	milligrams per litre	Each overflow event	Grab sample

POINT 17

Pollutant	Units of measure	Frequency	Sampling Method
Biochemical oxygen demand	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Weekly	Grab sample
pH	pH	Weekly	Grab sample

Total suspended solids	milligrams per litre	Quarterly	Grab sample

POINT 35

Pollutant	Units of measure	Frequency	Sampling Method
Fluoride	milligrams per litre	Each overflow event	Grab sample
pH	pH	Each overflow event	Grab sample
Polycyclic aromatic hydrocarbons	milligrams per litre	Each overflow event	Grab sample
TRH	milligrams per litre	Each overflow event	Grab sample

M2.5 For the purposes of the tables above, Special Frequency 1 mean samples are to be collected and analysed twice per quarter.

M2.6 For the purposes of sampling at Point 16, daily sampling means samples collected at a minimum of twelve hourly intervals during any discharge event.

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:
a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2010* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Testing methods - load limits

M4.1

Note: Division 3 of the *Protection of the Environment Operations (General) Regulation 2009* requires that

monitoring of actual loads of assessable pollutants listed in L2.2 must be carried out in accordance with the relevant load calculation protocol set out for the fee-based activity classification listed in the Administrative Conditions of this licence.

M5 Environmental monitoring

M5.1 The licensee must conduct a monitoring program capable of measuring the environmental impact of emissions from the smelter on the surrounding environment.

M5.2 The licensee must maintain a list of the monitoring sites and sampling frequency used to assess the impact of the smelter on surface water, groundwater, native vegetation and a map showing the locations of the smelter and the monitoring sites used.

M5.3 Copies of the list(s) of monitoring sites and the map(s) showing their locations must be presented as part of the licensee's annual report.

M5.4 Copies of the list of monitoring sites and the map showing their locations must be made available to any authorised officer of the EPA who ask to see them.

M5.5 Data must be presented in time series that allows year to year comparison.

M5.6 The environmental monitoring program must include the following:

a) The licensee must monitor fluoride levels in native vegetation within 10 kilometres of the smelter. Monitoring results must be reported every two years (each odd numbered year).

b) The licensee must monitor fluoride and visual assessment of foliar damage during the growing season at commercial orchards, vineyards and market gardens within 10 kilometres of the smelter. Monitoring results must be reported every two years (each odd numbered year).

c) The licensee must monitor fluoride levels in pasture grasses and forage crops within 10 kilometres of the smelter. Monitoring results must be reported every two years (each odd numbered year).

d) The licensee must monitor fluoride, pH and conductivity levels of surface waters within 16.5 kilometres of the smelter. Monitoring results must be reported annually.

e) The licensee must monitor fluoride pH and conductivity levels of groundwaters within 16.5 kilometres of the smelter. Monitoring results must be reported annually.

M5.7 **Ecological Monitoring**

The licensee must undertake a program of ecosystem monitoring relevant to the discharge of atmospheric emissions. This program must include an ecological study of the major ecosystems within the influence of the smelter to the satisfaction of the EPA.

The ecological study must include an assessment of vegetation species composition and vigour.

The monitoring and the results of the monitoring must be reported every two years (each odd numbered year).

M6 Weather monitoring

M6.1 For each monitoring point specified in the table below the licensee must monitor (by sampling and obtaining results by analysis) the parameters specified in Column 1. The licensee must use the sampling method, units of measure, averaging period and sample at the frequency, specified opposite in the other columns.

Point 18

Parameter	Units of Measure	Frequency	Averaging Period	Sampling Method
Ambient temperature at 5m	Degrees Celsius	Continuous	1 hour	AM-4
Ambient temperature at 30m	Degrees Celsius	Continuous	1 hour	AM-4
Humidity	Percentage	Continuous	1 hour	AM-4
Rainfall	Millimetres	Continuous	1 hour	AM-4
Sigma theta at 10m	Degrees	Continuous	15 minutes	AM-2 & AM-4
Solar radiation at 10m	Watts per square metre	Continuous	1 hour	AM-2 & AM-4
Wind direction at 10m	Degrees	Continuous	15 minutes	AM-2 & AM-4
Wind speed at 10m	Metres per second	Continuous	15 minutes	AM-2 & AM-4
Wind direction at 30m	Degrees	Continuous	15 minutes	AM-2 & AM-4
Wind speed at 30m	Metres per second	Continuous	15 minutes	AM-2 & AM-4
Additional requirements				
Siting				AM-1 & AM-4
Measurement				AM-2 & AM-4

M7 Recording of pollution complaints

M7.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M7.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;

c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M7.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M7.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M8 Telephone complaints line

M8.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M8.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M8.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M9 Requirement to monitor volume or mass

M9.1 For each discharge point or utilisation area specified below, the licensee must monitor:
a) the volume of liquids discharged to water or applied to the area;
b) the mass of solids applied to the area;
c) the mass of pollutants emitted to the air;
at the frequency and using the method and units of measure, specified below.

POINT 16

Frequency	Unit of Measure	Sampling Method
Daily	kilolitres per day	No method specified

POINT 17

Frequency	Unit of Measure	Sampling Method
Weekly	millimetres per week	No method specified

POINT 35

Frequency	Unit of Measure	Sampling Method
Continuous during discharge	kilolitres per day	Weir structure and level sensor

M9.2 For the purposes of the table/s above Special Frequency 1 and Measure 1 means:

a) Measuring the total flow to sewage treatment plant daily in kL/day;
b) Measuring the available capacity in stormwater detention basin three times weekly in kilolitres; and
c) Measuring the volume of effluent applied to the irrigation area weekly in mm/week.

M9.3 Mass emissions of fluoride are to be calculated from fluoride concentration and production data for primary and secondary emissions for each pot room group and the anode plant monthly. The relevant aluminium production figures for each pot room group based on total daily aluminium production from the smelter and the calculated aluminium equivalent corresponding to anode production used in the above calculation must be supplied to the satisfaction of the EPA.

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

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

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

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

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

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

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

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

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

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

R1.8 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

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

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

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

R4 Other reporting conditions

R4.1 **Monthly Emission and Pollution Control Equipment Reporting**

Within four weeks of the end of each month the stack and roof vent emission monitoring results for that month shall be forwarded to the EPA. This data must be presented as a time series that shows the level of emission and the trend.

R4.2 The licensee must monitor and record the availability of pollution control equipment installed on the premises and report the results this monitoring as part of the monthly emission report.

The report must include the date, time, duration and reason for every outage of pollution control equipment, a cumulative total of outage times for each piece of equipment during the licence period and details of any action taken to prevent a recurrence of the pollution control equipment outage.

Note: The pollution control equipment specified in this requirement includes all scrubber systems installed on Points 1,2,3,4,5,6,7, 8 and 9 for the purpose of removing fluoride, solid particles and polycyclic aromatic hydrocarbons from emissions to atmosphere.

Note: For the purpose of this condition an outage means any period of time exceeding 20 minutes when the pollution control equipment is not available for its intended purpose, for any reason.

7 General Conditions

G1 Copy of licence kept at the premises or plant

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

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

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

G2 Other general conditions

G2.1 Completed Programs

Program	Description	Completed Date
PRP 1 - Sulphur Dioxide Investigations	Sulphur Dioxide Investigations Report. Find sources of & minimise Sulphur dioxide emissions.(*)	29-May-2013
PRP 2 - Noise Auditing and Reporting	PRP 2 - Noise Auditing and Reporting for Production Increase. Investigate noise impacts. (+)	05-December-2014
PRP 3 - Waste Management plan	PRP 3 - Waste Management plan.	30-March-2011
PRP 4 - Sulphur Dioxide Exceedances	Investigations into Exceedances of EPA Sulphur Dioxide Impact Assessment Criteria at Ambient Monitors. Implementation of measures to resolve issues	02-July-2012
PRP 5 - Fluoride in Surface and Ground Water	Investigate and resolve elevated Fluoride concentrations from discharges from points 16 and 35.	31-March-2013
PRP 6 - Install Pressure Transducers on Alumina Silos	Install pressure transducers on all alumina silos	18-March-2013
PRP 8 - Investigation into the disposal of geobags	Investigation into to long term storage/disposal of geotextile bags of dredged material from the first flush pond.	29-March-2018
PRP 9 - Investigation of pollutants in stormwater	Investigation of the sources of pollutants in stormwater runoff from the premsies.	29-June-2018
PRP 10 - First flush pond investigation	Investigation of options to optimise and/or improve the operation and management of the first flush pond system to reduce the concentration of pollutants in waters discharged from the premises.	29-June-2018
PRP 11 - Investigation of stormwater treatment options	Investigation of feasible and reasonable options for the treatment of stormwater runoff from the premises to reduce pollutant concentrations in waters discharging the premises.	29-June-2018

Environment Protection Licence

Licence - 6163

Dictionary

General Dictionary

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

Environment Protection Licence

Licence - 6163

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

Environment Protection Licence

Licence - 6163

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

Mr Grahame Clarke

Environment Protection Authority

(By Delegation)

Date of this edition: 20-April-2000

Environment Protection Licence

Licence - 6163

End Notes

1	Licence varied by notice V/M upgrade, issued on 08-Jul-2000, which came into effect on 08-Jul-2000.
2	Licence varied by notice 1014382, issued on 25-Jan-2002, which came into effect on 19-Feb-2002.
3	Licence varied by notice 1016532, issued on 18-Apr-2002, which came into effect on 13-May-2002.
4	Licence varied by notice 1018042, issued on 05-Nov-2003, which came into effect on 30-Nov-2003.
5	Licence varied by notice 1041989, issued on 12-Nov-2004, which came into effect on 07-Dec-2004.
6	Licence varied by notice 1044367, issued on 08-Mar-2005, which came into effect on 02-Apr-2005.
7	Licence varied by notice 1056839, issued on 17-Mar-2006, which came into effect on 11-Apr-2006.
8	Licence varied by notice 1061531, issued on 31-Aug-2006, which came into effect on 31-Aug-2006.
9	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
10	Licence varied by notice 1097536, issued on 24-Apr-2009, which came into effect on 24-Apr-2009.
11	Licence varied by notice 1102846, issued on 11-Aug-2009, which came into effect on 11-Aug-2009.
12	Licence varied by notice 1107277, issued on 01-Jul-2010, which came into effect on 01-Jul-2010.
13	Licence varied by notice 1119919, issued on 11-Feb-2011, which came into effect on 11-Feb-2011.
14	Licence varied by notice 1501708 issued on 26-Oct-2011
15	Licence varied by notice 1504909 issued on 15-May-2012
16	Licence varied by notice 1509839 issued on 05-Nov-2012
17	Licence varied by notice 1517795 issued on 30-Oct-2014
18	Licence format updated on 04-Nov-2016
19	Licence varied by notice 1558503 issued on 18-Dec-2017
20	Licence varied by notice 1562052 issued on 16-Mar-2018

Environment Protection Licence

Licence - 6163

21	Licence varied by notice	1571299 issued on 24-Oct-2018
22	Licence varied by notice	1592629 issued on 29-Oct-2020

APPENDIX 4 –

EPL 6048
WALLAROO WASTE SITE

Environment Protection Licence

Licence - 6048

Licence Details	
Number:	6048
Anniversary Date:	29-October

Licensee

TOMAGO ALUMINIUM COMPANY PTY LTD

PO BOX 405

RAYMOND TERRACE NSW 2324

Premises

WALLAROO WASTE FACILITY

OLD SWAN BAY ROAD

SWAN BAY NSW 2324

Scheduled Activity

Waste disposal (application to land)

Fee Based Activity	Scale
Waste disposal by application to land	Any capacity

Region

Waste & Resource Recovery

59-61 Goulburn Street
SYDNEY NSW 2000

Phone: (02) 9995 5000

Fax: (02) 9995 5999

PO Box A290 SYDNEY SOUTH

NSW 1232

Environment Protection Licence

Licence - 6048

Environment Protection Licence

Licence - 6048

Environment Protection Licence

Licence - 6048

Information about this licence

Dictionary

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

Responsibilities of licensee

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

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

Variation of licence conditions

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

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

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

Duration of licence

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

Licence review

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

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

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

Environment Protection Licence

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

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

Transfer of licence

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

Public register and access to monitoring data

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

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

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

This licence is issued to:

TOMAGO ALUMINIUM COMPANY PTY LTD
PO BOX 405
RAYMOND TERRACE NSW 2324

subject to the conditions which follow.

Environment Protection Licence

Licence - 6048

1 Administrative Conditions

A1 What the licence authorises and regulates

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

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

Scheduled Activity	Fee Based Activity	Scale
Waste disposal (application to land)	Waste disposal by application to land	Any capacity

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
WALLAROO WASTE FACILITY
OLD SWAN BAY ROAD
SWAN BAY
NSW 2324
LOT 63 DP 753194, LOT 60 DP 753200

A3 Information supplied to the EPA

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

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

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

P1.1 The following utilisation areas referred to in the table below are identified in this licence for the purposes

of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Groundwater quality monitoring		Monitoring point labelled "A7 (901)" on "Map 8" provided on 6 August 2002.
2	Groundwater quality monitoring		Monitoring point labelled "A9 (902)" on "Map 8" provided on 6 August 2002.
3	Groundwater quality monitoring		Monitoring point labelled "C7 (903)" on "Map 8" provided on 6 August 2002.
4	Groundwater quality monitoring		Monitoring point labelled "Z9 (904)" on "Map 8" provided on 6 August 2002.
5	Groundwater depth		Monitoring point labelled "A8 (851)".
6	Groundwater depth		Monitoring point labelled "A10 (852)".
7	Groundwater depth		Monitoring point labelled "B7 (853)".
8	Groundwater depth		Monitoring point labelled "Y7 (855)".
9	Groundwater depth		Monitoring point labelled "Y10 (856)".
10	Surface water quality		Monitoring point labelled "801 - site runoff dam" on "Map 8" provided on 6 August 2002.
11	Surface water quality		Monitoring point labelled "802 - boundary dam" on "Map 9" provided on 6 August 2002.
12	Surface water quality		Monitoring point labelled "803 - Pipeclay" on "Map 9" provided on 6 August 2002.
13	Surface water quality		Monitoring point labelled "804 - 12 Mile Creek below crossing" on "Map 9" provided on 6 August 2002.
14	Surface water quality		Monitoring point labelled "805 - 12 Mile Creek - 1km above crossing" on "Map 9" provided on 6 August 2002.
16	Surface water quality		Monitoring point labelled "807 - Moffats Oyster Barn" on "Map 9" provided on 6 August 2002.
17	Groundwater depth		Monitoring point labelled "B10 (854)".

Environment Protection Licence

3 Limit Conditions

L1 Pollution of waters

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

L2 Waste

L2.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
D110	Inorganic fluorine compounds excl calcium fluoride			Only wastes generated at the Tomago Aluminium Company Pty Ltd may be disposed of at the Wallaroo landfill facility
NA	Waste			NA

Note: For the purposes of determining leachable fluoride in approved wastes to be deposited in the landfill, distilled water is the approved leachant.

Note: The licence conditions apply only to nominated accumulations of aluminium smelter wastes which have been analysed in accordance with the procedures outlined in the State Pollution Control Commission document “Procedures for the Sampling and Analysis of Aluminium Smelter Wastes for the Determination of Leachable Fluoride and/or Leachable Cyanide”, dated 19 December 1986 and which, on consideration of the analytical results and any other relevant information, the DECC has endorsed as approved for disposal. Such wastes are hereafter referred to as approved smelter wastes.

L3 Noise limits

L3.1 Noise from the premises must not exceed:
a) an LA10 (15 minute) noise emission criterion of 45 dB(A) (7am to 6pm) Monday to Friday and 7am to 1pm Saturday ; and

b) an LA10 (15 minute) noise emission criterion of 35 dB(A) during the evening (6pm to 10pm) Monday to Friday; and
c) at all other times, an LA10 (15 minutes) noise emission criterion of 35 dB(A),
except as expressly provided by this licence.

L3.2 Noise from the premises is to be measured at the boundary to determine compliance with this condition.

L4 Potentially offensive odour

L4.1 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

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

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O1.2 The licensee must ensure that all staff are aware of the manner in which the waste facility is to be managed in order to comply with the conditions of its licence and that appropriate staff are available that can competently carry out all duties required to meet the specified activities and outcomes identified in the waste facility's LEMP.

O2 Maintenance of plant and equipment

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

O3 Dust

O3.1 The licensee must control generation of dust from the facility.

Without limiting the above condition, the following measures must be followed:

a) Sealed or gravel roads must be constructed from the public roadway to the gateshouse / waste reception section of the landfill.

b) Dust suppression methods must be used as frequently as necessary for any unsealed or unvegetated areas of the landfill including the use of water sprays or water carts.

O4 Emergency response

O4.1 The licensee must extinguish fires at the waste facility as soon as possible.

O4.2 The licensee must have adequate fire prevention measures in place, and ensure that facility personnel are able to access fire fighting equipment and are able to manage fire outbreaks at any part of the facility.

O5 Processes and management

O5.1 The LEMP must address all areas of the waste facility where waste will be disposed of.

O6 Waste management

O6.1 The landfill surface must be contoured to minimise the run - on of surface waters onto areas where waste has been landfilled except during a storm event of not less than 1 in 10 year recurrence interval of one day duration.

O6.2 The stormwater sedimentation basin must be operated and maintained so as to collect and impound without discharge to surface waters all surface water runoff from or generated by a storm event of not less than a 1 in 10 year recurrence interval of one day duration.

O6.3 There must be no incineration or burning of any waste at the facility.

O6.4 The licensee must have in place and implement procedures to screen and remove any waste not permitted to be disposed of at the waste facility

O6.5 The licensee must operate the facility in accordance with the progressive filling plan detailed in the LEMP.

O6.6 The licensee must maintain a filling plan that identifies areas to be used in the future for the disposal of waste. The filling plan must be updated at intervals of no greater than 24 months determining the remaining volume of the landfill.

O6.7 The licensee must ensure that the landfill cells are capped progressively and effectively during operations and specifically at times when the level of waste reaches final heights as detailed in the LEMP.

O6.8 Final capping must comprise two layers in the order of installation: sealing layer and the revegetation layer as specified in the LEMP

O6.9 The licensee must take all practicable steps to prevent unauthorised access to the waste facility.

O6.10 The licensee must ensure that the landfill cells are capped progressively and effectively during operations and specifically at times when the level of waste reaches final heights as detailed in the LEMP.

O6.11 The licensee must control pests, vermin and weeds at the waste facility.

O6.12 The Company shall supervise the waste disposal operations to ensure that procedures to prevent any spillage of wastes and any environmental damage outside the disposal area are effective.

O6.13 The approved smelter wastes shall not be kept, sold, distributed, conveyed or used on these premises except as provided in this licence.

O6.14 The licensee is permitted to keep approved smelter wastes subject to the conditions of this licence.

O6.15 The approved smelter wastes must be kept on site in a secure manner such that all leachate from the waste is collected and no wind borne material can escape from the site.

O6.16 The site storage for the approved smelter wastes must be maintained in good order and good condition.

O6.17 The Premises must be proveded with physical security to prevent unauthorised access to the approved smelter wastes.

O6.18 The licensee is permitted to dispose of approved smelter wastes at the Premises subject to the conditions of this licence.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

Environment Protection Licence

Licence - 6048

M2 Requirement to monitor concentration of pollutants discharged

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

M2.2 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 4

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 5

Environment Protection Licence

Licence - 6048

Pollutant	Units of measure	Frequency	Sampling Method
Depth	metres	Quarterly	Grab sample

POINT 6

Pollutant	Units of measure	Frequency	Sampling Method
Depth	metres	Quarterly	Grab sample

POINT 7

Pollutant	Units of measure	Frequency	Sampling Method
Depth	metres	Quarterly	Grab sample

POINT 8

Pollutant	Units of measure	Frequency	Sampling Method
Depth	metres	Quarterly	Grab sample

POINT 9

Pollutant	Units of measure	Frequency	Sampling Method
Depth	metres	Quarterly	Grab sample

POINT 10

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 11

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 12

Pollutant	Units of measure	Frequency	Sampling Method

Environment Protection Licence

Licence - 6048

Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 13

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 14

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 16

Pollutant	Units of measure	Frequency	Sampling Method
Conductivity	microsiemens per centimetre	Quarterly	Grab sample
Cyanide	milligrams per litre	Quarterly	Grab sample
Fluoride	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample

POINT 17

Pollutant	Units of measure	Frequency	Sampling Method
Depth	metres	Quarterly	Grab sample

M2.3 The licensee must install and maintain all monitoring bores in a manner that ensures that samples taken from the bores are representative of the groundwater at the screened depths as defined in the LEMP at that location.

M2.4 The licensee must report to the EPA if the results for any parameter monitored in the groundwater detection monitoring program indicates a significant change to the concentration of any contaminants or any indication of actual or incipient environmental harm at any of the sampling locations.

M2.5 The licensee must report to the EPA if the results for surface water monitoring indicate that a significant change to the concentrations of any contaminants or any indication of actual or incipient environmental harm at any of the sampling locations.

M3 Testing methods - concentration limits

M3.1 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M3.2

M4 Recording of pollution complaints

M4.1 The record of a complaint must be kept for at least 4 years after the complaint was made.

M4.2 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M4.3 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M4.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M5 Telephone complaints line

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

M5.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M5.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

Environment Protection Licence

Licence - 6048

6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:
1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee a copy of the form that must be completed and returned to the EPA.

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

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

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

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

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

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

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

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

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

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

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

7 General Conditions

G1 Copy of licence kept at the premises or plant

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

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

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

8 Special Conditions

E1 Groundwater and Surface Water Assessment Report

E1.1 The Licensee is required to engage a suitably qualifed expert to :

1. Assess and interpret data from all groundwater and surface water monitoring which has been undertaken from 2012 to 2016 (inclusive), in accordance with this Licence; and
2. Undertake 1. (above) in the context of the receiving environment and background water quality levels.

E1.2 The Licensee is required to provide the EPA with a "Groundwater and Surface Water Assessment Report" on data from E1.1 (above), by no later than 1 March 2017.

Environment Protection Licence

Licence - 6048

Dictionary

General Dictionary

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

Environment Protection Licence

Licence - 6048

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

Environment Protection Licence

Licence - 6048

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

Mr Bernie Weir

Environment Protection Authority

(By Delegation)

Date of this edition: 06-July-2000

Environment Protection Licence

Licence - 6048

End Notes

1	Licence varied by notice 1015242, issued on 20-Feb-2002, which came into effect on 17-Mar-2002.
2	Licence varied by notice 1032931, issued on 19-Dec-2003, which came into effect on 13-Jan-2004.
3	Licence varied by notice 1044388, issued on 08-Mar-2005, which came into effect on 02-Apr-2005.
4	Licence varied by correction to DEC Region, issued on 18-Jan-2007, which came into effect on 18-Jan-2007.
5	Licence varied by notice 1077026, issued on 08-Oct-2007, which came into effect on 08-Oct-2007.
6	Licence varied by notice 1081354, issued on 17-Jan-2008, which came into effect on 17-Jan-2008.
7	Licence varied by notice 1093226, issued on 11-Nov-2008, which came into effect on 11-Nov-2008.
8	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
9	Licence varied by notice 1095613, issued on 04-Dec-2008, which came into effect on 04-Dec-2008.
10	Licence varied by Correction to EPA Region data record., issued on 28-Jun-2010, which came into effect on 28-Jun-2010.
11	Licence varied by notice 1546531 issued on 13-Dec-2016

APPENDIX 5 -

DEVELOPMENT CONSENT CONDITIONS

Red type represents 3 January 1991 modification
Green type represents 14 February 1995 modification
Blue type represents 23 August 2001 modification
Orange type represents 7 December 2009 modification
Purple type represents 12 October 2015 modification
Grey type represents 9 November 2016 modification
Pink type represents 23 October 2020 modification

THE ANNEXURE

ANNEXURE TO LETTER FROM THE MINISTER FOR ENVIRONMENT AND PLANNING IN CONNECTION WITH THE INSTRUMENT OF APPROVAL FOR THE PROPOSED TOMAGO SMELTER DATED 6TH MARCH, 1981

Nature reserves	(a)	Company at its own cost shall comply with the reasonable requirements of the Director of National Parks and Wildlife for making good damage to the existing or proposed nature reserves at Fullerton Cove, Kooragang Island and Hexham Swamp where the damage is found to be attributable to emissions from the smelter and comply with the reasonable requirements of the State Pollution Control Commission to mitigate or eliminate the cause of damage.
Financial assistance to Council	(b)	Provide financial assistance to the Port Stephens Shire Council for sports and recreational facilities the amount to be agreed between the developer and Council.
Council inquiry costs	(c)	Reimburse the Council for all costs incurred in association with appearing before the Commission of Inquiry.
	(d)	[DELETED]

DEPARTMENT OF ENVIRONMENT AND PLANNING

OF NEW SOUTH WALES

PROPOSED ALUMINIUM SMELTER AT TOMAGO

CONSENT TO A DEVELOPMENT APPLICATION REFERRED FOR DETERMINATION PURSUANT TO SECTION 101 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979.

APPLICANT'S NAME AND ADDRESS: Tomago Aluminium Company Pty. Limited,
3rd Floor,
4 O'Connell Street,
SYDNEY N.S.W. 2000.

WHEREAS:

(a) The Minister for Planning and Environment (hereinafter called the "Minister") gave a direction (hereinafter called the "direction") in writing in accordance with Section 101(1) of the Environmental Planning and Assessment Act, 1979, (hereinafter called the "Act") dated the 5th November, 1980, to the Council of the Shire of Port Stephens (hereinafter called the "Council") to refer to the Secretary of the Department of Environment and Planning (hereinafter called the "Department") for determination by the Minister of all development applications specified in the direction in relation to certain lands in the Schedule to the direction;

(b) a development application (hereinafter called the "application") for the development of an aluminium smelter (hereinafter called the "proposed development") on lands described as ALL THOSE pieces or parcels of land situate at Tomago, Shire of Port Stephens, Parish of Stockton and County of Gloucester being Lot 100, Deposited Plan 604166 in Certificate of Title Volume 13997 Folio 58, Lots 12, 13, 14, 15 and 16, Deposited Plan 258020 in Certificates of Title Volume 13767 Folios 91, 92, 93, 94 and 95, respectively, Lot 3, Deposited Plan 38904 in Certificate of Title Volume 13811 Folio 196, the whole of the land in Certificate of Title Volume 6353 Folio 184, And the whole of the land secondly described in Conveyance No. 269 Book 2018 but excepting thereout Lots 1, 2, 3, 4, 5 and 6 in Deposited Plan 38904 (hereinafter called the "land"), and being an application to which the direction applies, was received by the Council from Tomago Aluminium Company Pty. Limited (hereinafter called the "applicant") and referred to the Secretary of the Department in accordance with the Act;

(c) persons referred to in Section 101(3) of the Act in accordance with Section 101(4) of the Act, required to be afforded the opportunity of a hearing before the Minister determined the application;

(d) the Minister directed that an inquiry be held in accordance with Section 119 of the Act, by a Commission of Inquiry appointed in

accordance with Section 119(2) of the Act (hereinafter called the "Commission of Inquiry");

(e) the Director of Environment and Planning has concurred in the proposed development;

(f) and whereas the Commission of Inquiry was held accordingly;

Now, I, the Minister for Planning and Environment, after consideration of the findings and recommendations of the Commission of Inquiry, do hereby determine the application by granting consent to the application for the proposed development, generally in accordance with the Environmental Impact Statement for an Aluminium Smelter at Tomago, N.S.W., Volume 1 & 2, prepared by James B. Croft & Associates, Newcastle, and marked "Submission 36", and Environmental Impact Statement for an Aluminium Smelter at Tomago, N.S.W., Volume 3 Figures, prepared by James B. Croft & Associates, Newcastle, and marked "Submission 36A", as modified by the environmental impact statement for the proposed expansion of the Tomago Aluminium Smelter, Tomago, NSW, dated July, 1990, prepared by Crooks Michell Peacock and Stewart Pty Limited and the Appendices to that EIS (the 1990 Smelter Expansion EIS), and as modified by the Statement of Environmental Effects (SEE) titled "Modification of Development Consent for the Proposed Production Capacity Increase at Tomago Aluminium Smelter", prepared by HLA-Envirosciences, and certified by Gary Freeland on 3 April 2001, and the Statement of Environmental Effects entitled "Production Capacity Increase Statement of Environmental Effects Tomago Aluminium Smelter", prepared by ENSR Australia Pty Ltd, dated May 2009; as modified by the project proposal titled *Tomago Aluminium Company Pty Ltd Production Capacity Increase 575,000 to 585,000 Tonnes Saleable Metal* and accompanied by a letter dated 5 August 2015 from the Tomago Aluminium Company Pty Limited; and as modified by the project proposal titled *Tomago Aluminium Company Pty Ltd Production Capacity Increase 585,000 to 600,000 Tonnes Saleable Metal* (which Environmental Impact Statements are hereinafter called the "Statement"), the development application for aluminium smelter at Tomago, N.S.W. dated the 20th August, 1980 and marked "Submission 36C", the Statement entitled "National Economic Impact of the Proposed Tomago Aluminium Smelter dated February, 1981 and marked "Submission 36E", And the Plan entitled Tomago Aluminium Company Pty. Limited Aluminium Smelter Project, Tomago, N.S.W., Extent of Property Controlled as at September, 1980 endorsed K41568 and marked "Submission 36G" all of which are deposited in the office of the Department, subject to the following conditions:–

Statutory requirements

1. that the applicant shall meet the requirements of all public authorities having statutory responsibilities in respect of the proposed development and shall negotiate with all relevant authorities with a view to meeting their reasonable requirements;

S.P.C.C. licences

2. that the applicant shall obtain from the State Pollution Control Commission all statutory approvals required under the Clean Air, Clean Waters, Environmentally Hazardous Chemicals and Noise Control Acts. In the event of emissions exceeding the approved levels, or in the event that there are adverse effects on the environment beyond those anticipated at the time of approval and which can be reasonably attributed to emissions from the smelter, the developer

shall comply with the conditions, directions or notice issued under the foregoing Acts aimed at achieving the approved levels of emissions or at mitigating or eliminating the adverse effects;

Operating/ monitoring controls

3. that the applicant shall carry out all those operating and monitoring measures as described and specified in the Statement to prevent, minimise or ameliorate adverse environmental, social and economic impact except where there is inconsistency with the conditions of this development consent, the consent for the smelter expansion the subject of DA 4908/90 dated 2 August, 1990, submitted to Port Stephens Shire Council, or the requirements of authorities referred to, the conditions of approval or the authorities' requirements shall prevail;

Monitoring programme

4. that the applicant shall, subject as hereinafter provided, establish monitoring stations to collect relevant information on air and water quality and noise pollution. Further, that the applicant shall prepare a programme for the purposes of air and water quality and noise pollution and shall submit such a programme and details of the location of the installations to the State Pollution Control Commission (hereinafter called the "Commission") for approval prior to the commencement of the programme. Further, the information collected and recorded at the monitoring stations shall be forwarded to the Commission at such intervals as required by the Commission and to any monitoring committee which may be established for the purposes indicated above;

Monitoring surface water

5. that the applicant shall enter into licence agreements with the owners of land within 4 kilometres of the potlines for the purposes of conducting monthly analysis of surface water sites for fluoride levels. Further, the applicant shall obtain the prior consent of the Commission and the Hunter District Water Board (hereinafter called the "Board") to enter upon the Board's lands situate within the Board's catchment area for the purposes of conducting monthly analysis of surface water sites for fluoride levels. Further, the results shall be made available on the first day of each month to the Commission and to the Board and to any monitoring committee which may be established for the purposes of monitoring fluoride emission from the proposed development;

Monitoring water supply

6. that the applicant shall establish and operate monitoring systems as may be required by the Board (including those referred to in Condition 5 above):–

(a) on the land the subject of the application and the Board's land at Grahamstown~~, Nelson Bay-Anna Bay~~ and Tomago which lands constitute part of the Board's Catchment Area for the purposes of providing information on the changes in fluoride concentration and determining, from time to time, the level of fluoride concentration therein in groundwater, surface water, rainwater, and on fauna and flora in those catchment areas; and

(b) at or adjacent to the liquid effluent disposal area on the land for the purposes of checking the level of chemical or bacteriological contamination reaching groundwater and on the movement of the infiltrated effluent relative to local groundwater flow;

Water Management Plan

7. The Applicant shall prepare and implement, an updated Water Management Plan for the development to the satisfaction of the Director-General. This plan must:

a) be prepared in consultation with DECCW and Hunter Water;
b) be submitted to the Director-General for approval within 12 months of the approval of DA 391-80 MOD 4;
c) include a detailed water balance for the development;
d) describe the developments water management system in detail, including:
    i. the measures that would be implemented to improve water efficiency on site, and reduce the use of potable water;
    ii. the stormwater management system on site;
    iii. the treatment and control of wastewater; and
    iv. the irrigation of effluent to the irrigation area and the management of soil and groundwater in this area.
e) include a description of:
    i. the relevant statutory requirements; and
    ii. the measures that would be used to judge the performance of the water management system, and trigger the implementation of any contingency plans.
f) include a comprehensive program to monitor and report:
    i. the water efficiency of the development;
    ii. the effectiveness of the stormwater management system;
    iii. the volume of effluent discharged and irrigated on site;
    iv. the quality of the effluent discharged from the site;
    v. the effects of the effluent discharges on the ecology of the Hunter River;
    vi. the effects of the irrigation scheme on the irrigation areas; and
    vii. on groundwater quality, including the Tomago Sandbeds Water Supply Works.
g) identify the contingency measures that would be implemented should the impacts of the development approach or exceed the relevant standards or performance measures referred to in f) above;
h) include a protocol for managing and reporting incidents and complaints; and
i) include a protocol for periodic review of the plan.

Spillage

8. that the applicant shall, prior to commencement of the smelter operations:–

(a) ensure, to the satisfaction of the Board, that any spillage and/or dust from material handling operations does not pollute the Tomago sandbeds; and

(b) prepare a programme, in accordance with the requirements of the Board, to ensure that spillages are removed forthwith from roadways, surfaces, parking areas and other areas on the land the subject of the proposed development and to provide for the regular cleaning and sweeping of same;

Acts affecting

9. that the applicant shall immediately inform the Board of any action or occurrence on the site which may affect the Board's water supply.

water supply		Further, the applicant shall, in order to remedy any defect arising out of the action or occurrence, comply forthwith with the requirements of the Board;
	10.	that the applicant shall, in the event of any deleterious effect to the Board's water supply which effect can be attributed to the smelter operations, re-examine the water management scheme and shall make such adjustments to that scheme as may be required by the Commission and the Board. Further, that the applicant shall bear any costs incurred by the Board to remedy the defect in the water supply;
	11.	that the applicant shall, prior to the commencement of the smelter operations, enter into a Deed of Indemnity with the Board, whereby the applicant shall indemnify and keep indemnified the Board for all costs and expenses which the Board may incur in the event of the proposed development requiring the Board to provide, operate and maintain a treatment system for defluoridation of water drawn from the Tomago sandbeds and the Lake Grahamstown Catchment Area;
Drainage and effluent disposal	12.	that the applicant shall, prior to the commencement of the smelter operations, complete all drainage, paving, materials handling and storage systems and effluent treatment plant with ancillary liquid effluent disposal systems, in accordance with the requirements of the Commission and the Board;
Start up	13.	that the applicant shall, prior to the commencement of the smelter operations, complete the integration of both the construction and the start-up phases to ensure that all pollution control measures meet the requirements of the Commission and the Board;
Waste Management Plan	14.	The Applicant shall prepare and implement, a Waste Management Plan for the site in consultation with DECCW and to the satisfaction of the Director-General. This plan must: a) be submitted to the Director-General for approval within 12 months of the approval of DA 391-80 MOD 4; b) characterise all waste imported, exported and re-used on site according to the current waste classification guidelines, and include procedures for classifying each of the waste materials; c) include details of the quantities and destinations of all waste materials; d) describe the measures in place to minimise and manage waste; e) describe the system for the treatment of spent pot linings and provide an approximate timeline for the treatment of stockpiled material; f) describe the options available to further reduce and reuse waste; g) ensure that all waste materials are sent to sites that can lawfully accept waste; and h) describe the waste monitoring program, detail the results of this monitoring and prepare a monitoring and reporting program.
Water to farms and residences	15.	that the applicant shall, in accordance with the requirements of the Commission, provide filtering and purifying systems or such other alternatives, such as reticulated water, as approved by the Commission, to existing farm and residential properties which depend on tank or dam water for domestic and stock purposes provided that

such farms and residential properties are within 2 kilometres of the site of the proposed development or at such other distance as determined by the Commission, to prevent the concentration of fluoride in these water supplies exceeding:–

(a) in the case of water for human consumption 1.0 mg/litre;

(b) in the case of water for stock, crop and other domestic uses, a level prescribed by the New South Wales Department of Agriculture;

Stand-by measures

16. that the applicant shall, in accordance with the requirements of the Commission:–

(a) install adequate stand-by emission collection and treatment facilities to meet possible machine or plant failure;

(b) ensure that the facilities are in good working order and condition at all times; and

(c) ensure that the bakehouse and potline dry scrubbing systems have adequate stand-by equipment for all rotating and mechanised devices, such as fans, pumps and feeders;

(d) install an additional bakehouse emission scrubber, generally in accordance with the 1990 smelter expansion EIS.

Stacks

17. that the applicant shall comply with the requirements of the Commission and the Department regarding stacks associated with the plant and the height of stacks;

Flora and Fauna Monitoring Plan

18. The Applicant shall prepare and implement, a revised Flora and Fauna Monitoring Plan for the site in consultation with the DECCW to the satisfaction of the Director-General. This Plan must:

a) be submitted to the Director-General for approval within 12 months of the approval of DA 391-80 MOD 4;

b) include an ecosystem monitoring program to measure the impacts of fluoride and other contaminants on flora and fauna including farm animals and livestock (if any) within the vicinity of the smelter; and

c) include a monitoring program for the effects of fluoride on vegetative communities, with provision to be made for compensatory mechanisms for replanting if mangroves or wetlands are adversely affected.

Fauna

19. that the applicant shall, within 12 months of the date of this Consent, report to the Director of the National Parks and Wildlife Service on the applicant's programmes designed to protect and preserve koalas and other native fauna inhabiting the area in and around the land the subject of this Consent and shall comply with all requirements of the Director of the National Parks and Wildlife Service for their preservation, protection and relocation;

Nature reserves

20. that the applicant shall at its own cost comply with the requirements of the Director of National Parks and Wildlife for making good damage to

the existing or proposed nature reserves at Fullerton Cove, Kooragang Island and Hexham Swamp where the damage is found to be attributable to emissions from the smelter and comply with the reasonable requirements of the Commission to mitigate or eliminate the cause of damage;

Financial assistance to Council	21.	that the applicant shall contribute to the Council towards the costs of the provision of sports and recreational facilities, such amount to be agreed to between the applicant and the Council;
Council enquiry costs	22.	that the applicant shall reimburse the Council for all costs incurred by the Council arising out of the Council's appearing before the Commission of Inquiry;
On site car parking	23.	that the applicant shall, prior to the commencement of the smelter construction, prepare a plan showing the design and layout of the car parking area on the land and shall submit a plan for approval by the Council. All car parking spaces shall be separately accessible, clearly marked, adequately paved and drained and shall comply with the requirements of the Council;
On site council facilities	24.	that the applicant shall provide a satisfactory on-site office for the sole use of Council employees, such office to be supplied with telephone, plan filing facilities, and catalogue sets of approved plans and details. Adequate safety equipment shall be provided for use by Council's employees;
Inform council	25.	that the applicant shall forward to the Council copies of all approvals and requirements of authorities related to the development;
Monitoring health	26.	that the applicant shall prepare and operate a programme designed for monitoring of employee health and medical examination, to the satisfaction of the Health Commission of New South Wales and of the Division of Inspection Services of the Department of Industrial Relations;
Energy conservation	27.	that the applicant shall minimise energy usage and conserve heat and energy such as by the use of thermal energy recovery from the gases evolved during the smelting operation, heat recovery measures in anode baking and, minimisation of heat loss from electrolytic cells where technically and economically practicable in the design and construction of the smelter;
Fire	28.	that the applicant shall comply with all requirements of the Board of Fire Commissioners before construction commences, in relation to on-site and off-site fire fighting facilities.
Roads and traffic	29.	that the applicant shall, prior to commencement of construction of the proposed development, meet the reasonable requirements of:

(a) the Department of Main Roads and the New South Wales Traffic Authority relating to traffic likely to be generated by construction work;

(b) the Council relating to on-site parking and access to the site during

construction;

(c) the Council and the Commission regarding construction working hours, noise control, and night work illumination during construction;

Roads and traffic

30. that the applicant shall bear all the direct costs of upgrading roads and roadworks directly required as a result of the development in accordance with the requirements of the Department of Main Roads and the Council, namely:

(a) at the intersection of the Pacific Highway, Old Punt Road, and a new on-site road to be constructed along a disused airfield;

(b) at access to the site on Tomago Road.

"Airfield" road

31. that the applicant shall, prior to commencement of construction of the proposed development, construct an on-site road along the site of the disused airfield from the plant to the intersection of the site with Pacific Highway;

Internal roads

32. that the applicant shall submit to and obtain the Council's approval to design plans and specifications for all internal roads. Further, the applicant shall before he submits the design plans and specifications obtain the concurrence of the Hunter District Water Board and the Commission to those plans and specifications. The roads related to each stage of the proposed development shall be constructed before commencement of that stage of proposed development commences operations. The road along the disused airfield is to be constructed prior to commencement of construction work on the proposed development (but not including work related to preparation of the site.)

Restriction on trucks – Tomago Road

33. The Applicant shall ensure that trucks carrying raw and unfinished materials to and from the expanded smelter only use Tomago Road in the event of a road closure or accident on the approved regular transport route (i.e. via Hexham Bridge).

Workforce

34. Within six months of the date of this consent, submit a programme of workforce development to the satisfaction of the Minister for Industrial Relations for approval. This programme shall include:

(a) a training scheme for apprentices per intake, including the number from each trade, starting and completion times, and allocation of apprentices to employers in both the short and long term;

(b) training schemes for construction staff, process operators, foremen and supervisors and other employees.

35. Employ:

(a) persons to provide counselling and other support services to women and to disadvantaged groups employed by the applicant and to assist in fostering community relations between the developer, its staff and the community; and

(b) a senior environmental officer and sufficient staff to the satisfaction of the Council who will be responsible for environmental monitoring and analysis, pollution control, and environmental studies and research.

Dep. landscaping

36. Within six months of the date of this consent, cause to be prepared detailed landscaping plans by a qualified landscape architect to the satisfaction of the Department.

Monitoring costs

37. Bear the costs associated with the establishment and operation of all monitoring programmes referred to in these conditions, the analysis of data, recording results and providing information required to all relevant authorities including any monitoring committee that may be established and in the event of a monitoring committee being established, make a final contribution towards the cost of establishing and operating that committee, the amount to be agreed with the Department.

38. [DELETED]

Landholder's information service

39. Establish an information and advice service for landholders within 4 km of the proposed development to advise them of any precautions necessary to preserve the health of their plants and stock, together with an educational programme to keep landowners informed of likely problems in growing and using sensitive crops, or grazing susceptible animals.

40. [DELETED]

Shift times

41. Negotiate with the relevant trade unions on shift starting and ending times, with the object of minimising:

(a) noise generated during nightshift changeover in the late night/early morning;

(b) road traffic congestion during morning and afternoon peaks;

(c) the conflict of shift change time with other major industry in Newcastle and Port Stephens Local Government areas, if feasible.

Housing construction workforce

42. Ensure that adequate accommodation is available for the construction workforce during the course of construction of the proposed development. In this regard, the developer shall:

(a) liaise with caravan park owners, mobile home-site owners and others concerned with the provision of housing, both temporary and permanent, in the sub-region;

(b) negotiate with owners of local caravan parks and assist with provision of additional caravan sites;

(c) negotiate with developers and assist in providing mobile homes in the Fern Bay area;

(d) negotiate with property and housing developers to provide

additional housing stock;

(e) on the 1st day of June and December each year until the completion of the proposed development, report to the Department of Environment and Planning and Port Stephens Shire Council on availability of accommodation;

(f) comply with the reasonable requirements of the Council and the Department relating to construction of workforce accommodation.

43. Obtain any necessary approval of the Height of Buildings Committee.

44. Any disputes arising between any of the parties in respect of the above conditions, including a conflict arising between the conditions of this consent and the conditions attached to the consent for the smelter expansion, shall be referred to the Minister for Planning for resolution.

45. This approval does not relieve the applicant of the obligation to obtain any other approval required under the Local Government Act, 1919, (as amended) the Ordinances (including approval of building plans) or any other Act.

(File: 80/10069)

46. The Applicant upon receipt of a request from an owner of land within the buffer area described in this condition to purchase that land shall:

(a) take all reasonable steps to acquire the property; and

(b) subject to agreement on the purchase price, acquire such property,

for the purpose of establishing an expanded buffer area around the smelter within the boundaries as shown on Map "1" attached to these conditions, except for

(c) land zoned "general industrial" under the Port Stephens Local Environmental Plan - Shire of Port Stephens, unless the lands are subject to non-conforming uses;

(cc) land zoned "general industrial" under the Port Stephens Local Environmental Plan - Shire of Port Stephens, subject to non-conforming uses where the Applicant was the registered proprietor at any time since 1 January 1980;

(d) lands zoned "Special Uses";

(e) land which is in ownership of the State Government, a State authority or instrumentality at the date of this consent, land which subsequently comes into such ownership and the Hunter River; and

(f) the Caravan Park situated on the southern side of Tomago Road.

If agreement cannot be reached regarding the acquisition price, then

the land owner may refer the matter to the Secretary of the Department of Planning for determination by an independent panel.

Upon receipt of the matter, the Secretary shall arrange for the constitution of a panel to determine the acquisition price. The panel shall consist of:

(g) The Director of Planning or her nominee;

(h) The President of the Law Society of New South Wales or his nominee;

(i) The President of the NSW Division of the Australian Institute of Valuers and Land Managers (Inc), or his nominee.

In determining the acquisition price, the panel shall have regard to –

(j) The current market value of the property at the date on which the matter is referred to the panel but on the basis that the more valuable of either the use of the property as conducted at 6 March, 1981, or the use as at the date of this amendment, had continued.

(k) The cost to the land owner of disturbance and relocation if the land owner elects to relocate his existing activity, PROVIDED THAT for the purpose of assessing this cost, the land owner will be deemed to be relocating within the sub-region known as the Lower Hunter.

(l) Following the determination by the Panel the Applicant shall offer to purchase the relevant property at a price not less than that determined by a majority of the panel.

(m) The Applicant shall meet the costs of providing the panel and any costs associated therewith unless otherwise determined by the panel.

(n) In the event that the landowner does not accept within 12 months the offer of the Applicant, then the Applicant's obligations under this clause shall lapse. Non-acceptance or refusal by the landowner shall not prejudice any rights under condition number 47.

Nothing in this clause shall remove, limit or prejudice the rights of any owner of land within the buffer zone existing prior to the date of this amendment.

Pending acquisition of all properties included in the proposed expanded buffer area the Applicant shall provide on January each year until 1994 a report to the Department of Planning indicating the progress of acquisition, and upon request thereafter.

47. The Applicant shall expeditiously seek to reach agreement, in the event of claims for compensation or requests for acquisition of property being received by the Applicant from land owners or

occupiers of land within 4 kilometres of the site, claiming that their property is affected by emissions from the development. If agreement cannot be reached, the claim or request may be referred to the Secretary of the Department of Planning for determination by an independent panel.

Upon receipt of the matter, the Secretary shall arrange for the constitution of a panel to determine the claim or request. The panel shall consist of:

(a) The Director of Planning or her nominee;

(b) The President of the Law Society of New South Wales or his nominee;

(c) The President of the NSW Division of the Australian Institute of Valuers and Land Managers (Inc), or his nominee.

The panel shall determine:–

(d) Whether the claimant has a claim resulting from emissions from the proposed development;

(e) If so, whether the claim can be settled by payment of compensation without acquisition of the claimant's property;

(f) If so, the amount of such compensation; or

(g) If the claim cannot be settled by compensation, the acquisition price for the property; and

(h) The costs, if any, to be awarded to the claimant in respect of expenses for legal advice and representation and expert witnesses.

(i) In the case of any publicly owned lands within 4 kilometres of the site the panel shall consider whether a claim can be settled by the provision of an equivalent replacement habitat which is not environmentally affected by the smelter operation.

In determining the price for acquisition referred to above, if the panel decides that acquisition is warranted, the panel shall have regard to:–

(j) The market value of the claimant's land unaffected by the Tomago Aluminium Smelter and having regard to the existing use of the land;

(k) The length of time which has elapsed since the granting of development approval and completion of the development, if relevant; and

(l) The cost to the claimant of disturbance and relocation if the claimant elects to relocate his existing activity, PROVIDED THAT for the purpose of assessing this cost, the claimant will be deemed to be relocating within the sub-region known as the Lower Hunter.

The decision of the panel shall be binding on the Applicant.

The Applicant will meet the costs of providing the panel and any costs

associated therewith.

48. Until the proposed modification is fully implemented, the Applicant shall submit an Annual Progress Report on the proposed expansion program to the Director and the EPA. This report must:
    (a) Describe the status of the implementation of the expansion program;
    (b) Assess the environmental impacts of the expansion against the goals identified in the SEE for the proposed expansion; and
    (c) Outline the proposed program for the implementation of the remainder of the expansion.

49. The Applicant shall:
    (a) Install continuous real time monitoring of gaseous fluoride emissions from the roof vents in each potline; and
    (b) Maintain and operate an ambient air quality monitoring network, including sulphur dioxide monitoring in the vicinity of the smelter,

    to the satisfaction of the EPA.

50. The Applicant shall prepare and implement, an Air Quality Monitoring Program for the development to the satisfaction of the Director-General. This program must:
    a) be prepared in consultation with DECCW;
    b) be submitted to the Director-General for approval by 1 May 2010;
    c) include:
        i. three additional SO2 monitoring sites; ensuring sufficient monitoring points around “the Farm” precinct;
        ii. mapping of all monitoring points;
        iii. a description of the monitoring to be undertaken including pollutants, units of measure, frequency and sampling method;
        iv. a program to monitor and report on the ongoing performance of the development; and
        v. a description of the contingency measures that would be implemented should the monitoring identify any non-compliances/exceedances.

50A. The Applicant shall prepare and submit an Air Quality Verification Report to the satisfaction of the Director-General and the DECCW by 30 May 2013 or once the facility is operational at full capacity, whichever comes sooner. The Air Quality Verification Report shall include:
    a) a validation of the predictions made in the SEE titled “Production Capacity Increase Statement of Environmental Effects Tomago Aluminium Smelter”, prepared by ENSR Australia Pty Ltd, dated May 2009;
    b) monitoring data required by the EPL;
    c) comparison of monitoring results with any limits or conditions in the EPL; and if necessary
    d) additional measures that would be implemented to comply with the requirements of the EPL.

Noise

51. The Applicant shall ensure that the noise from the operation of the development does not exceed any noise limits specified in the EPL for the facility.

Noise Auditing and Reporting

52. The Applicant must undertake pre and post modification noise audits to ensure the expansion does not increase noise emissions from the transformers. The auditing must be undertaken by a suitably qualified and experienced person whose appointment has been endorsed by the Director-General, and include:

a) a pre modification noise audit and report which must:
   i. be provided to DECCW and the Department and approved by the Director-General prior to the commencement of the expansion;
   ii. be undertaken during a period when the facility is operating under normal operating conditions;
   iii. identify the existing noise levels produced by the transformers; and
   iv. report any noise complaints received in the last 12 months.

b) a post modification noise audit and report which must:
   i. be provided to DECCW and the Department and approved by the Director-General;
   ii. be undertaken within 5 years of the date of this modification approval or once the facility is operational at full capacity, whichever comes sooner;
   iii. identify the noise levels produced by the transformer;
   iv. compare the transformer noise levels with the levels identified in the pre modification noise audit in a) above;
   v. report any noise complaints received since undertaking the previous noise audit;
   vi. assess whether any noise management or mitigation measures are required;
   vii. describe any measures proposed to be implemented, including a timetable for the implementation; and
   viii. detail how the effectiveness of these measures would be assessed and reported.

53. In consultation with the NPWS, the Applicant shall assist in the development of, and participate in, a periodic monitoring program targeting specific areas/species within Kooragang Island Nature Reserve.

54. The Applicant shall obtain a Section 50 certificate under the *Hunter Water Act 1991* for any increases in potable water demand associated with the proposed expansion.

55. At least 1 month before commencing the construction of any component of the modification, or within such further period as the Director may agree, the Applicant shall submit the following studies to the Director for approval:

a) A Fire Safety Study covering all aspects detailed in the Department's *Hazardous Industry Planning Advisory Paper No. 2 - Fire Safety Study Guidelines* and the New South Wales Government's *Best Practice Guidelines for Contaminated Water Retention and Treatment Systems*. The Study shall focus on the alterations to the existing development, which are the subject of this modification. The Applicant shall also submit the Study for the approval of the NSW Fire Brigades.

b) A Construction Safety Study prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 7 -*

Construction Safety Study Guidelines. The Study shall detail specific measures to address hazards associated with construction activities on an operating development. The Applicant may seek the Director's approval to stage submission of the Study, consistent with staging of construction.

Construction shall not commence until the Director has approved both studies, and the Commissioner of the NSW Fire Brigades has approved the Fire Safety Study.

56. Within 12 months of commencing the construction of any component of the modification, or within such further period as the Director may agree, the Applicant shall submit the following studies to the Director for approval:
    a) An Updated Emergency Plan and detailed emergency procedures for the site, prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 1 - Industry Emergency Planning Guidelines*. The Plan shall be an update of the existing emergency plan for the site.
    b) A Safety Management System, covering all operations on-site and associated transport activities involving hazardous materials. The System shall clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for adherence to procedures and managing change. Records shall be kept on site and shall be available for inspection by the Director-General upon request. The Safety Management System shall be an update of the existing system for the site and be prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 9 - Safety Management*.

57. Within 24 hours of any incident with actual or potential significant off-site impacts on people or the biophysical environment, a report shall be supplied to the Director outlining the basic facts. A further detailed report shall be prepared and submitted following investigations into the causes and identification of additional preventative measures. That report must be submitted to the Director no later than 14 days after the incident. The Applicant shall maintain a register of accidents, incidents and potential incidents. The register shall be made available for inspection at any time by the Director.

58. Within 12 months of the approval of DA 391-80 MOD 4, and then as directed by the Director-General, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
    a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Director-General;
    b) include a Hazard Audit in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 5 – Hazard Audit Guidelines. The audit shall include a review of the Safety Management System and of all incidents recorded and be accompanied by a program for the implementation of all recommendations made in the audit report. If the Applicant intends to defer the implementation of a recommendation, justification must be included;
    c) assess the environmental performance of the development, and its

effects on the surrounding environment and sensitive receivers;

d) assess whether the development is complying with the conditions, relevant standards, performance measures, and statutory requirements;
e) review the adequacy of any strategy/plan/program required under this approval; and, if necessary,
f) recommend measures or actions to improve the environmental performance of the development, and/or any strategy/plan/program required under this approval.

59. Within 6 weeks of completing this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General with a response to any recommendations contained in the audit report.

60. Within 3 months of submitting an audit report to the Director-General, the Applicant shall review and if necessary revise the strategy/plans/programs required under this approval to the satisfaction of the Director-General.

Signed at Sydney this sixth
day of March, 1981.

ERIC BEDFORD
Minister for Planning
and Environment

Red type represents 14 February 1995 modification
Blue type represents 23 August 2001 modification
Orange type represents 7 December 2009 modification
Purple type represents 12 October 2015 modification
Gray type represents 9 November 2016 modification
Green type represents 23 October 2020 modification

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

DETERMINATION OF A DEVELOPMENT APPLICATION PURSUANT TO SECTION 101

I, the Minister for Planning, pursuant to Section 101 of the Environmental Planning and Assessment Act 1979 ("the Act"), determine the development application for the expansion of the Tomago Aluminium Smelter ("the smelter expansion") referred to in Schedule 1 by granting consent to the application subject to the conditions set out in the attached Schedule 2.

The reasons for the imposition of the conditions are:

i) to protect the environment and minimise the adverse impact the development may cause through noise, traffic generation, and air and water pollution;

ii) to provide for environmental monitoring and reporting;

iii) to provide for an expanded buffer zone, and

iv) to provide consistency between the instruments of approval covering the existing aluminium smelter and the smelter expansion, the subject of this application.

DAVID HAY
Minister for Local Government and
Minister for Planning

Sydney, 11th January, 1991

Schedule 1

APPLICATION MADE BY:	Mr W Brooks on behalf of Tomago Aluminium Company Pty Limited.
TO:	Port Stephens Shire Council.
IN RESPECT OF:	Expansion of the Tomago Aluminium Smelter on land described below.

FOR THE CARRYING OUT OF:	Construction and operation of a third potline containing 280 pots, an additional anode baking furnace and paste plant, extension of the two existing potlines each from 240 to 280 pots and all necessary support facilities and buildings on the properties listed below on the schedule of properties and being described in the Environmental Impact Statement, and the Appendices to the Environmental Impact Statement dated July, 1990 prepared by Crooks Michell Peacock Stewart Pty Limited accompanying the Development Application.
SCHEDULE OF PROPERTIES	35 Tomago Road, TOMAGO. Lot 16 DP 258020 45 Tomago Road, TOMAGO. Lot 15 DP 258020 Land to the north of numbers 35 and 45 Tomago Road being part of portion 6, Parish of Stockton and being the remainder of the land in Certificate of Title Volume 6352 Folio 184 after the excision of land for the Old Punt Road deviation. 36 Tomago Road, TOMAGO Lot 100 DP 604166 and located on the south side of Tomago Road. 50, 52 and 76 Tomago Road, TOMAGO, located on the south side of Tomago Road. Lots in DP 258020 and more particularly: Lot 12, Lot 13 and Lot 14. 35 School Drive, TOMAGO Lot 70 DP 634535 13 McIntyre Road, TOMAGO Lot 3232 DP 618103 21a Tomago Road, TOMAGO Lot 301 DP 634536 43 School Drive, TOMAGO Lot 3 DP 38904
NOTES:	(1) To ascertain the date on which this consent becomes effective refer to section 101(9) of the Act. (2) To ascertain the date upon which this consent is liable to lapse, refer to section 99 of the Act.

SCHEDULE 2

CONDITIONS OF DEVELOPMENT CONSENT
TOMAGO ALUMINIUM SMELTER EXPANSION
DA 4908/90 DATED 2 AUGUST 1990
SUBMITTED TO PORT STEPHENS SHIRE COUNCIL

Section 91(3)(b)

1. The Applicant (Tomago Aluminium Company Pty Limited) shall arrange, prior to submitting a Building Application for the smelter expansion to Port Stephens Shire Council, for the completion and lodgement of the attached Form 5 of the Environmental Planning and Assessment Regulation, 1980, in respect of the modifications set out in Schedule 3 to this consent.

General

2. The Applicant shall carry out the expansion of the Tomago Aluminium Smelter generally in accordance with the Environmental Impact Statement (EIS) and Appendices, dated July 1990, prepared by Crooks Mitchell Peacock Stewart Pty Limited and certified by James J. Varjavandi on 27 July 1990; as modified by the Statement of Environmental Effects (SEE) titled Modification of Development Consent for the proposed Production Capacity Increase at Tomago Aluminium Smelter, dated April 2001; as modified by the Statement of Environmental Effects entitled "Production Capacity Increase Statement of Environmental Effects Tomago Aluminium Smelter", prepared by ENSR Australia Pty Ltd, dated May 2009; as modified by the project proposal titled *Tomago Aluminium Company Pty Ltd Production Capacity Increase 575,000 to 585,000 Tonnes Saleable Production*, and as may be modified by the project proposal titled *Tomago Aluminium Company Pty Ltd Production Capacity Increase 585,000 to 600,000 Tonnes Saleable Production*, and as may be modified by the following conditions.

Statutory Requirements

3. The Applicant shall meet the requirements of all public authorities having statutory responsibilities in respect of the proposed development and shall negotiate with all relevant authorities with a view to meeting their reasonable requirements.

Requirements of the State Pollution Control Commission

4. The Applicant shall obtain from the State Pollution Control Commission ("the Commission") all statutory approvals required under the Clean Air, Clean Waters, Noise Control, and Environmentally Hazardous Chemicals Acts.

   In the event of emissions exceeding the approved levels, or in the event that there are adverse effects on the environment beyond those anticipated at the time of approval and which can be reasonably attributed to emissions from the smelter expansion, the Applicant shall comply with the conditions, directions or notice issued under the foregoing Acts aimed at achieving the approved levels of emissions or at mitigating or eliminating the adverse effects.

5. The Applicant at its own expense shall expand, including, if so required, the establishment of additional monitoring stations, and operate the existing monitoring programs for ambient air and water quality and noise pollution in accordance with any

reasonable requirements of the Commission, whether these monitoring programs are carried out by the Applicant, the Commission or an agent of the Commission. Further, the information collected and recorded at the monitoring stations shall be forwarded to the Commission at such intervals as required by the Commission.

Water Management Plan

6. The Applicant shall prepare and implement, an updated Water Management Plan for the development to the satisfaction of the Director-General. This plan must:
   a) be prepared in consultation with DECCW and Hunter Water;
   b) be submitted to the Director-General for approval within 12 months of the approval of DA 4908-90 MOD 3;
   c) include a detailed water balance for the development;
   d) describe the developments water management system in detail, including:
      i. the measures that would be implemented to improve water efficiency on site, and reduce the use of potable water;
      ii. the stormwater management system on site;
      iii. the treatment and control of wastewater; and
      iv. the irrigation of effluent to the irrigation area and the management of soil and groundwater in this area.
   e) include a description of:
      i. the relevant statutory requirements; and
      ii. the measures that would be used to judge the performance of the water management system, and trigger the implementation of any contingency plans.
   f) include a comprehensive program to monitor and report:
      i. the water efficiency of the development;
      ii. the effectiveness of the stormwater management system;
      iii. the volume of effluent discharged and irrigated on site;
      iv. the quality of the effluent discharged from the site;
      v. the effects of the effluent discharges on the ecology of the Hunter River;
      vi. the effects of the irrigation scheme on the irrigation areas; and
      vii. on groundwater quality, including the Tomago Sandbeds Water Supply Works.
   g) identify the contingency measures that would be implemented should the impacts of the development approach or exceed the relevant standards or performance measures referred to in f) above;
   h) include a protocol for managing and reporting incidents and complaints; and
   i) include a protocol for periodic review of the plan.

7. The Applicant at its own expense shall complete, prior to the commencement of the expanded smelter operations forming part of the development, all drainage, paving, materials handling and storage systems and the effluent treatment plant with ancillary liquid effluent disposal systems, in accordance with the requirements of the Commission and the Hunter Water Board (“the Board”).

Waste Management Plan

8. The Applicant shall prepare and implement, a Waste Management Plan for the site in consultation with DECCW and to the satisfaction of the Director-General. This plan must:
   a) be submitted to the Director-General for approval within 12 months of the approval of DA 4908-90 MOD 3;

b) characterise all waste imported, exported and re-used on site according to the current waste classification guidelines, and include procedures for classifying each of the waste materials;
c) include details of the quantities and destinations of all waste materials;
d) describe the measures in place to minimise and manage waste;
e) describe a system for the treatment of spent pot linings and provide an approximate timeline for the treatment of stockpiled material;
f) describe the options available to further reduce and reuse waste;
g) ensure that all waste materials are sent to sites that can lawfully accept waste; and
h) describe the waste monitoring program, detail the results of this monitoring and prepare a monitoring and reporting program.

9. The Applicant at its own expense shall install, and maintain in good working order, in accordance with the requirements of the Commission, adequate stand-by emission collection and treatment facilities to meet possible machine or plant failure for the expansion, including failure involving potlines and carbon bake furnaces.

Requirements of the Hunter Water Board

10. The Applicant at its own expense shall establish and operate revised monitoring systems as may be required by the Board.

(a) On the land the subject of the application and on any of the Board's lands, at Grahamstown~~, Nelson Bay-Anna Bay~~ and Tomago, which constitute part of the Board's catchment areas, for the purposes of providing information on the changes in fluoride concentration and determining, from time to time, the level of fluoride concentration therein in groundwater, surface water, rainwater, and in fauna and flora in those catchment areas; and

(b) At or adjacent to the liquid effluent disposal area on the land for the purposes of checking the level of chemical or bacteriological contamination reaching groundwater and on the movement of the infiltration effluent relative to local groundwater flow.

11. The Applicant shall continue the monitoring and reporting program as currently agreed with the Board and the Commission, in the vicinity of the smelter expansion and shall only vary the program if agreed by these two authorities.

12. The Applicant shall immediately inform the Board of any action or occurrence on the site which may affect the Board's water supply. Further, the Applicant shall, in order to remedy any defect arising out of the action or occurrence, comply forthwith with the requirements of the Board.

13. The Applicant shall, in the event of any deleterious effect to the Board's water supply which effect can be attributed to the expanded smelter operations, re-examine the water management scheme and shall make such adjustments to that scheme as may be required by the Commission and the Board.

Further, the Applicant shall bear any costs incurred by the Board to remedy the defect in the water supply.

14. The Applicant shall install additional monitoring bores in the vicinity of the proposed stormwater surge basin (shown on Figure 5.1 of the 1990 EIS as a stormwater retention pond to the north of the new potline and located within the gazetted

catchment area), test samples from these bores every month or as agreed, and supply the results to the Board and Commission. If the results are not satisfactory to the Board, the Applicant shall take remedial action as agreed by the Board.

15. The Applicant shall ensure that the storage areas for spent pot linings are secure and do not allow contaminants to reach groundwater. If such contamination is detected, the Applicant shall immediately remove the spent pot linings to a secure location and satisfactorily remove the contamination.

16. The Applicant shall install additional monitoring points, as required by the Board, if contamination becomes evident within the catchment area.

17. The Applicant shall, as required by the Board, replace any existing sampling points affected by the smelter expansion to an agreed location nearby, and establish an adequate correlation of results by taking samples from the original and the relocated sampling points.

18. The Applicant shall, prior to the commencement of the expanded smelter operations, complete the integration of both the construction and the start-up phases to ensure that all pollution control measures meet the requirements of the Commission and the Board.

19. The Applicant shall, prior to the commencement of the expanded smelter operations, provide for the safe storage or disposal of all waste materials from the site, including combustible, solid and hazardous wastes, waste oils and effluent wastes, in accordance with the requirements of the Commission, the Council and the Board. Further, the applicant shall:

    a) ensure that all storage for spent pot linings and other hazardous wastes associated with the smelter expansion, in addition to being roofed, shall be 'hard sealed', concreted, kerbed and guttered in order to prevent ingress of rainwater, and shall comply with the requirements of the Commission; and

    b) ensure, in accordance with the requirements of the Commission, the Board and the Council, that there is control of pollution from human wastes, oils and other waste materials produced during construction of the proposed smelter expansion.

20. [DELETED]

21. The Applicant shall excavate and revegetate the proposed borrow areas for construction fill material in accordance with the Board's requirements, and shall enter into an agreement with the Board before commencing clearing and excavation on the borrow areas.

22. The Applicant shall restrict excavation to a depth which is at least 1 metre above the highest groundwater level. This minimum distance of 1 metre is not to be reduced unless agreed by the Board.

23. The Applicant shall remove and store the topsoil and vegetation for use in restoration of borrow areas.

24. The Applicant shall restore the cleared and excavated areas with local endemic species to a standard nominated by the Board, which shall be not less than that adopted by the Board for mineral sands mining activities. Respreading of topsoil and revegetation shall as far as possible be completed progressively after excavation.

25. The Applicant shall take all reasonable steps to ensure there is no spillage of contaminated material within the Grahamstown and Tomago catchment areas. The Applicant shall adopt all practical means, including the use of sealed trucks to avoid spillage. Any spillage must be immediately cleaned up to the satisfaction of the Board.

26. The Applicant shall extend the Deed of Indemnity with the Board to include the plant extension.

27. The Applicant shall meet the normal water supply amplification charges imposed by the Board for additional demand placed on the water supply system.

28. The Applicant shall protect the Board's trunk watermains where they are crossed by the proposed construction access road, by means of a bridge or other structure agreed by the Board.

Affected Lands and Residences

29. The Applicant shall, in accordance with the requirements of the Commission, provide filtering and purifying systems or such other alternatives, such as reticulated water, as approved by the Commission, to existing farm and residential properties which depend on tank or dam water for domestic and stock purposes, provided that such farms and residential properties are within 2 kilometres of the site of the development or at such other distance as determined by the Commission, to prevent the concentration of fluoride in these water supplies exceeding:

    (a) In the case of water for human consumption, 1.0 mg/litre; and

    (b) In the case of water for stock, crop and other domestic uses, a level prescribed by New South Wales Agriculture and Fisheries.

30. The Applicant upon receipt of a request from an owner of land within the buffer area described in this condition to purchase that land shall:

    (a) take all reasonable steps to acquire the property; and

    (b) subject to agreement on the purchase price, acquire such property,

    for the purpose of establishing an expanded buffer areas around the proposed expanded smelter within the boundaries as shown on Map "1" attached to these conditions, except for

    (c) land zoned "general industrial" under the Port Stephens Local Environmental Plan - Shire of Port Stephens, unless the lands are subject to non-conforming uses;

    (cc) land zoned "general industrial" under the Port Stephens Local Environmental Plan - Shire of Port Stephens, subject to non-conforming uses where the Applicant was the registered proprietor at any time since 1 January 1980;

    (d) lands zoned "Special Uses";

    (e) land which is in ownership of the State Government, a State authority or instrumentality at the date of this consent, land which subsequently comes into such ownership and the Hunter River; and

(f) the Caravan Park situated on the southern side of Tomago Road.

If agreement cannot be reached regarding the acquisition price, then the land owner may refer the matter to the Secretary of the Department of Planning for determination by an independent panel.

Upon receipt of the matter, the Secretary shall arrange for the constitution of a panel to determine the acquisition price. The panel shall consist of:

(g) The Director of Planning or her nominee;

(h) The President of the Law Society of New South Wales or his nominee;

(i) The President of the NSW Division of the Australian Institute of Valuers and Land Managers (Inc), or his nominee.

In determining the acquisition price, the panel shall have regard to –

(j) The current market value of the property at the date on which the matter is referred to the panel but on the basis that the more valuable of either the use of the property as conducted at 6 March, 1981, or the use as at the date of this consent, had continued.

(k) The cost to the land owner of disturbance and relocation if the land owner elects to relocate his existing activity, PROVIDED THAT for the purpose of assessing this cost, the land owner will be deemed to be relocating within the sub-region known as the Lower Hunter.

(l) Following the determination by the Panel the Applicant shall offer to purchase the relevant property at a price not less than that determined by a majority of the panel.

(m) The Applicant shall meet the costs of providing the panel and any costs associated therewith unless otherwise determined by the panel.

(n) In the event that the landowner does not accept within 12 months the offer of the Applicant, then the Applicant's obligations under this clause shall lapse. Non-acceptance or refusal by the landowner shall not prejudice any rights under condition number 31.

Nothing in this clause shall remove, limit or prejudice the rights of any owner of land within the buffer zone existing prior to the date of this consent.

Pending acquisition of all properties included in the proposed expanded buffer area the Applicant shall provide on January each year until 1994 a report to the Department of Planning indicating the progress of acquisition, and upon request thereafter.

31. The Applicant shall expeditiously seek to reach agreement, in the event of claims for compensation or requests for acquisition of property being received by the Applicant from land owners or occupiers of land within 4 kilometres of the site, claiming that their property is affected by emissions from the development. If agreement cannot be reached, the claim or request may be referred to the Secretary of the Department of Planning for determination by an independent panel.

Upon receipt of the matter, the Secretary shall arrange for the constitution of a panel to determine the claim or request. The panel shall consist of:

(a) The Director of Planning or her nominee;

(b) The President of the Law Society of New South Wales or his nominee;

(c) The President of the NSW Division of the Australian Institute of Valuers and Land Managers (Inc), or his nominee.

The panel shall determine:–

(d) Whether the claimant has a claim resulting from emissions from the proposed development;

(e) If so, whether the claim can be settled by payment of compensation without acquisition of the claimant's property;

(f) If so, the amount of such compensation; or

(g) If the claim cannot be settled by compensation, the acquisition price for the property; and

(h) The costs, if any, to be awarded to the claimant in respect of expenses for legal advice and representation and expert witnesses.

(i) In the case of any publicly owned lands within 4 kilometres of the site the panel shall consider whether a claim can be settled by the provision of an equivalent replacement habitat which is not environmentally affected by the smelter operation.

In determining the price for acquisition referred to above, if the panel decides that acquisition is warranted, the panel shall have regard to:–

(j) The market value of the claimant's land unaffected by the Tomago Aluminium Smelter and having regard to the existing use of the land;

(k) The length of time which has elapsed since the granting of development approval and completion of the development, if relevant; and

(l) The cost to the claimant of disturbance and relocation if the claimant elects to relocate his existing activity, PROVIDED THAT for the purpose of assessing this cost, the claimant will be deemed to be relocating within the sub-region known as the Lower Hunter.

The decision of the panel shall be binding on the Applicant.

The Applicant will meet the costs of providing the panel and any costs associated therewith.

Upgrading Roads and Provision of Facilities

32. The Applicant shall comply with its undertaking to the Port Stephens Shire Council regarding:

(a) the upgrading of approximately 1.7 kilometres of Tomago Road from the Smelter to the Pacific Highway; and

(b) the costs of providing sports, recreational community facilities,

in accordance with the exchange of correspondence between the Applicant and the Council dated 27 November, 1990 and 5 December, 1990, respectively.

33. The Applicant shall meet the costs of those improvements made necessary by the proposed development to the following intersections, as agreed with the Roads and Traffic Authority:

(i) SH10 and Old Punt Road,

(ii) Old Punt Road and Airstrip Road; and

(iii) Tomago Road and McIntyre Road.

34. All designs and specifications associated with improvement work shall be submitted to Council's Local Traffic Committee for its concurrence prior to the commencement of work.

Transport

35. Construction traffic at the eastern boundary of the development shall only use the existing service road from the Industrial Estate. Access is denied directly to MR302, even on a temporary basis.

36. The Applicant shall ensure that trucks carrying raw and unfinished materials to and from the expanded smelter only use Tomago Road in the event of a road closure or accident on the approved regular transport route (i.e. via Hexham Bridge).

Safety Studies and Hazard Management

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

(Construction Safety Study)

(i) Comprehensive organisational and operational safety procedures proposed to be implemented on the development site during the construction period for the proposed development. This report should cover, inter alia, any demolition and the commissioning of plant. Further, the Applicant shall comply with the reasonable requirements of the Director in respect of the implementation of any measures, arising from the subject approval, during the construction period.

(Hazard and Operability Study)

(ii) A Hazard and Operability Study (HAZOP) for the proposed development to be carried out at the Applicant's expense and conducted by an independent qualified person approved by the Director.

(Final Hazard Analysis)

(iii) A hazard analysis and risk assessment of the detailed design layout of the proposed development as well as the existing development to be prepared at the Applicant's expense. Measures to reduce the quantities of chlorine used and stored shall be considered. Alternatives to air tempered LPG shall be considered for backup fuel.

(Fire Safety Study)

(iv) A fire safety study for the proposed development as well as the existing development. This study shall cover all aspects detailed in the Department's Hazardous Industry Planning Advisory Paper No. 2 Fire Safety Study Guidelines. This study shall also be submitted for the approval of the New South Wales Fire Brigades.

Emergency Plan

38. Not less than two months prior to the commencement of operation of the proposed development, or within such further period as the Director may agree, the Applicant shall prepare and submit for the approval of the Director a comprehensive emergency plan and detailed emergency procedures for the proposed development as well as the Applicant's existing currently approved development.

This plan should include detailed procedures for the safety of people in areas outside the development and potentially affected by the development. The plan should be in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 1 Industry Emergency Planning Guidelines.

Hazard Audit

39. Within 12 months of the approval of DA 4908-90 MOD 3, and then as directed by the Director-General, the Applicant shall commission and pay the full cost of an Independent Environmental Audit of the development. This audit must:
    a) be conducted by a suitably qualified, experienced, and independent team of experts whose appointment has been endorsed by the Director-General;
    b) include a Hazard Audit in accordance with the Department's Hazardous Industry Planning Advisory Paper No. 5 – Hazard Audit Guidelines. The audit shall include a review of the Safety Management System and of all incidents recorded and be accompanied by a program for the implementation of all recommendations made in the audit report. If the Applicant intends to defer the implementation of a recommendation, justification must be included;
    c) assess the environmental performance of the development, and its effects on the surrounding environment and sensitive receivers;
    d) assess whether the development is complying with the conditions, relevant standards, performance measures, and statutory requirements;
    e) review the adequacy of any strategy/plan/program required under this approval; and, if necessary,
    f) recommend measures or actions to improve the environmental performance of the development, and/or any strategy/plan/program required under this approval.

39A. Within 6 weeks of completing this audit, or as otherwise agreed by the Director-General, the Applicant shall submit a copy of the audit report to the Director-General with a response to any recommendations contained in the audit report.

39B. Within 3 months of submitting an audit report to the Director-General, the Applicant shall review and if necessary revise the strategy/plans/programs required under this approval to the satisfaction of the Director-General.

Compliance with Safety Studies and Hazard Management Requirements

40. The Applicant at its own expense shall comply with all the reasonable requirements of the Director in respect of the implementation of any measures arising from the approvals given in respect of conditions 37 to 39 above, within such time as the Director may agree. Such compliance, where applicable, shall be prior to the commencement of operations of the proposed development and shall bring to the Director's notice those matters which the Applicant considers may require further investigation. Further, that upon the receipt of the Director's reasonable instructions, the Applicant shall proceed to implement those instructions to the satisfaction of the Director within such time as the Director may approve.

Landscaping and Carparking

41. Prior to lodging a building application, the Applicant shall cause to be prepared detailed landscaping plans by a qualified landscape architect to the satisfaction of Council. The landscaping shall provide as far as reasonably practicable, a barrier of suitable fast growing, fluoride resistant trees, with a view to minimising impact, particularly from airborne fluoride emissions, on the Botanic Gardens.

42. The Applicant shall, prior to the commencement of the development prepare a plan showing the design and layout of the car parking area on the land and shall submit a plan for approval by the Council. All car parking spaces shall be separately accessible, clearly marked, adequately paved and drained and shall comply with the requirements of the Council.

Requirements of the National Parks and Wildlife Service

43. Should evidence of Aboriginal occupation be uncovered during excavation and construction, the Applicant shall cease work in the area concerned and inform the National Parks and Wildlife Service (NPWS) immediately and take action in accordance with the requirements of the NPWS.

44. The Applicant at its own expense shall comply with the requirements of the Director of National Parks and Wildlife for making good damage to the Kooragang Nature Reserve and Hexham Swamp Nature Reserve where the damage is found to be attributable to emissions from the expanded smelter and comply with the reasonable requirements of the Commission to mitigate or eliminate the cause of damage.

45. [DELETED]

Hunter Region Botanic Gardens Ltd

46. The Applicant shall establish a fluoride monitoring system within the Gardens and the results obtained shall be made available to the Chairman of the Gardens or his representative.

Energy Conservation

47. The applicant in respect of the development shall minimise energy usage and conserve heat and energy, such as by the use of thermal energy recovery from the

gases evolved during the smelting operation, heat recovery measures in anode baking, and minimisation of heat loss from electrolytic cells, where technically and economically practicable, in the design and construction of the smelter expansion.

Environmental Monitoring and Reporting

48. The Applicant shall ensure that, unless already included in the environmental monitoring program required under condition number 5, the following requirements are met to the satisfaction of NSW Agriculture and Fisheries, the Commission, the Board, NPWS, and the Director:

    (a) Monitoring of stormwater discharge from the Applicant's property to establish levels of possible pollutants, including fluoride, heavy metals and cyanide, discharged to the Hunter River, to be undertaken at a point or points to be selected and agreed upon by the Applicant and the authorities referred to above.

    (b) A bio-accumulation and sediment monitoring program for fluoride and other relevant substances be established at the nearest feasible location or locations downstream from the point where the stormwater discharge enters the Hunter River with the experimental design being developed in consultation with NSW Agriculture and Fisheries.

    Flora and Fauna Monitoring Plan

    c) The Applicant shall prepare and implement, a revised Flora and Fauna Monitoring Plan for the site in consultation with the DECCW to the satisfaction of the Director-General. This Plan must:
        i. be submitted to the Director-General for approval within 12 months of the approval of DA 4908-90 MOD 3;
        ii. include an ecosystem monitoring program to measure the impacts of fluoride and other contaminants on flora and fauna including farm animals and livestock (If any) within the vicinity of the smelter; and
        iii. include a monitoring program for the effects of fluoride on vegetative communities, with provision to be made for compensatory mechanisms for replanting if mangroves or wetlands are adversely affected.

49. The Applicant shall expand and operate the existing programme designed for monitoring of employee health and medical examination, to include the additional employees in positions created by the smelter expansion, to the satisfaction of the Health Department of New South Wales.

50. The Applicant shall provide to the Department of Planning, NSW Agriculture and Fisheries, the Commission, the Board, NPWS, and the Council the results and analyses of environmental monitoring undertaken in pursuance of the provisions of conditions number 5 and 48. Such results and analyses shall be provided on a quarterly basis, for review by the responsible government bodies in order to identify any areas of non-compliance so that the necessary remedial action can be instituted. The Applicant shall agree to Council making the reports available on request for public inspection.

51. The Applicant shall bear the costs associated with the establishment and operation of all monitoring programmes referred to in these conditions, the analysis of data, recording results and providing information required to all relevant authorities.

Annual Report

52. The Applicant shall, within six (6) months of the commencement of construction of the proposed development, ascertain the requirements of the Director in relation to an annual report to be submitted at the Applicant's expense to the Director, the Commission and the Council in respect of the performance of the development. Each report shall be in respect of the calendar year ending 31 December and the first such report shall be submitted by 31 March in the following year. The Applicant shall agree to Council making the reports available on request for public inspection.

53. The annual report shall provide the following information:

    (a) the performance of the development;

    (b) the stage of implementation reached and the effectiveness of the environmental controls and conditions relating to the development;

    (c) results of environmental monitoring in respect of air, water and noise pollution and the effects on flora and fauna;

    (d) production levels for operations undertaken during the preceding 12 months;

    (e) modifications made or intended to be made to operations, if any, to mitigate any adverse environmental impacts; and to meet the reasonable requirements of the Director, the Commission or the Council.

Informing Council

54. The applicant shall forward to the Council copies of all approvals and requirements of authorities related to the development.

Dispute resolution

55. Any dispute arising between any of the parties in respect of the above conditions, including a conflict between the above conditions and conditions attached to the consent for the original smelter, shall be referred to the Minister for Planning for resolution.

56. Until the proposed modification is fully implemented, the Applicant shall include an Annual Progress Report on the proposed expansion program in the Annual Report (see Condition 52). The Annual Progress Report must:
    (a) Describe the status of the implementation of the expansion program;
    (b) Assess the environmental impacts of the expansion program against the goals identified in the SEE for the proposed expansion; and
    (c) Outline the proposed program for the implementation of the remainder of the expansion.

57. The Applicant shall:
    (a) Install continuous real time monitoring of gaseous fluoride emissions from the roof vents in each potline; and
    (b) Maintain and operate an ambient air quality monitoring network, including sulphur dioxide monitoring in the vicinity of the smelter
    to the satisfaction of the EPA.

58. The Applicant shall prepare and implement, an Air Quality Monitoring Program for the development to the satisfaction of the Director-General. This program must:

a) be prepared in consultation with DECCW;
b) be submitted to the Director-General for approval by 1 May 2010;
c) include:
    i. three additional SO2 monitoring sites; ensuring sufficient monitoring points around “the Farm” precinct;
    ii. mapping of all monitoring points;
    iii. a description of the monitoring to be undertaken including pollutants, units of measure, frequency and sampling method;
    iv. a program to monitor the ongoing performance of the development; and
    v. a description of the contingency measures that would be implemented should the monitoring identify any non-compliances/exceedances.

58A. The Applicant shall prepare and submit an Air Quality Verification Report to the satisfaction of the Director-General and the DECCW by 30 May 2013 or once the facility is operational at full capacity, whichever comes sooner. The Air Quality Verification Report shall include:
a) a validation of the predictions made in the SEE titled “Production Capacity Increase Statement of Environmental Effects Tomago Aluminium Smelter”, prepared by ENSR Australia Pty Ltd, dated May 2009;
b) monitoring data required by the EPL;
c) comparison of monitoring results with any limits or conditions in the EPL; and if necessary
d) additional measures that would be implemented to comply with the requirements of the EPL.

Noise

59. The Applicant shall ensure that the noise from the operation of the development does not exceed any noise limits specified in the EPL for the facility.

Noise Auditing and Reporting

60. The Applicant must undertake pre and post modification noise audits to ensure the expansion does not increase noise emissions from the transformers. The auditing must be undertaken by a suitably qualified and experienced person whose appointment has been endorsed by the Director-General, and include:
a) a pre modification noise audit and report which must:
    i. be provided to DECCW and the Department and approved by the Director-General prior to the commencement of the expansion;
    ii. be undertaken during a period when the facility is operating under normal operating conditions;
    iii. identify the existing noise levels produced by the transformers; and
    iv. report any noise complaints received in the last 12 months.
b) a post modification noise audit and report which must:
    i. be provided to DECCW and the Department and approved by the Director-General;
    ii. be undertaken within 5 years of the date of this modification approval or once the facility is operational at full capacity, whichever comes sooner;
    iii. identify the noise levels produced by the transformers;
    iv. compare the transformer noise levels with the levels identified in the pre modification noise audit in a) above;
    v. report any noise complaints received since undertaking the previous noise audit;
    vi. assess whether any noise management or mitigation measures are required;

vii. describe any measures proposed to be implemented, including a timetable for the implementation; and
viii. detail how the effectiveness of these measures would be assessed and reported.

61. In consultation with the NPWS, the Applicant shall assist in the development of, and participate in, a periodic monitoring program targeting specific areas/species within Kooragang Island Nature Reserve.

62. The Applicant shall obtain a Section 50 certificate under the *Hunter Water Act 1991* for any increases in potable water demand associated with the proposed expansion.

63. At least 1 month before commencing the construction of any component of the modification, or within such further period as the Director may agree, the Applicant shall submit the following studies to the Director for approval:
    a) A Fire Safety Study covering all aspects detailed in the Department's *Hazardous Industry Planning Advisory Paper No. 2 - Fire Safety Study Guidelines* and the New South Wales Government's *Best Practice Guidelines for Contaminated Water Retention and Treatment Systems*. The Study shall focus on the alterations to the existing development, which are the subject of this modification. The Applicant shall also submit the Study for the approval of the NSW Fire Brigades.
    b) A Construction Safety Study prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 7 - Construction Safety Study Guidelines*. The Study shall detail specific measures to address hazards associated with construction activities on an operating development. The Applicant may seek the Director's approval to stage submission of the Study, consistent with staging of construction.

    Construction shall not commence until the Director has approved both studies, and the Commissioner of the NSW Fire Brigades has approved the Fire Safety Study.

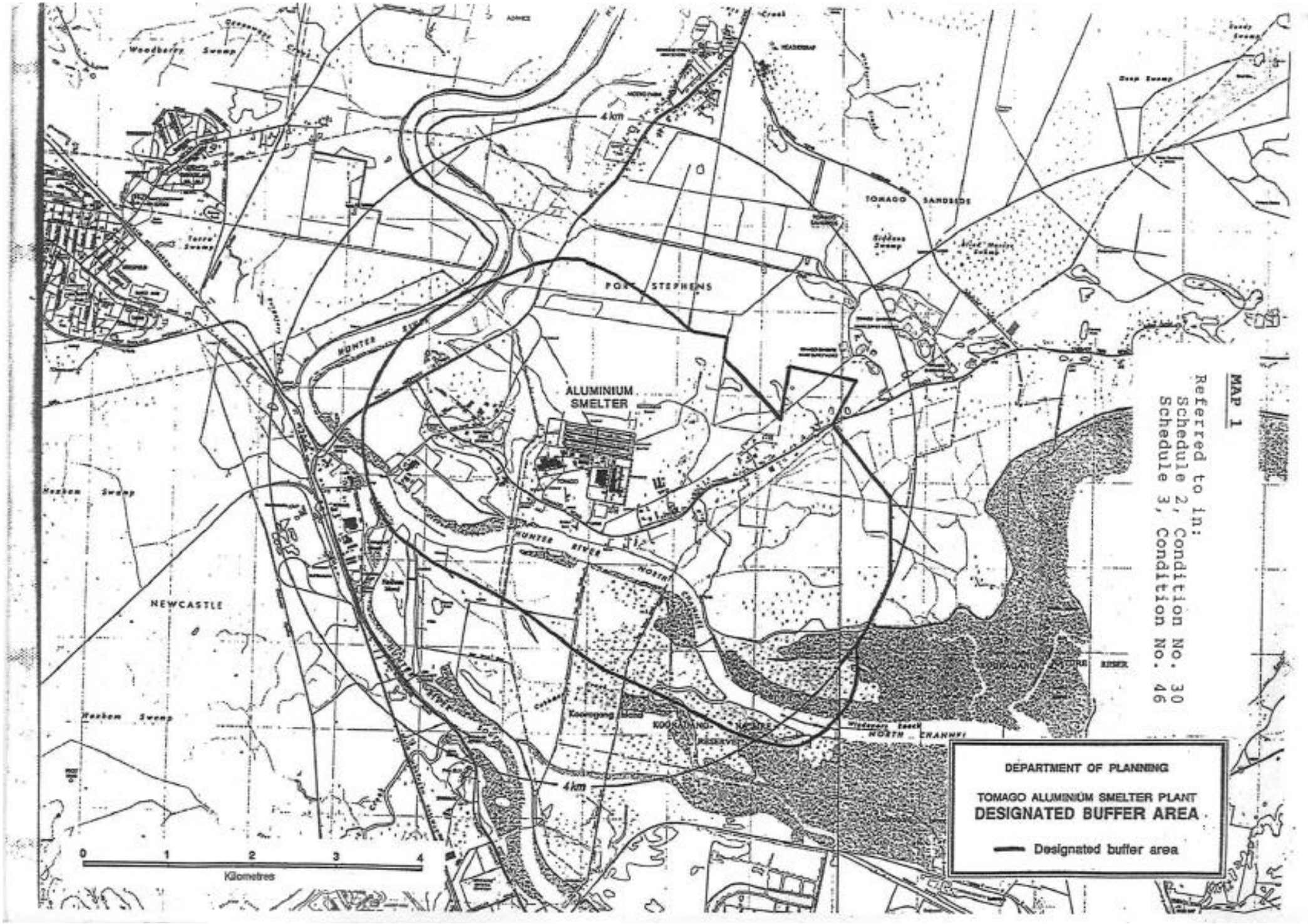
64. Within 12 months of commencing the construction of any component of the modification, or within such further period as the Director may agree, the Applicant shall submit the following studies to the Director for approval:
    a) An Updated Emergency Plan and detailed emergency procedures for the site, prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 1 - Industry Emergency Planning Guidelines*. The Plan shall be an update of the existing emergency plan for the site.
    b) A Safety Management System, covering all operations on-site and associated transport activities involving hazardous materials. The System shall clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for adherence to procedures and managing change. Records shall be kept on site and shall be available for inspection by the Director-General upon request. The Safety Management System shall be an update of the existing system for the site and be prepared in accordance with the Department's *Hazardous Industry Planning Advisory Paper No. 9 - Safety Management*.

65. Within 24 hours of any incident with actual or potential significant off-site impacts on people or the biophysical environment, a report shall be supplied to the Director outlining the basic facts. A further detailed report shall be prepared and submitted following investigations into the causes and identification of additional preventative measures. That report must be submitted to the Director no later than 14 days after the incident. The Applicant shall maintain a register of accidents, incidents and potential incidents. The register shall be made available for inspection at any time by the Director.

66. [DELETED]

NOTE:

This approval does not relieve the applicant of the obligation to obtain any other approval under the Local Government Act, 1919, as amended, the ordinances made thereunder (including approval of building plans), or any other Act.


MAP 1
Referred to in:
Schedule 2, Condition No. 30
Schedule 3, Condition No. 46
ALUMINIUM SMELTER
4km
4km
NEWCASTLE
TOMAGO SANDBEDS
POR STEPHENS
HUNTER RIVER
DEPARTMENT OF PLANNING
TOMAGO ALUMINIUM SMELTER PLANT
DESIGNATED BUFFER AREA
Designated buffer area
0 1 2 3 4
Kilometres

FORM 5
Referred to in:
Schedule 2, Condition No. 1.

ENVIRONMENTAL PLANNING AND ASSESSMENT REGULATION, 1980

FORM 5.

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979.

MODIFICATION OF A CONSENT GRANTED UNDER THE ACT OR A RIGHT CONFERRED BY DIVISION 2 OF PART IV OF THE ACT.

I, ..., of .....
being the owner of the land described in Column A of the following Table do, by this memorandum, modify *the consent/the right (having effect in relation to that land) specified in Column B of the Table in the manner and to the extent indicated in Column C of the Table.

TABLE

Column A	Column B	Column C
Description of land	Particulars of *the consent/the right that is modified	Manner and extent of the modification of *the consent/the right
ALL THOSE pieces or parcels of land situate at Tomago, Shire of Port Stephens, Parish of Stockton and County of Gloucester being Lot 100, Deposited Plan 604166 in Certificate of Title Volume 13997 Folio 58, Lots 12, 13, 14, 15 and 16, Deposited Plan 258020 in Certificates of Title Volume 13767 Folios 91, 92, 93, 94 and 95, respectively, Lot 3, Deposited Plan 38904 in Certificate of Title Volume 13811 Folio 196, the whole of the land in Certificate of Title Volume 6353 Folio 184, And the whole of the land secondly described in Conveyance No. 269 Book 2018 but excepting Lots 1, 2, 3, 4, 5 and 6 in Deposited Plan 38904.	Consent to a Development Application for the development of an aluminium smelter made by Tomago Aluminium Company Pty Limited to Port Stephens Shire Council, determined pursuant to section 101 of the Environmental Planning and Assessment Act, 1979 by Eric Bedford, as Minister for Planning and Environment, dated 6 March, 1981 with Annexure, as modified by the Minister's letter of 16 August, 1983 (File 80/10069).	As set out on the attached Schedule 3.