Bell Bay Aluminium Annual Environment Report

2024

RioTinto | BELL BAY ALUMINIUM

FOREWORD

Bell Bay Aluminium is located on the banks of the Tamar Estuary, near George Town in northern Tasmania. It was the first aluminium smelter built in the southern hemisphere, commencing production in 1955 as a joint venture between the Australian and Tasmanian governments. The company – formerly Comalco Aluminium (Bell Bay) Limited – is wholly owned by Rio Tinto. Acquired by Rio Tinto in 2007, the smelter adopted the brand name of Bell Bay Aluminium in 2011. The company's registered business name remains Rio Tinto Aluminium (Bell Bay) Limited and the ABN and ACN numbers are unchanged.

This Annual Environmental Report has been prepared for the Bell Bay Aluminium smelter. It supports and describes the metallurgical works, aluminium smelter operations and associated activities.

Under the *Environmental Management and Pollution Control Act 1994* (EMPCA), the Bell Bay Aluminium smelter is classified as a Level Two activity under Schedule 2 and operates under Environmental Protection Notice (EPN) 7047/2.

This report provides information regarding operational compliance with the conditions expressed within EPN 7047/2 and other requirements of the EMPCA. Responsibility for the procedures, commitments and directions listed in this document sits with the General Manager – Operations at the Bell Bay Aluminium smelter.

The General Manager – Operations acknowledges the contents of the Annual Environmental Report and certifies the accuracy and validity of its contents.

Richard Curtis, General Manager

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1.0 Operation overview

1.1 Policy

As per section G9 1.1 from EPN 7047/2, the latest version of the site policy, which includes environment, can be seen below.

RioTinto | BELL BAY ALUMINIUM

Health, Safety, Environment and Communities

Our commitment to health, safety, environment and communities is fundamental to how we do business at Rio Tinto. It applies wherever and whenever we operate, from exploration to closure.

WE ACT WITH CARE for people, for the communities in which we operate and for our environment

WE ACT WITH COURAGE to try new things, speak up and do what's right

WE ACT WITH CURIOSITY to collaborate, learn and innovate

Delivering world-class health, safety, environment and communities performance is essential to our business success. Meeting our commitments in these areas contributes to sustainable development and underpins our continued access to resources, capital and engaged people. Our focus on continuous improvement ensures regular renewal and relevance of our policies, procedures and activities.

We make the safety and wellbeing of our employees, contractors and communities our number one goal. Always. Everyone goes home safe and healthy every day.

Equally critical, is maintaining stakeholder confidence through accountable and effective management of our risks and our impacts. Safely looking after the environment is an essential part of our care for future generations.

We approach each social, environmental or economic challenge as an opportunity to create safer, more valuable and more responsible ways to run our business. Wherever possible we prevent, or otherwise minimise, mitigate and remediate the effects of our business operations. We assess the impact of our activities and products in advance, and we work with local communities and agencies to manage and monitor these impacts.

Our approach starts with compliance with relevant laws and regulations. We have the courage and commitment to doing what is right, not what is easiest. We maintain our focus on ethics, transparency and building mutual trust. We support and encourage further action by helping to identify, develop and implement world-class practices through the application of our Group wide standards.

We actively monitor and ensure the security and resilience of our operations and collaborate when confronted with unwanted events or interruptions to minimise the impact on our people, communities, stakeholders and operations.

We work together with colleagues, partners and communities globally to deliver the products our customers need. We learn from each other to improve our performance and achieve success. We promote active partnerships at international, national, regional and local levels, based on mutual commitment and trust. We engage with our joint venture partners to share our practices and insights. We recognise and respect diverse cultures, communities and points of view.

We acknowledge and respect Indigenous and local communities' connections to lands, waters and the environment and seek to develop mutually beneficial agreements with land-connected peoples. We prioritise local economic participation through employment and business development. We respect human rights and work with communities to create mutual value throughout and beyond the life of our operations.

Importantly, it is a shared responsibility, requiring the active commitment and participation of all our leaders, employees and contractors. Our business standards, systems and processes support responsible operations, as well as contributions and innovations that make a positive and sustainable difference in every region we are part of.

This policy was endorsed on the 7th of August 2023 by the Bell Bay Management Team

Richard Curtis General Manager Operations	Sam Duncan Business Partner HSE	Alana Phegan Manager Carbon	Hayden Thorp Manager Asset Management	Mark Warren Manager Potrooms	Claire Ramson Operational Excellence Manager	Lou Clark Principal Advisor Communities & Communication	Sam McCready Manager Metal Products	Leigh Darcy Principal Advisor Energy & Strategy

Figure 1: Bell Bay Aluminium's health, safety, environment and communities policy

1.2 Carbon raw materials

1.2.1 Coke

Bell Bay receives two types (low sulphur and high sulphur) of coke as a raw material for the carbon anode making process. Total coke consumption in 2024 was **77,070 tonnes** (t).

Below is the summary for both supplies of coke.

Coke A – BP		
Shipment	**Shipment date**	**Sulphur content**
M/V Kangting	February 2024	2.62%
M/V Diamond Harbour	June 2024	2.3%
M/V Koombana Bay	August 2024	2.57%
M/V Yasa Rose	October 2024	2.89%

Table 1: coke A sulphur content

Coke B		
Shipment	**Shipment date**	**Sulphur content**
Sinoway – M/V Ken Haru	February 2024	2.62%
Rain coke – M/V Koombana Bay	May 2024	2.63%
Yujia – M/V Belle Luna	July 2024	2.68%
JSHC – M/V Norse Mobile	November 2024	3.05%

Table 2: coke B sulphur content

In 2024, the blending ratio was **60 percent (%)** coke A to **40%** coke B. In accordance with Clause G10 of EPN 7047/2, it is stipulated that the sulphur content of coke must not exceed a rolling 12-month average of 3% by weight. Based on the data provided in tables 1 and 2, the rolling average sulphur content for coke was recorded at **2.66%**. This result demonstrates compliance with the specified sulphur content limit set in the clause.

1.2.2 Pitch

Bell Bay Aluminum receives liquid pitch from Koppers in Newcastle, NSW, as another raw material for the carbon process. Total pitch consumed in 2024 was **15,044t.**

In accordance with Clause G10 of EPN 7047/2, sulphur content of pitch must not exceed a rolling 12-month average of 0.75% by weight. Based on the data provided in table 3, the rolling average sulphur content for pitch was recorded at **0.46%**. This result demonstrates compliance with the specified sulphur content limit set forth in the clause.

Pitch		
Shipment	**Shipment date**	**Sulphur content**
Koppers – Asphalt Transporter	January 2024	0.46%
Koppers – Asphalt Transporter	March 2024	0.39%
OCI – Bit Redo	May 2024	0.67%
Koppers – Asphalt Transporter	July 2024	0.45%
Koppers – Asphalt Transporter	September 2024	0.39%
Koppers – Asphalt Transporter	October 2024	0.41%

Table 3: pitch sulphur content

1.3 Alumina

Annual consumption of alumina was **361,861t**, with the suppliers being QAL and Yarwun Alumina Refinery in Gladstone, QLD. This figure remains below the license limit of 450,000t, as specified in Clause Q1 1.1 of EPN 7047/2.

1.4 Hot metal production

The total hot metal production for the site in 2024 was **186,793t**, which was 505t below the planned production target of 187,299t. This figure also remains below the license limit of 200,000t, as specified in Clause Q1 1.2 of EPN 7047/2.

The primary factor contributing to the discrepancy between the planned and actual production was an elevated number of non-operational cells, following an extended outage in Potline 4.

Figure 2: hot metal production 2011-2024

1.5 Environment management system

Bell Bay Aluminium underwent an external ISO14001 and ISO45001 surveillance audit in August 2024. Previous years' non-conformances and opportunities for improvement were addressed and closed leading up to the 2024 audit and three new minor non-conformances were raised with gaps relating to:

- the system to identify and incorporate any health, safety and environment legal changes or updates
- emergency preparedness and response, specifically related to documentation of follow-up actions and learnings following an emergency drill
- conducting internal audits on site management system processes.

Bell Bay Aluminium will be working during the first half of 2025 to address and sustainably close the three minor non-conformities stated above.
The next annual surveillance audit is planned for September 2025.

1.6 Objectives and targets

Table 4 summarises Bell Bay Aluminium's performance in relation to its aspirational stretch targets. While not all site internal targets were achieved, the practice of tracking actual performance against these stretch targets has enabled the site to foster a culture of continuous improvement.

Indicator	2023 actual	2024 target	2024 actual	Target met ✓/✗	Detailed in section
Non-compliance with license conditions	5	0	6	✗	2.0
Total fluoride emissions (kgF/tAl)	1.02	≤0.83	0.94	✗	6.1
Waste to landfill (average tonnes per month)	86.60	≤13	36.0	✗	5.1
Fresh water use (kL/tAl)	1.02	≤0.74	0.92	✗	4.1
On-site scope 1 emissions (tCO_2-eq/tAl)	1.98	≤1.90	1.88	✓	7.1
Energy use for anodes (GJ/t baked anode)	2.97	≤3.00	2.74	✓	7.1.2
Spent cell lining (SCL) stockpile reduction (t)	2,212	≥2,302	2,174	✗	5.3.1
ISO14001 compliance	Certified compliant	Certified compliant	Certified compliant	✓	1.5

Table 4: compliance to internal targets

Note: kgF/tAl = kilograms of fluoride per tonne of aluminium produced, kL/tAl = kilolitres per tonne of aluminium produced, tCO2-eq/tAl = tonnes of carbon dioxide equivalent per tonne of aluminium produced,
GJ/t = gigajoules per tonne

2.0 Incident review

In 2024, a total of six reportable events occurred at the site. Of these, three were due to an exceedance of the soluble aluminium limit at the main drain outfall, and two were associated with the potrooms dry scrubber. Further details regarding these events is provided in the sections below.

2.1 Exceedance of hydrogen fluoride limit at dry scrubber – 9 December 2024

On 9 December at 4.30am, an event occurred during the process of filling the tanker (a pressure vessel used to transport alumina from the bulk store to the dry scrubber) at the bulk store. The chutes and tanker were damaged because of the event which necessitated immediate repairs before operations could resume.

Due to the repairs, the alumina flow rate to the reactors at the dry scrubber was temporarily reduced. The extended repair timeframe led to the depletion of alumina in the primary silo. Consequently, the scrubber was unable to effectively scrub the fumes, resulting in an exceedance of the hydrogen fluoride (HF) limit of 50 milligrams per cubic meter (mg/m3) for more than 60 minutes.

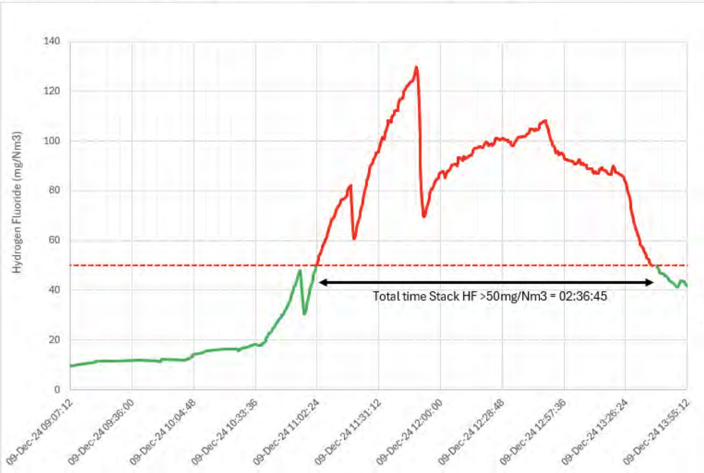

Figure 3: exceedance period in graphical format

Corrective measures are currently in progress to further reduce the risk of this event re-occuring. These include:

- feasibility studies and trial on the installation of an interlock between chutes lowering and vehicle brakes
- reviewing chute location and design to reduce risk of damage if tanker is moved with chutes still in plac
- pre-feasibility studies on technical monitoring on the dry scrubber at the remote operating centre in Brisbane to provide an additional layer of monitoring control.

2.2 Gas flow below 400 cubic meters per second at dry scrubber – 12 April, 2024

A fault on the external 200-kilovolt electricity network resulted in a significant power disruption to site which caused all three potlines to be load shed under the Basslink protection scheme.

The disturbance also caused several substations to trip, causing the loss of power to many site facilities. This power loss caused the scrubber to experience low flow for 63 minutes, exceeding the 60 minute timeframe stipulated in the site's EPN by three minutes.

This event was investigated due to the number of areas impacted with this external outage. The actions specific to the dry scrubber impact are:

- replacement of uninterruptible power supply batteries in scrubber fan sub station
- changes to response plans to further minimise down time during recovery.

2.3 Soluble aluminium exceedance at main drain

In 2024, three events occurred involving exceedances of the soluble aluminium limit at the main drain outfall. According to the permit, the limit for dissolved aluminium is **6.0 milligrams per litre (mg/L).** The exceedances were occurred on the following dates:

Date of event	Dissolved aluminium value
17/01/2024	8.5mg/L
4/04/2024	6.24mg/L
20/06/2024	8.9mg/L

Table 5: table of exceedance events

The causal factor for all three events was due to site experiencing deluge rainfall events following a period of relative dryness.

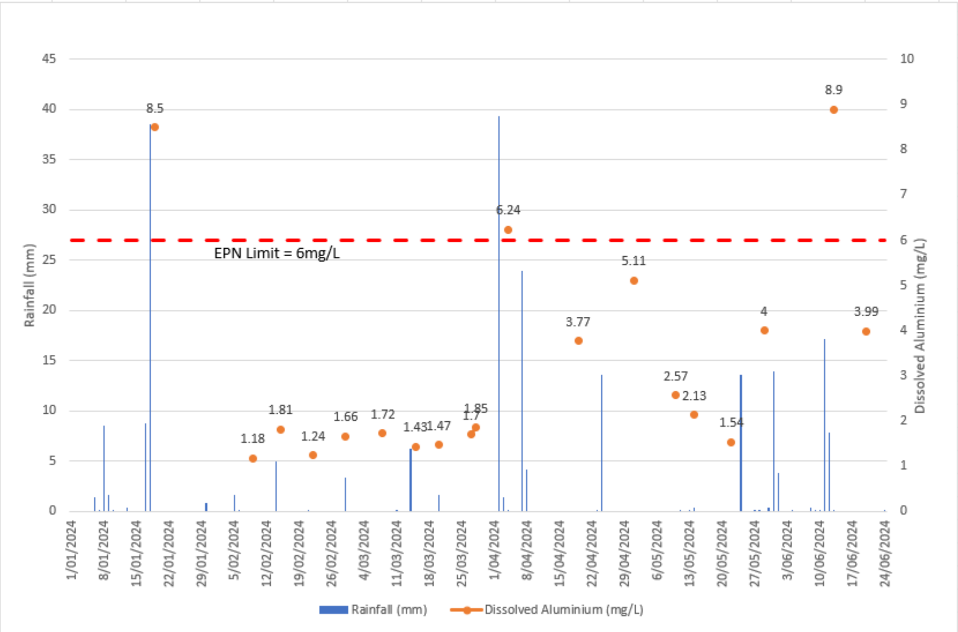

Figure 4: graph depicting dissolved aluminium values in comparison to rainfall

Within the site, material from the internal northern drain, which predominantly contains cryolite-based process material, plays a key role in the observed increase in dissolved aluminum in the discharge water. This material originates from various processes situated within the north drain boundary, including the dry scrubber, potrooms, and rodding room.

To address the exceedances of soluble aluminium at the main drain, a comprehensive approach was implemented focusing on two key layers of control:

1. Reduce source of material ingress into the drains

Efforts were made to reduce the amount of cryolite-containing process material entering the stormwater system. The steps involved were:

- **Reduction of material leaks:** collaborative work by the Asset Management and Operations teams addressed some material spillages from the dry scrubbing and rodding room processes, preventing further ingress into the drains.
- **Road sweeping campaign:** a targeted road sweeping campaign focusing on the area surrounding the north drain was introduced. This was carried out with the assistance of contracted partners to reduce the accumulation of process material on-site, thereby reducing the severity of the "first-flush" events.
- **Routine drain clearing:** a preventive maintenance schedule was followed for the regular clearing of stormwater drains during drier months to minimise sediment build-up within the stormwater network.

March 2023 - *before*

March 2023 - *after*

February 2024 - *before*

February 2024 - *after*

2. Remediation of the wetlands

The wetlands, which serve as the final layer of control before the stormwater from the northern drains reaches the settling ponds and outfall, have been instrumental in managing stormwater quality since commissioning in 1997. However, due to material build-up and reed growth over time, their performance efficiency has declined. A study was initiated to assess the necessary remediation work, and three options were considered:

- **Option 1:** constructing a new, independent wetland treatment system adjacent to the existing one.
- **Option 2:** excavating the existing wetland ponds to partially or fully restore to its original capacity.
- **Option 3:** retrofitting the existing wetland by raising internal spillways and final outlet structures by approximately 100 millimetres (mm) to increase capacity.

Option 3 (retrofitting the existing wetland) was initially considered but was found unsuitable for meeting the site's long-term strategic requirements. Though it would initially achieve the stormwater quality improvement goal, it would only be a medium-term solution that has the potential to further complicate maintenance requirements. In addition, the solution would not sufficiently address the requirement comply with Condition EF1 – 1.2 of the EPN, which mandates the system's ability to manage a one in 20-year annual exceedance probability rainfall event. Therefore, alternative options are being assessed to restore the wetlands and address both stormwater compliance requirements.

These combined efforts aim to reduce soluble aluminium levels in the discharge water and ensure the stormwater system functions effectively.

2.4 HF exceedance at Inalco dust collector – 21 February 2024

Inalco is a dross processing facility within the Metal Products department at Bell Bay Aluminium. The facility utilises a rotary furnace to remelt dross produced on site to recover aluminium for casting and produce aluminium oxide for export.

Fluoride gases are emitted during this process with the gases being treated through a cyclone and baghouse system with alumina injection as the scrubbing agent.

During the routine annual stack testing conducted in February 2024, a total fluoride value of 23mg/m^3 was recorded against a limit of 20mg/m^3. This was previously unreported due to the stack testing report having the regulatory limit as 50mg/m^3.

The 2024 results had led to a maintenance campaign being conducted on the baghouse with a replacement of the dust collector bags and adjustments made to the alumina injection system in September 2024. The effectiveness of these changes will be measured in the March 2025 stack testing.

The root causes leading to the unreported exceedance were:

- condition of filter bag and cages
- clerical error in concentration limit had resulted in exceedance not being identified by either Inalco or Bell Bay Aluminium team.

The following corrective actions were completed both prior to and post being aware of the exceedance:

- dust collector filter bag and cage service and change-out (completed in September 2024)
- removal, sandblast and repaint of clean air duct
- spare bags stocked on site for ad-hoc replacement
- stack testing company notified and exceedance limit corrected on report.

Future actions nominated to prevent recurrence are:

- confirm effectiveness of bag changes in March 2025 stack test
- conduct quarterly stack testing campaigns to build baseline data to determine bag life and establish a preventative maintenance plan
- build a preventative maintenance plan including quarterly bag house and duct work inspections and additional monitoring based on inline particulate analysers
- submit business case for inline HF monitoring at dross stack.

2.5 Community complaints

In 2024, two community complaints were received regarding dust emissions during alumina unloading operations – on 12 March and 21 May – affecting neighbouring businesses. A root cause investigation was conducted for both incidents, resulting in the following action plans:

- **Temporary mitigation:** the dust collector outlet was redirected to discharge within the containment area of the bottom transfer station as an interim measure.
- **Long-term solution:** a new dust collector has been ordered and is scheduled for installation to further reduce emissions.
- **Equipment maintenance:** the belt scraper on the C15 conveyor was replaced to improve dust control.

Following the 21 May incident, a proactive engagement was carried out by Bell Bay Aluminium with neighbouring businesses on 9 July after the ship unloading operation that took place from 24 June to 3 July. Feedback from neighbouring businesses during this visit indicated noticeable improvements in dust management during that unloading..

3.0 Environment improvement initiatives

3.1 Carbon

3.1.1 Star bag trial in carbon baking furnace scrubber bag houses

The carbon baking furnace Fume Treatment Centre filter trial is a modification of our existing filter system. The trial consists of converting seven-meter long filter bags and cages to four meters in length with a unique design increasing surface area due to its geometric star shape. Twenty eight bags (out of 294) were trialled in filter 2 in 2023. These bags were then tested at a laboratory after nine months of operation to confirm they would function correctly and not fail.

The combination of a newly designed filter bag, cage and customised filter media provides the following benefits:

- Operation with high filtration efficiency, lowering emissions.
- Reduction in differential pressure, resulting in less pulse frequency and less compressed air consumption.
- Similar flow capacity using smaller bags and cages, resulting in less manual labour and improved maintenance.
- Lower maintenance costs due to extended bag life and more effective cleaning over the full bag length.
- Reduced electrical load on Fume Treatment Centre fans.

Following on from the successful trial conducted in 2023 (captured in the 2023 Annual Environment Report), a full bag change was conducted in a filter cell in 2024.

3.1.2 New generation rebuild

New generation is a change to the refractory design of the carbon baking furnace. The benefits of the change are:

- reduced energy consumption. Further details of this improvement are included in section 7.1.2
- increased baking capacity within the CBF
- reduced requirement for refractory maintenance.

In 2024, a further two NG zones were installed in the CBF, bringing the total number of NG zones to six.

3.2 Potrooms

3.2.1 Fume scrubbing efficiency improvement work

In 2024, several improvement initiatives were led by the Services/Scrubbing team and the Potrooms technical team to enhance the efficiency of fume scrubbing and the reliability of equipment, with the goal of reducing the risk of exceedance events at the dry scrubber. The key initiatives included:

1. Ducting replacement in potline 4 H-Bay: the ducting for five cells in Potline 4 H-Bay was replaced due to corrosion that had caused air ingress, disrupting the seal. The new ducting improved the extraction process, reducing fugitive HF emissions within the area, thereby enhancing the overall effectiveness of fume scrubbing.

2. Neo stack lens air purging system: the Neo sensor on the stack, which previously required lens replacements every two months due to exposure conditions, was equipped with an air purging system. This system has proven effective, as the lenses have remained in good condition for over nine months since installation. This improvement has contributed to more reliable data for process monitoring and ensuring better accuracy in the calculation of total fluoride (kgF/tAl).

3. Scrubber operation trial for unplanned outages: following an exceedance event in 2023, where an unplanned outage of a reactor coincided with the planned downtime of another, a successful trial was conducted to run the scrubber on 4.5 reactors for number of hours.

This is a new mode of operation and provides a buffer, allowing the team to respond to similar situations in the future without triggering an exceedance of the criteria set in the EPN.

4. Improved bag house clear-out procedure: a new method for clearing out a full bag house was developed, which involves boosting airflow to the air mat for around 20 minutes to break down problematic scale damns that form over time during operation. This improvement reduces reactor downtime, as in most cases, entry into a confined space is avoided to remove unwanted material from the reactor, enhancing overall operational efficiency.

3.3 Site initiatives

3.3.1 Scrap material removal

In July 2024, there was a collaborative effort between the Operations team, the Environment Advisor and contracting parties to remove around 140t of scrap material from site.

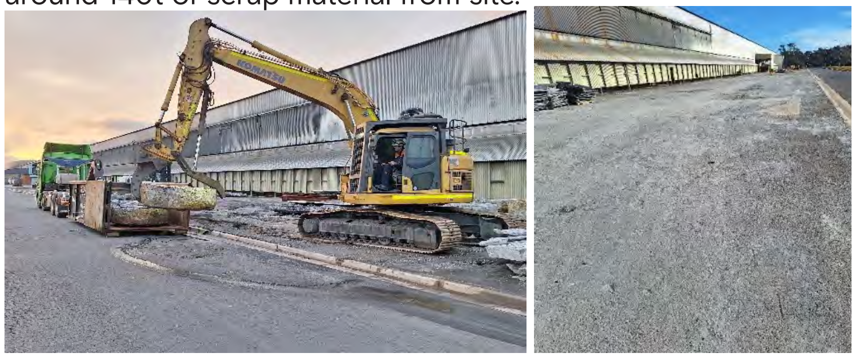

Figure 5: scrap aluminium slab removal from site

3.3.2 Decant pond capacity increase

The decant pond is the engineered site storage facility for liquid and solid wastes. Common sources of material in this stream are wet street sweeping, vac truck washouts, press pit pumped out material in addition to inputs through rainfall. The liquid component of this pond is the input to the leachate treatment plant on site. As time progresses, the solid levels build up in the pond and the capacity of liquid storage is reduced.

The process of removing the solid material from the decant pond to reinstate this capacity involved a rigorous campaign of testing the material and seeking approvals to dispose of the material at a Copping C-Cell landfill facility. A combined effort between our contracting parties and the on-site Land Management Officer resulted in the safe disposal and carting of **240.3t** of material.

Figure 6: decant pond capacity increase before and after

3.4 Surface water monitoring improvements

3.4.1 Reduced turn-around time for external analysis

Bell Bay Aluminium's lab previously relied on a local company for stormwater sample analysis, where a competitive rate was negotiated and the service provided was of high quality. However, the best turnaround time for results from this lab was typically three weeks, and delays could extend this time further. This lengthy turnaround time hindered the ability to respond promptly to and escalate exceedance events.

In February 2024, a new lab with a reduced turnaround time was trialled. The primary challenge was the lead time for delivering the samples.

Once this issue was addressed, the new lab consistently provided results within five working days. Additionally, results could be expedited on a case-by-case basis.

The reduced turnaround time has improved Bell Bay Aluminium's ability to respond to exceedance events and ensures more timely and accurate reporting to the Environment Protection Authority (EPA).

3.4.2 Implementation of Hach spectrometer for additional analysis

The Hach spectrometer was purchased in 2022 following an ammonia exceedance event at Bell Bay Aluminium, with the goal of enabling same-day results for ammonia concentrations in the stormwater network. In late 2023, a site visit by Bell Bay Aluminium team members to TasWater revealed that the spectrometer could be used to measure a broader range of contaminants, including aluminum and iron.

A trial was conducted in Q3 2024, and the results have assisted with providing an initial concentration for soluble aluminium, while confirmation of results is still pending from the accredited external testing facility. This initiative enables the site to take a more proactive approach in management of handling potential exceedance events.

3.4.3 South drain sampling pump replacement

The south drain is one of the site's main internal drains. Data from this location had become unreliable due to repeated failures of the water sampling pump. In 2024, an altered sampling procedure was implemented to ensure that sampling could still be conducted on the drain. However, this procedure introduced additional risks due to exposure to sloped and potentially slippery surfaces at shallow water's edge, further emphasising the need for a reliable pump.

Despite replacing the pump three times during 2022-23, failures persisted. The root cause was determined to be the build-up of solids within the pit where the pump was submerged. To resolve this issue, the pump location was changed to an above-ground position, improving asset integrity and simplifying maintenance in the event of any future failures and repairs.

Figure 7: new sampling pump

The pump was successfully installed and commissioned in November 2024, restoring the reliability of sampling in the south drain area.

4.0 Water

4.1 Water consumption

In 2024, Bell Bay Aluminium consumed a total of **171,947 kiloliters** (kL) resulting in water usage efficiency of **0.92kL/tAl**. This figure exceeds the internal target of **0.74kL/tAl**. Figure 7 is a graph representing the water efficiency from 2019 to 2024.

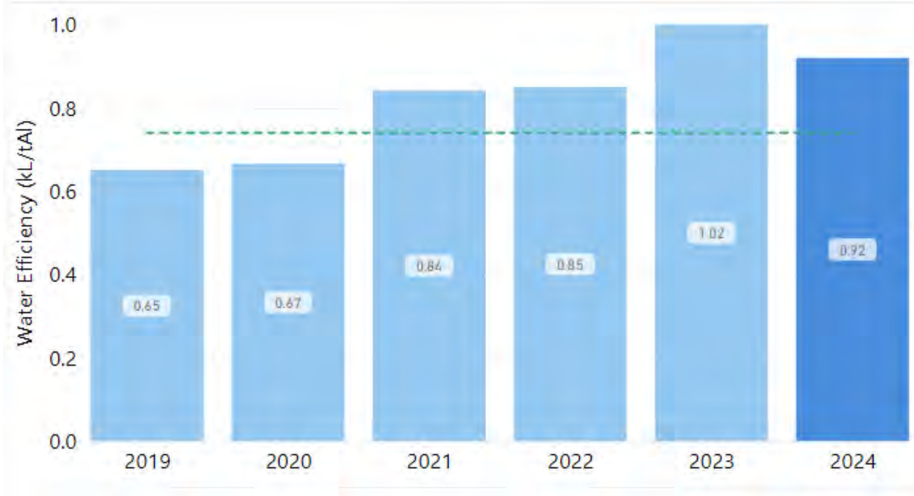

Figure 8: water efficiency (kL/tAl) trend 2019–24

The increased consumption at the green carbon water meter contributed to exceeding the internal target. Following multiple investigations, it was discovered that the recirculating pipe under the anode cooling conveyor, which is used to cool green anodes, had become blocked. As a result of the blockage, water that would typically be recirculated was instead directed into the overflow drain. This led to the use of raw water, which is normally used as a top-up mechanism, becoming the primary source for cooling the green anodes.

Additionally, the increased production of anodes during the year compounded the water usage, resulting in the overall increase in total water consumption. Once the blockage was identified and repaired, water consumption returned to normal ranges in the following months.

4.2 Surface water

In compliance with conditions EF1 and EF2 of EPN 7047/2, Bell Bay Aluminium's management strategy for surface water is aimed at controlling and reducing effluent emissions into the Tamar Estuary. The site drainage network at the smelter is designed so under normal conditions all process and stormwater is discharged via the main drain outfall. The outfall pipe extends 35 meters (m) into the estuary and is approximately 5.5m below mean low tide.

In 2024, the total volume of water discharged from the main drain outfall was estimated to be **339,940kL**. The monthly average flows can be seen in the figure 9:

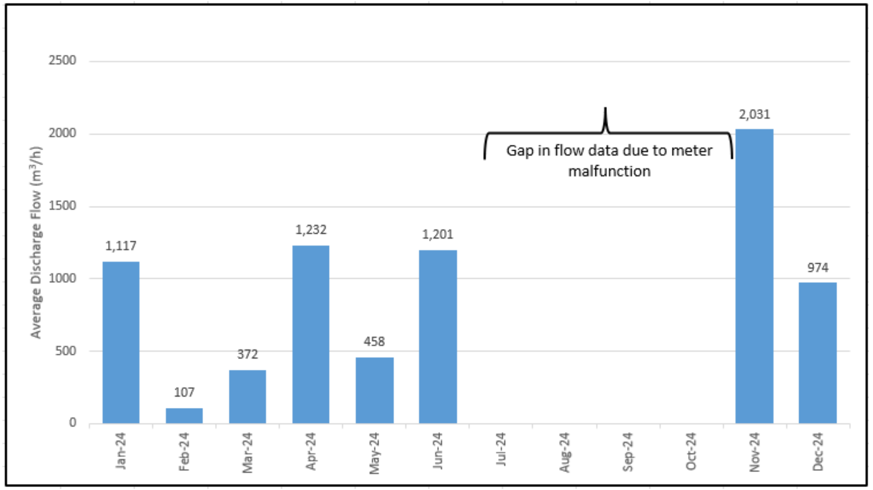

Figure 9: average discharge flows per month in 2024

However, there was a data gap from 1 July 2024 to 15 November 2024 due to a flow meter malfunction caused by a data connection fault between the logger and the data recording system. This led to the loss of that period of data. As a result, estimates for the missing data were made based on the quantity of rainfall received at the site during the affected months.

To prevent a recurrence of this issue, an investigation is underway to assess and implement solutions, including setting up local storage on the device or installing remote data logging storage on a secondary flow meter for main drain sampling. This will ensure more reliable data collection and eliminate future gaps in discharge measurements.

4.3 Surface water monitoring program results

Bell Bay Aluminium continues to manage its surface water discharge with an aim to avoid exceeding compliance limits. This involves the regulation of internal flows and monitoring of analytes in internal drains where applicable.

In 2024, the entire sampling unit was replaced with a Vega VEGAMET 862 flow sensor, which allowed local control and was no longer connected to the site's supervisory control and data acquisition system. Since this installation, no flow proportional samples have failed in their validation check.

A summary of the 2024 results is presented in table 6 with charts containing data from 2023-24 depicted in figures 10-16.

Monitoring Parameter	Regulatory Limit	Compliance to Limit	Comments
pH	6.5-9.0	☑	pH values were compliant. No concerns to report.
Soluble Aluminium	6mg/L	☐	3 exceedance events of soluble aluminium limits reported on in section 2.
Soluble Fluoride	45mg/L	☑	Soluble fluoride values were compliant. No concerns to report.
Soluble Iron	9mg/L	☑	Soluble iron values were compliant and were well under the limit.
TSS (Total Suspended Solids)	60mg/L	☑	One elevated figure in December with most figures being below the Practical Quantification Limit (PQL).
Weak Acid Dissociable (WAD) Cyanide	0.15mg/L	☑	All measured values except the sample analysed on 3/12/2024 were below the Practical Quantification Limit (PQL).
Ammonia	1.8mg/L	☑	Ammonia values were compliant. No concerns to report.
Total Recoverable Hydrocarbons	10mg/L	☑	Total Recoverable Hydrocarbons were compliant. No concerns to report.
Quarterly Polyaromatic Hydrocarbons	No applicable limit	☑	Quaterly sample schedule met.

Table 6: stormwater compliance summary

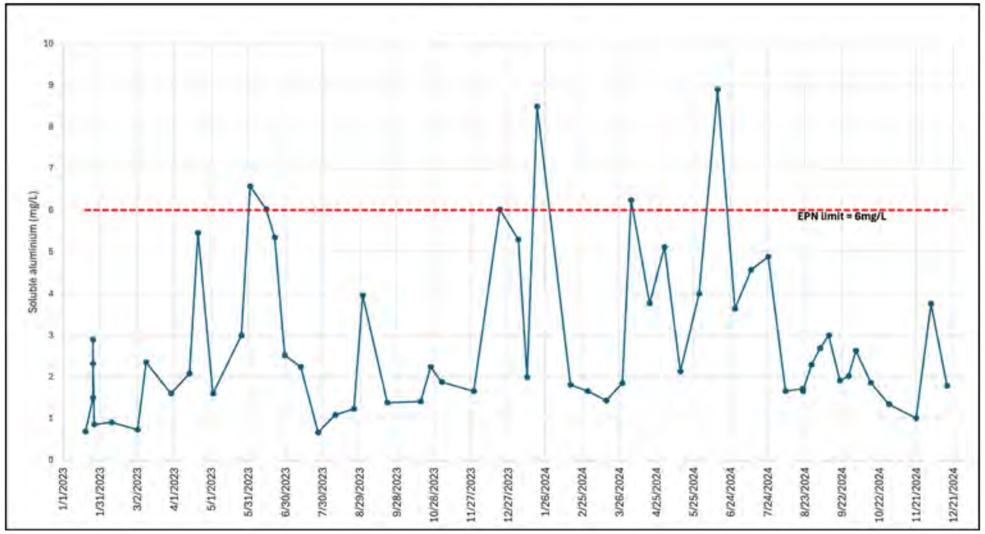

Figure 10: soluble aluminium versus site EPN limit

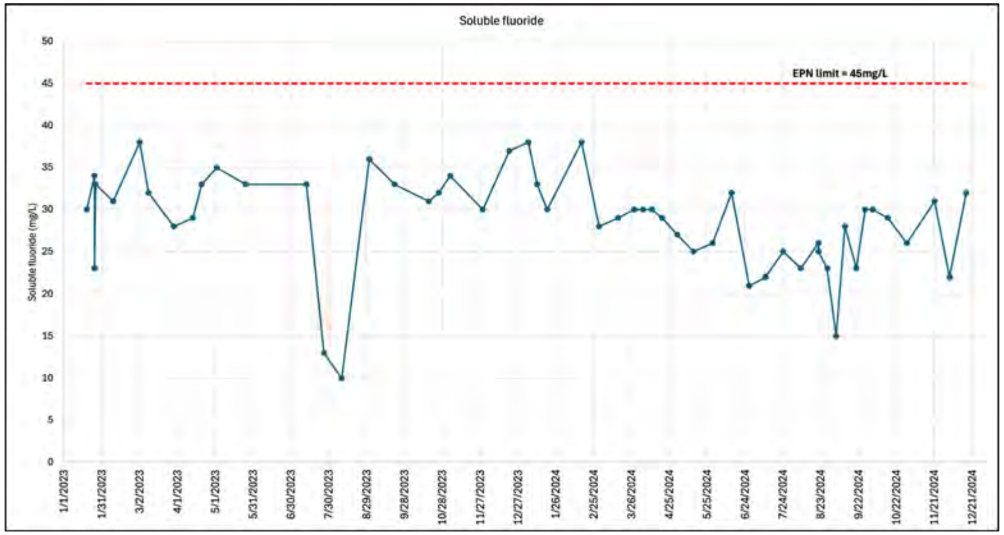

Figure 11: soluble fluoride versus site EPN limit

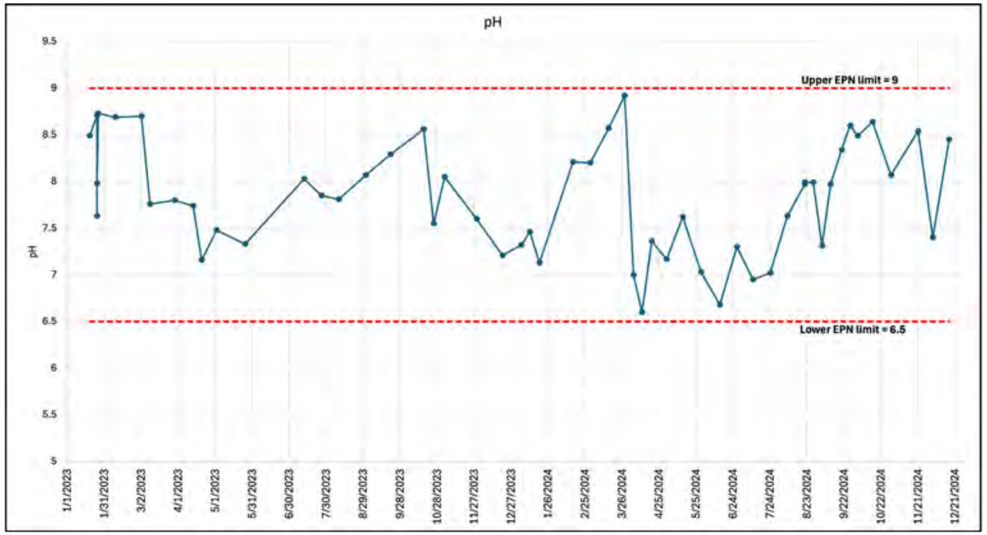

Figure 12: pH versus site EPN limit

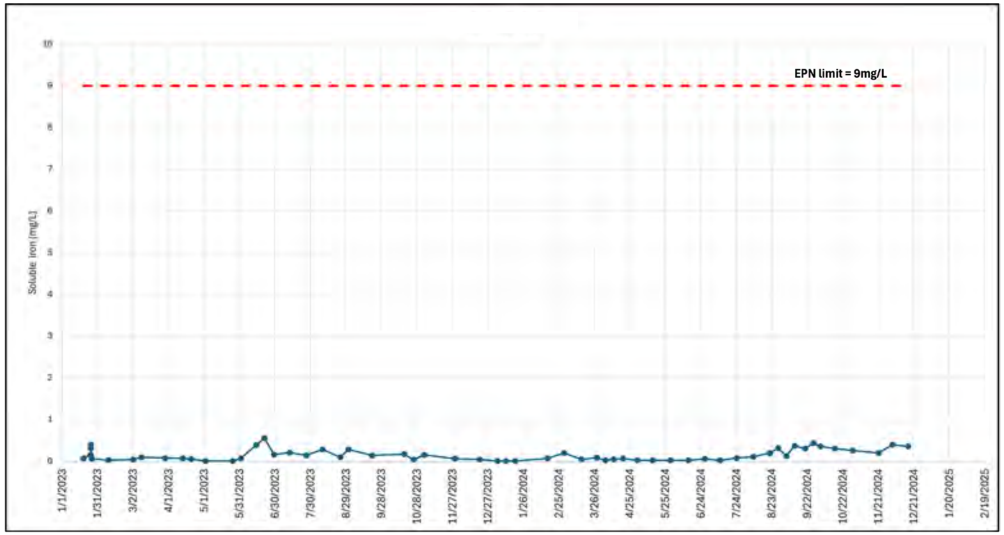

Figure 13: soluble iron versus site EPN limit

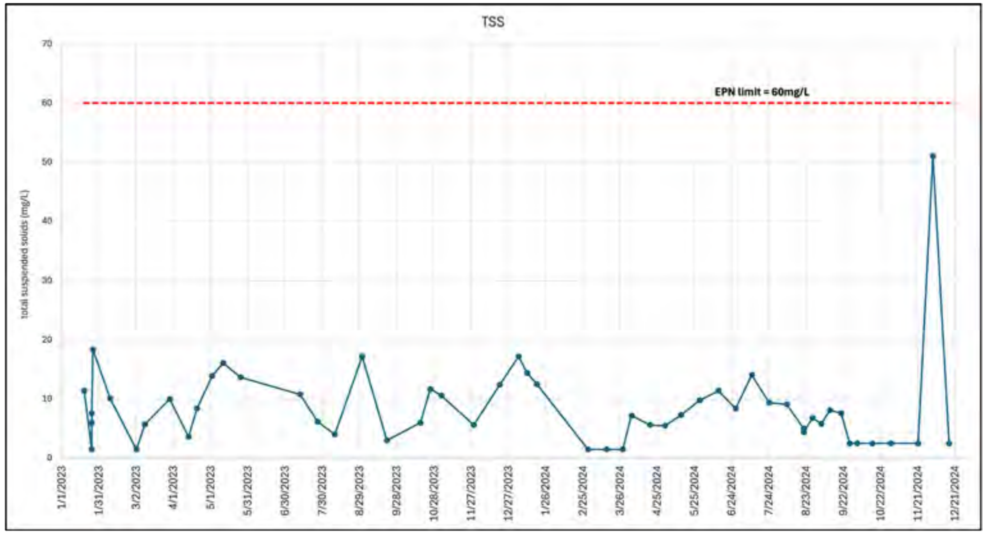

Figure 14: total suspended solids versus site EPN limit

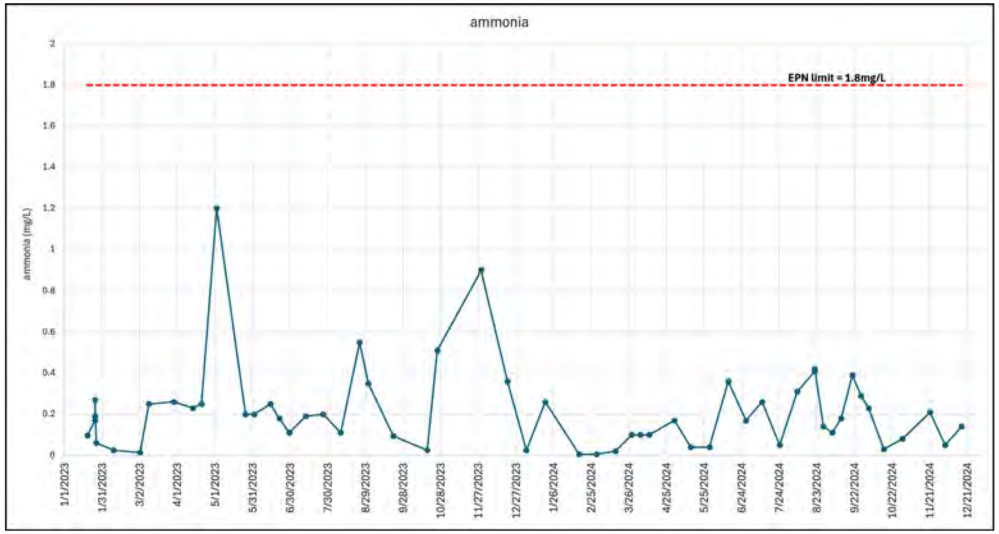

Figure 15: ammonia versus site EPN limit

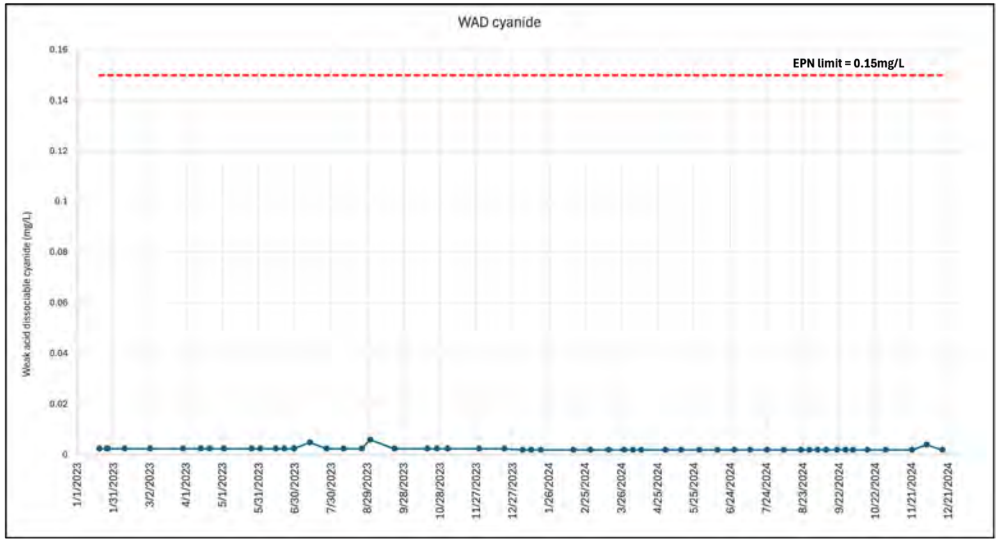

Figure 16: weak acid dissociable (WAD) cyanide versus site EPN limit

*Note: All measured values were below Practical Quantification Limit (PQL) and therefore displayed with a value of 0.5 * PQL*

Pollutant	Average concentration at main drain outfall for 2024 (mg/L)	Mass discharged (t)
Aluminium	3.17	1.0775
Fluoride	27.61	9.3867
Soluble iron	0.16	0.0527
Total suspended solids	8.28	2.8145
Ammonia	0.16	0.0550
Cyanide	0.0021	0.0007

Table 7: yearly mass emissions for key pollutants

Polyaromatic hydrocarbons (PAH) – No applicable limit													
Year	**2023**									**2024**			
Quarterly grab sample	**Q1**	**Q2**	**Q2**	**Q3**	**Q3**	**Q3**	**Q3**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Sample date	**19 Jan**	**13 Apr**	**2 May**	**26 Jul**	**3 Aug**	**9 Aug**	**21 Aug**	**31 Aug**	**11 Oct**	**4 Jan**	**4 Apr**	**10 Jul**	**3 Oct**
PAH Acenaphthene (µg/L)	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
PAH Acenaphthylene (µg/L)	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
PAH Anthracene (µg/L)	*<0.5*	*<0.5*	<0.5	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
PAH Benzo[a]anthracene (µg/L)	*<0.6*	*<0.6*	<0.6	<0.6	<0.6	<0.6	<0.6	0.8	<0.6	<0.6	<0.6	0.5	<0.6
PAH Benzo[a]pyrene (µg/L)	*<0.5*	*<0.5*	<0.5	<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5	<0.5	0.7	0.5
PAH Benzo[b&k]fluoranthene (µg/L)	*<0.6*	*<0.6*	<0.6	*<0.6*	*0.7*	*<0.6*	*0.7*	*1.6*	*<0.6*	*<0.6*	*<0.6*	*1.3*	*1.1*
PAH Benzo[ghi]perylene (µg/L)	*<0.6*	*<0.6*	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	0.9	<0.6
PAH Chrysene (µg/L)	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*	*<0.8*
PAH Dibenzo[a,h]anthracene (µg/L)	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
PAH Fluorene (µg/L)	*<0.5*	*<0.5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAH Indeno[1,2,3-cd]pyrene (µg/L)	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*0.6*	*<0.5*	*<0.5*	*<0.5*	*1.0*	*0.9*
PAH Naphthalene (µg/L)	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*	*<0.5*
PAH Phenanthrene (µg/L)	*<0.5*	*<0.5*	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAH Pyrene (µg/L)	*<0.5*	*<0.5*	<0.5	*<0.5*	*0.5*	*<0.5*	*<0.5*	*0.8*	*<0.5*	*<0.5*	*<0.5*	*0.9*	*<0.5*

Table 8: polyaromatic hydrocarbon sampling result

Note: results in italics are below the limit of quantification. µg/L = micrograms per litre

Total recoverable hydrocarbons (limit = 10mg/L)				
Sample date	TRH >C10-C16 (mg/L)	TRH >C16-C34 (mg/L)	TRH >C34-C40 (mg/L)	TRH total >C10-C40 (mg/L)
19/01/2023	<0.05	<0.1	<0.1	<0.1
26/01/2023	<0.05	<0.1	<0.1	<0.1
9/02/2023	<0.05	<0.1	<0.1	<0.1
2/03/2023	<0.05	<0.1	<0.1	<0.1
29/03/2023	<0.05	<0.1	<0.1	<0.1
13/04/2023	<0.05	<0.1	<0.1	<0.1
20/04/2023	<0.05	<0.1	<0.1	<0.1
2/05/2023	<0.05	<0.1	<0.1	<0.1
11/05/2023	<0.05	<0.1	<0.1	<0.1
25/05/2023	<0.05	<0.1	<0.1	<0.1
1/06/2023	<0.05	<0.1	<0.1	<0.1
9/06/2023	<0.05	<0.1	<0.1	<0.1
14/06/2023	<0.05	<0.1	<0.1	<0.1
21/06/2023	<0.05	<0.1	<0.1	<0.1
29/06/2023	<0.05	<0.1	<0.1	<0.1
12/07/2023	<0.05	<0.1	<0.1	<0.1
26/07/2023	<0.05	<0.1	<0.1	<0.1
3/08/2023	<0.05	<0.1	<0.1	<0.1
9/08/2023	<0.05	<0.1	<0.1	<0.1
21/08/2023	<0.05	<0.1	<0.1	<0.1
24/08/2023	<0.05	<0.1	<0.1	<0.1
31/08/2023	<0.05	<0.1	<0.1	<0.1
8/09/2023	<0.05	<0.1	<0.1	<0.1
20/09/2023	<0.05	<0.1	<0.1	<0.1
17/10/2023	<0.05	<0.1	<0.1	<0.1
25/10/2023	<0.05	<0.1	<0.1	<0.1
3/11/2023	<0.05	<0.1	<0.1	<0.1
29/11/2023	<0.05	<0.1	<0.1	<0.1
14/12/2023	<0.05	<0.1	<0.1	<0.1
20/12/2023	<0.05	<0.1	<0.1	<0.1
4/01/2024	<0.05	<0.1	<0.1	<0.1
4/01/2024	<0.05	<0.1	<0.1	<0.1

Total recoverable hydrocarbons (limit = 10mg/L)				
Sample date	TRH >C10-C16 (mg/L)	TRH >C16-C34 (mg/L)	TRH >C34-C40 (mg/L)	TRH total >C10-C40 (mg/L)
11/01/2024	<0.05	<0.1	<0.1	<0.1
17/01/2024	<0.05	<0.1	<0.1	<0.1
19/01/2024	<0.05	<0.1	<0.1	<0.1
19/01/2024	<0.05	<0.1	<0.1	<0.1
15/02/2024	<0.05	<0.1	<0.1	<0.1
22/02/2024	<0.05	<0.1	<0.1	<0.1
29/02/2024	<0.05	<0.1	<0.1	<0.1
15/03/2024	<0.05	<0.1	<0.1	<0.1
27/03/2024	<0.05	<0.1	<0.1	<0.1
4/04/2024	<0.05	<0.1	<0.1	<0.1
1/05/2024	<0.05	<0.1	<0.1	<0.1
14/05/2024	<0.05	<0.1	<0.1	<0.1
29/05/2024	<0.05	<0.1	<0.1	<0.1
13/06/2024	<0.05	<0.1	<0.1	<0.1
20/06/2024	<0.05	<0.1	<0.1	<0.1
27/06/2024	<0.05	<0.1	<0.1	<0.1
3/07/2024	<0.05	<0.1	<0.1	<0.1
10/07/2024	<0.05	<0.1	<0.1	<0.1
17/07/2024	<0.05	<0.1	<0.1	<0.1
24/07/2024	<0.05	<0.1	<0.1	<0.1
7/08/2024	<0.05	<0.1	<0.1	<0.1
21/08/2024	<0.05	<0.1	<0.1	<0.1
28/08/2024	<0.05	<0.1	<0.1	<0.1
4/09/2024	<0.05	<0.1	<0.1	<0.1
11/09/2024	<0.05	<0.1	<0.1	<0.1
20/09/2024	<0.05	<0.1	<0.1	<0.1
27/09/2024	<0.05	<0.1	<0.1	<0.1
3/10/2024	<0.05	<0.1	<0.1	<0.1
15/10/2024	<0.05	<0.1	<0.1	<0.1
30/10/2024	0.170	2.5	0.220	2.9
21/11/2024	<0.05	<0.1	<0.1	<0.1
3/12/2024	<0.05	<0.1	<0.1	<0.1

Table 9: total recoverable hydrocarbon sample results

Note: results ins are below the limit of quantification. TRH = total recoverable hydrocarbons, C = carbon

4.4 Groundwater

Groundwater Monitoring Results

Two borehole sampling events were undertaken during February and October 2024.

Figure 17: groundwater monitoring sample locations

Industrial landfill monitoring

Bore N3 monitors the quality of the water within the clay-lined industrial landfill, and has consistently shown soluble fluoride concentrations between 50mg/L and up to 80mg/L. This is significantly above background levels, so fluoride continues to be an excellent indicator of potential ground water movement from the landfill to the adjacent aquifer.

Bores P3, P4, P5, P6 and P42 monitor groundwater below and down gradient from the landfill. The table below displays the soluble fluoride concentrations in these boreholes as related to bore N3. The 2024 results continue to support the assessment that there is no evidence of ground water contamination from the landfill.

	Within landfill	Outside of landfill						
Sampling quarter	N3	N1	N2	P3	P4	P5	P6	P42
Q1 2013	53	0.2	0.05	0.2	0.2	0.3	0.9	-
Q3 2013	64	0.4	0.4	0.4	0.5	0.4	1.2	-
Q1 2014	70	0.05	0.05	0.1	0.1	0.05	0.8	0.1
Q3 2014	65.7	0.1	0.1	0.2	0.3	0.2	0.8	0.3
Q1 2015	62	0.1	0.1	0.3	0.2	0.2	-	0.2
Q3 2015	55	0.05	0.05	0.2	0.1	0.1	0.6	0.1
Q1 2016	56	0.2	0.1	0.2	0.2	0.1	0.6	0.2
Q3 2016	64	0.05	0.05	0.1	0.4	0.05	0.5	0.2
Q1 2017	62	0.1	0.1	0.1	0.1	0.1	0.5	25
Q3 2017	60	0.1	0.2	0.1	0.2	0.1	0.5	0.1
Q1 2018	52	0.1	0.1	0.1	0.1	0.1	0.3	0.1
Q4 2018	48	0.1	0.1	0.2	0.1	0.2	0.4	0.1
Q2 2019	48	0.1	0.1	0.2	-	0.1	0.4	0.1
Q3 2019	49	0.1	0.2	0.2	0.2	0.2	0.4	0.3
Q3 2020	58	0.1	0	0.1	0.1	0.1	0.3	0.1
Q2 2021	52	0.9	0.2	0.2	0.4	0.2	0.4	0.4
Q4 2021	58	0.4	0.2	0.6	0.4	0.2	0.4	0.4
Q1 2022	55	0.3	0.6	0.3	0.3	0.4	0.9	0.3
Q3 2022	64	0.3	0.3	0.3	0.3	0.3	0.4	0.3
Q1 2023	80	0.3	0.3	0.2	0.2	0.4	1.2	0.9
Q3 2023	74	0.8	0.6	0.4	0.4	0.7	0.7	0.4
Q1 2024	59	0.6	0.3	0.4	-	0.4	0.4	0.3
Q3 2024	52	0.5	0.1	0.2	0.3	0.1	0.3	0.2

Table 10: groundwater sampling results in landfill area

Red mud dam monitoring

Bores P24 and P50 monitor the water within the red mud dam and a series of bores monitor potential contamination below and down gradient from the dam (P61, P58 and P48). Soluble fluoride concentrations are used to monitor any movement of water between the red mud dam impoundment and the adjacent aquifer.

P24 and P50 show variable levels of elevated fluoride consistent with the nature of the red mud material contained within the historic tailings facility. The trend of soluble fluoride outside the tailings facility shows no evidence of contamination moving from the red mud dam to the adjacent aquifer.

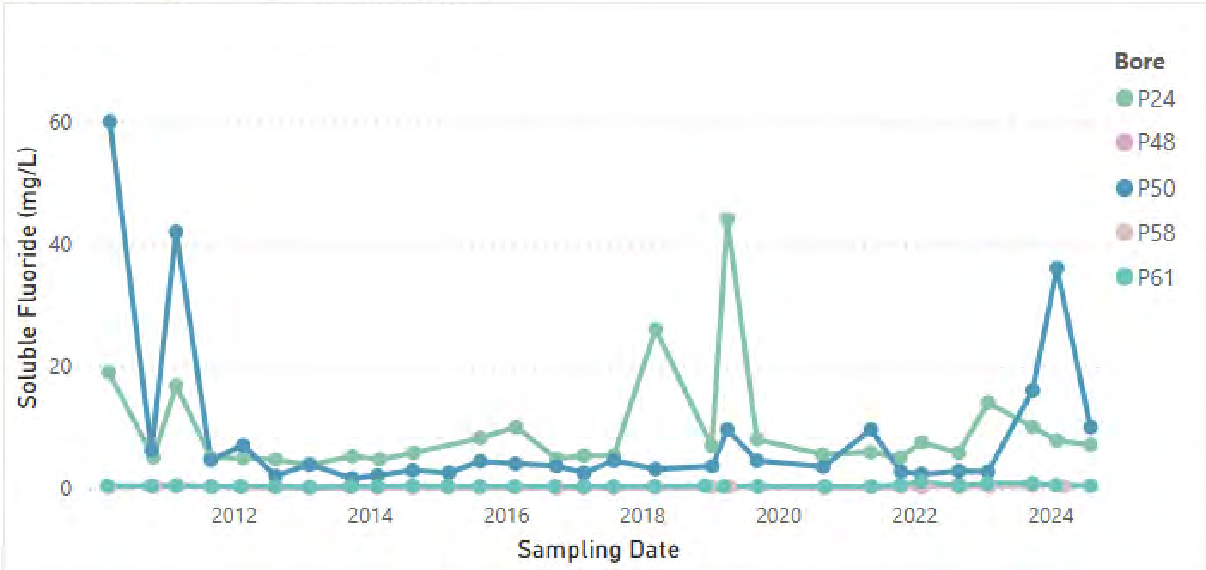

Figure 18: graph of fluoride results from bores in red mud dam area

Location	Bore number	Date	Soluble fluoride mg/L
Inside red mud dam	P24	06/02/2024	7.8
		05/08/2024	7.1
	P50	6/02/2024	36
		05/08/2024	10
Down gradient from dam	P48	6/02/2024	Dry
		05/08/2024	Dry
	P58	14/03/2024	0.30
		05/08/2024	No data
	P61	01/02/2024	0.5
		05/08/2024	0.4

Table 11: groundwater sampling results in red mud dam area

SCL encapsulations and decant pond monitoring

A series of bores monitor for potential contamination from the SCL 3 and 4 encapsulations and decant pond. The total cyanide concentrations within the water sampled from these bores with most being below the limit of quantification in recent years.

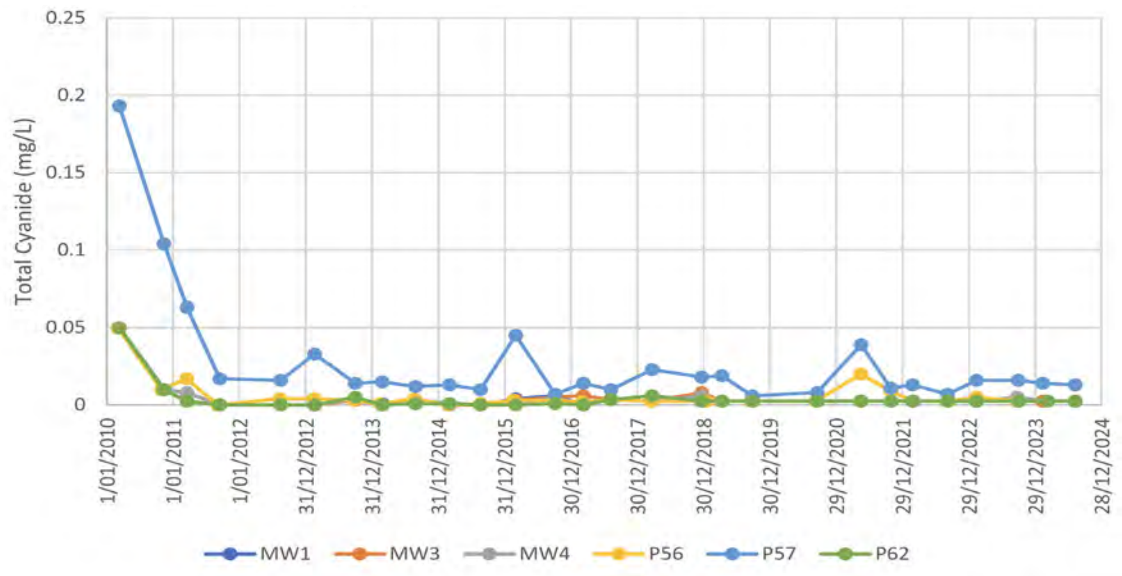

Figure 19: graph of cyanide results from bores in SCL encapsulations and decant area

Bore number	Date	Total cyanide mg/L
MW1	6/03/2024	*0.0025*
	5/08/2024	*0.0025*
MW3	8/02/2024	*0.0025*
	5/08/2024	*0.0025*
MW4	6/03/2024	*0.0025*
	5/08/2024	*0.0025*
P56	6/03/2024	*0.0025*
	5/08/2024	*0.0025*
P57	8/02/2024	0.014
	5/08/2024	0.013
P62	6/03/2024	*0.0025*
	5/08/2024	*0.0025*

Table 12: groundwater sampling results in SCL encapsulations and decant pond area

Note: results in italics are below the limit of quantification

Wetlands area monitoring

The area adjacent to the wetlands, which was the location of the SCL stockpile before it was encapsulated in the mid 1990s, contains a number of bores. The data collected in 2024 shows:

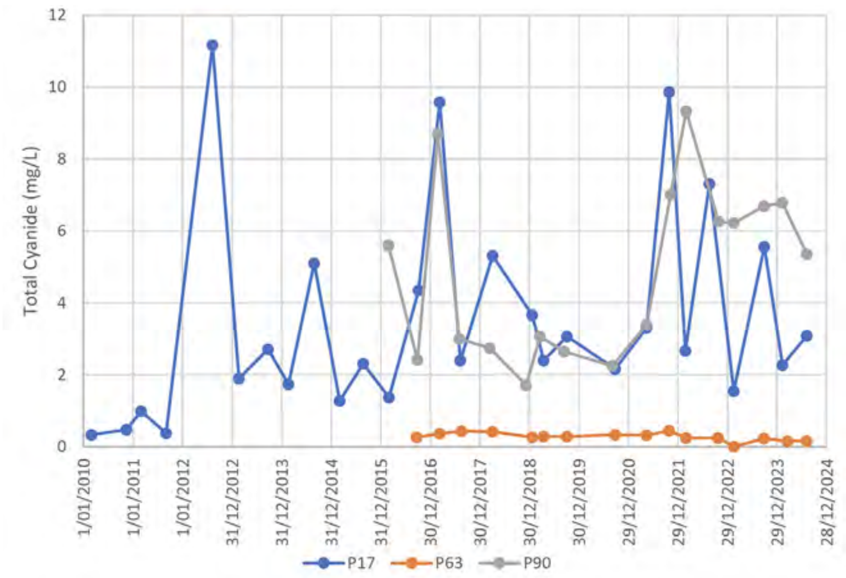

Figure 20: total cyanide in bores near wetlands

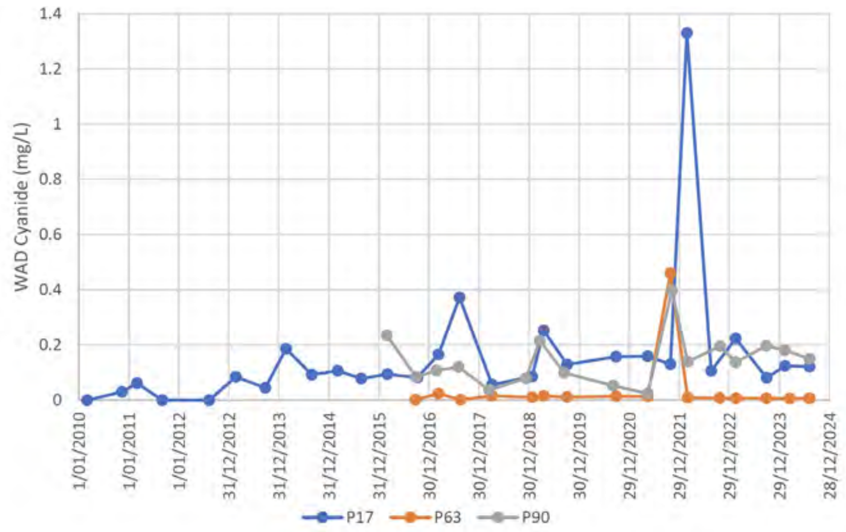

Figure 21: weak acid dissociable cyanide in bores near wetlands

Bore number	Date	Total cyanide mg/L	Cyanide WAD mg/L
P17	8/02/2024	2.27	0.121
	5/08/2024	3.09	0.084
P63	14/03/2024	0.155	0.0006
	5/08/2024	0.165	0.0007
P90	6/02/2024	6.78	0.181
	5/08/2024	5.36	0.149

Table 13: groundwater sampling results in wetlands area

- P17, which is located closer to the previous SCL stockpile, continues to show variable levels of both total and WAD cyanide concentrations with a continued decreasing trend in 2024
- P90, which was installed in late 2015, contained comparable results to P17. During 2024, P90 trends remained consistent with previous years performance
- P63 was reinstated in 2016 from which point it has contained total cyanide levels significantly lesser than in 2011. In 2024, monitoring has indicated that it is remaining stable.

Main processing plant monitoring

P69, H01 and H02 are adjacent to the green carbon plant and were located to monitor historical hydrocarbon contamination from fuel storage areas. Results for 2024 on H01 and H02 remain consistent with previous years performance. P69 had one elevated value in the Q1 run for 2024, however values returned to below the limit of quantification in the second sampling campaign in Q3 2024.

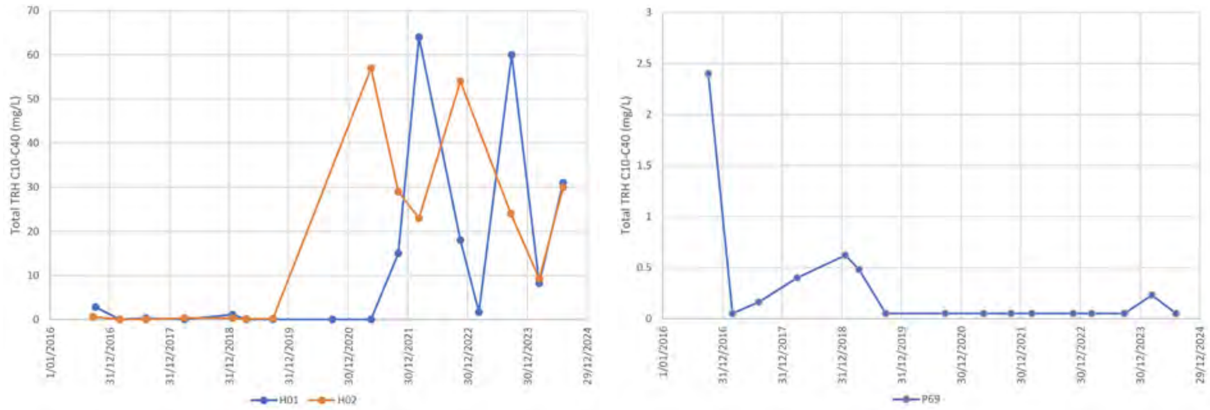

Figure 22: TRH results from bores near green carbon plant

Bore number	Date	Total TRH µg/L
H01	12/03/2024	8.2
	5/08/2024	31
H02	12/03/2024	9.2
	5/08/2024	30
P69	12/03/2024	0.23
	5/08/2024	0.05

Table 14: groundwater sampling results in green carbon plant area

5.0 Byproducts and waste management

5.1 Waste to landfill

Bell Bay Aluminium continues to manage its waste arisings in a manner that avoids, as much as practicably possible, disposal of waste to landfill. The strategy aims to reduce generation and take advantage of reuse, recycling and energy recovery opportunities.

A total of **431.5t** of waste material was sent to landfill in 2024. Of this value, **28.9t** was due to the disposal of dry scrubber bags following bag changes and **240.3t** of waste material was from the decant pond capacity improvement initiative detailed in section 3. The remainder of the tonnage comprised general waste.

5.2 Recycled waste

1,232.98t of non-hazardous waste and **5,271.30t** of hazardous waste was recycled in 2024.

The breakdown of each non-hazardous waste type is provided in table 15.

Non-hazardous waste	Tonnes recycled
Scrap metal	1,208.28
Plastics	5.71
Paper and cardboard	18.64
Co-mingled recycling	0.35

Table 15: non-hazardous recycled waste tonnages

The breakdown of each hazardous waste type is provided in table 16:

Hazardous waste	Tonnes recycled
Used hydrocarbons	11
Rubber tyres	5.3
SCL	5,255

Table 16: hazardous recycled waste tonnages

5.3 Byproducts

Bell Bay Aluminium continues its efforts to minimise generation of byproducts and continues to work with local and international partners on eliminating legacy stockpiles from site. Below is a summary on the status of the stockpiles in 2024.

Byproduct	Quantity at start of 2024 (t)	Quantity at end of 2024 (t)	Quantity produced in 2024 (t)	Quantity disposed offsite in 2024 (t)
SCL	33,000	30,826	3,080	5,254
Burn-off butts	7,500	7,750	250	0
Butt bath	2,400t	2,700	300	0
Bricks	36,000	35,900	0t	100
Alumina	2,854* (720m3)	2,793.65t est.	39.65* (10m3)	100

5.3.1 Spent Cell Lining

Bell Bay Aluminium continues the long-standing solution to manage the ongoing SCL generation by crushing it on-site and transporting it to the Cement Australia Kiln at Railton to be used as an alternative fuel. There was an elevated generation of SCL due to an extended unplanned power outage in Potline 4, which had resulted in 40 cells being cut out of circuit as detailed in section 1.4. Despite this increased generation, the site was still able to reduce the on-site stockpile by **2174t** in 2024 by disposing of **5254t** of SCL via this reuse option.

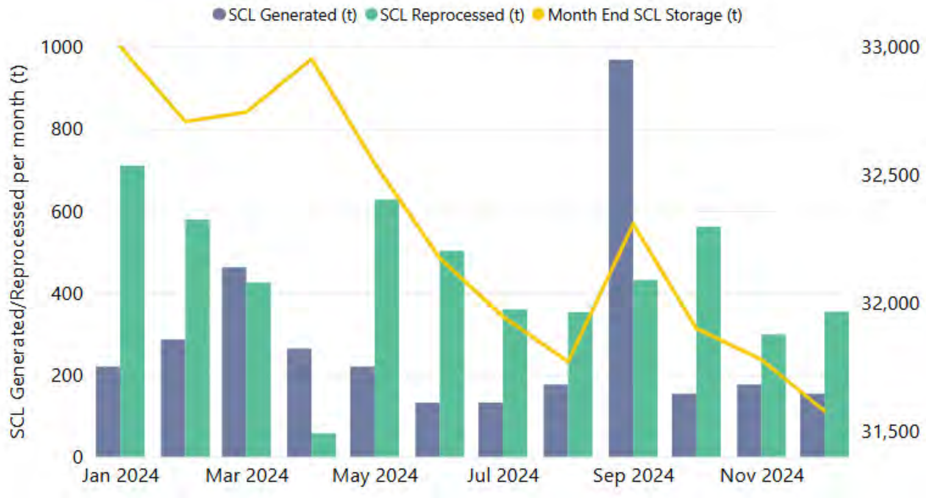

Figure 23: SCL generated and reprocessed graphs

During 2024, there were several improvement initiatives that assisted in ensuring material delivery to Cement Australia while managing site legacy stockpiles, which are:

1. Utilising material from old SCL shed:

Material is stored in SCL shed #1, shed #2 and shed #3. Shed #1 and #2 contain stockpiles of SCL with #2 being the current material shed. Shed #3 contains the processing equipment and is the working shed. To create space to process other byproducts generated on-site, an improvement initiative started to utilise material stored in SCL shed #1.

SCL from shed #1 was tested and found to be identical to the product in shed #2 and therefore safe to re-add to the process. A total of 1,500t was removed from shed #1 with some material being sent to Cement Australia and the rest to be processed in shed #3.

2. Throughput improvements due to change in maintenance procedures

A maintenance tactic improvement on the impactor (a critical asset in the SCL process) has improved the throughput capability of the SCL plant from 5500t per year to 7000t per year.

This change involved a proactive rotation of the blow bar within the impactor every six weeks. Before this change, the throughput capacity would be 80t per hour on a normal run and deteriorate to 80t per four hours before the blow bar rotation was initiated. With this change, the worst-case scenario is a deterioration of 80t per two hours.

5.3.2 Burn-off butts

There are three pathways being pursued currently for the removal of burn-off butts from site.

Preferred option

An international customer in Thailand expressed interest in a 100t trial using cleaned, uncrushed burn-off butts. If successful, this trial can result in the consumption of the legacy stockpile in its entirety. EPA approval for export from Devonport was secured in late 2024, by referencing prior ecotoxicity and due diligence work completed for a Cambodian customer completed in 2021. However, due to logistical challenges at Devonport, a 2025 review will explore dispatching from the Bell Bay port to both streamline and reduce risks in the delivery process.

Tasmania-based options

Norske Skog

Collaboration with Norske Skog continued in 2024, with the company commencing work to apply for EPA approval to trial 60–100t of burn-off butts for use in their process.

Approvals and trial scheduling are expected to extend into 2025.

Grange Resources

Grange Resources secured EPA approval in 2024 for a burn-off butts trial.

Bell Bay Aluminium conducted an on-site crushing campaign using foggers to control dust, producing 100t of trial material. However, the batch was found to be contaminated with crushed bricks upon delivery and was returned to Bell Bay Alumiunium prior to commencement of the trial.

In 2025, efforts will focus on identifying methods on elimination of the contamination source and ensuring future deliveries are properly sized and segregated.

5.3.3 Butt bath

Butt bath material is generated in two ways on site:

1. It is collected in skips during the process of "pac-manning" when removing burn-off butts from a cell.
2. It occurs when the burn-off butts collected from the cell are tumbled to clean them of excess bath material.

The stockpile generated from these two sources is currently stored outside. Due to the exposure to the elements, this material cannot be easily re-added to the process without sufficient controls in place on ensuring the material is dry to eliminate the risk of a molten material explosion.

Therefore, alternatives were explored in removing this stockpile from site. Progress with Regain NSW has been strong in 2024, with approvals now in place to begin trials in 2025.

There has also been an on-site improvement focus on the removal of storing the stockpile outside. Approximately 1,000t of the material has been moved into lined, seaworthy containers. This mitigates environmental risks by better containment of a stockpile that contains leachable fluoride and ensures the material is ready for dispatch once notice is received from Regain NSW.

5.3.4 Bricks and alumina

As reported in 2023, trials utilising bricks and alumina were delayed due to additional monitoring requirements being requested for Railton to receive permits for the trial. The plan was to complete this work during Q2 and Q3 2024. These trials were successfully completed in Q3 2024, with 50t of alumina and 100t of bricks being sent to Railton. The requested monitoring was also completed during the trial.

The focus for 2025 will be to establish a routine consumption plan. The quantity of bricks and alumina that will be consumed is subject to the quality of the other raw materials to the Railton process. The priority will be given to processing the alumina first, as its removal will reduce community impact associated with dust generation. Additionally, the bricks are well-contained and managed within the on-site landfill, making it a lower priority for immediate processing.

5.3.5 Red mud

In 2024, discussions started with the mine sites on the west coast of Tasmania to explore opportunities to re-use Bauxsol, which can be derived from the on-site red mud facility. There are three avenues currently being assessed for feasibility and eventual trials. These are:

- using Bauxsol for rehabilitating acid mine drainage (AMD) at the mine sites
- treatment of tailings in tailings storage facilities
- hardness testing and trials using this material in paste plants to backfill mine shafts.

For Bell Bay Aluminium to be ready for when these trials start, a Type A EPN was granted with the support of the EPA and site regulator. This enabled 500t of material to be excavated in Q3 2024 and be dried for the remainder of the year. The next steps, once adequately dried, will be to assess how to convert the material to Bauxsol on-site for use in the trials.

6.0 Fluoride emissions

Fluoride emission sources from the smelter are defined in table 17 along with their monitoring requirements:

Sample point	Parameter	Frequency	EPN limit
Potlines dry scrubber stack	Total fluoride Gaseous fluoride	Quarterly	Total fluoride as HF - 20 mg/m^3
Carbon bake scrubber stack	Gaseous fluoride	Annually	Total fluoride as HF – 50 mg/m^3
Rodding room induction furnace	Gaseous fluoride	Annually	HF - 50 mg/m^3
Dross processing stack	Gaseous fluoride Particulate fluoride	Within 90 days post commissioning and annually thereafter	Total fluoride as HF - 20 mg/m^3
Reduction line roof vents	Total particulate Particulate fluoride Gaseous fluoride	Monthly	No applicable limit

Table 17: fluoride emission sources and monitoring requirements

The locations of these stacks are identified in figure 24 with their EPN point numbers

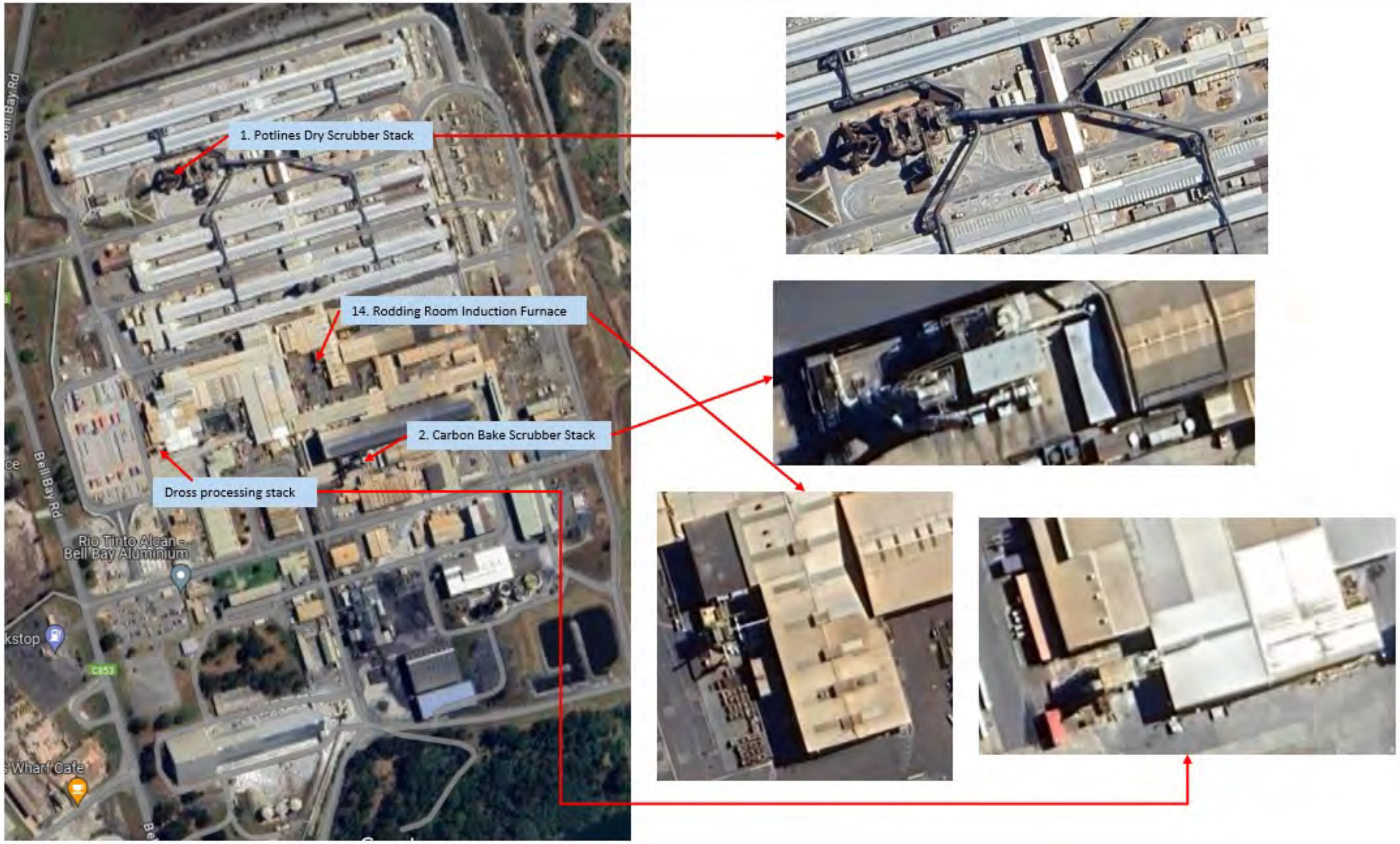

Figure 24: map of point-source emissions of fluoride

Sample point	Parameter	EPN limit	Measured value
EPN - carbon bake scrubber stack	Gaseous fluoride	Gaseous fluoride as HF – 50mg/m³	0.87mg/m³
EPN - rodding room induction furnace	Gaseous fluoride	Gaseous fluoride as HF – 50mg/m³	23mg/m³
Dross processing stack	Gaseous fluoride	Total fluoride as HF – 20 mg/m³	23mg/m³
	Particulate fluoride	N/A	8.7mg/m³

Table 18: summary of annual stack testing for fluoride

The stack test for total fluoride at the dross processing stack was reported following the compilation of the Annual Environment Report 2023, due to an error in the limit recorded on the external report. The limit was stated to be 50mg/m³ as opposed to the 20mg/m³ stated on site's EPN. Details of the investigation are covered in section 2.4

6.1 Potlines fluoride emissions

6.1.1 Total fluoride efficiency

The total fluoride emission efficiency in 2024 was **0.95kgF/tAl**, which is lower than the EPN annual limit of **1.2kgF/tAl**. This was an improvement from the reported 2023 value of **1.02kgF/tAl.** Sitewide efforts were undertaken to improve this value and these were:

- improvements in cell sealing conditions due to arrival of new hoods and re-enforced operational standards by operation leaders and team members. This contributed to a step change in year-to-date fluoride efficiencies being from **0.50kgF/tAl** for fugitive gas and **0.25kgF/tAl** for fugitive particulate to **0.43kgF/tAl** for fugitive gas and **0.22kgF/tAl** for fugitive particulate
- improvements in carbon bake scrubber stack testing result, which contributed to a step change in fluoride efficiencies from **0.04kgF/tAl** to **0.01kgF/tAl**.

Figure 25 demonstrates compliance with respect to the monthly compliance limit of **1.4kgF/tAl**.

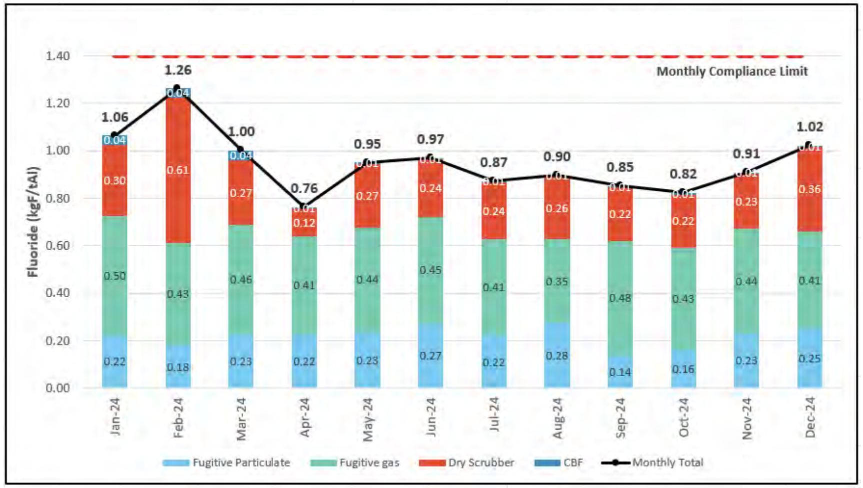

Figure 25: site fluoride emissions breakdown in comparison to monthly compliance limit

There has been a continuous step change improvement in total fluoride from 2022 to 2024 from **1.1kgF/tAl** to **0.95kgF/tAl** as shown in figure 26.

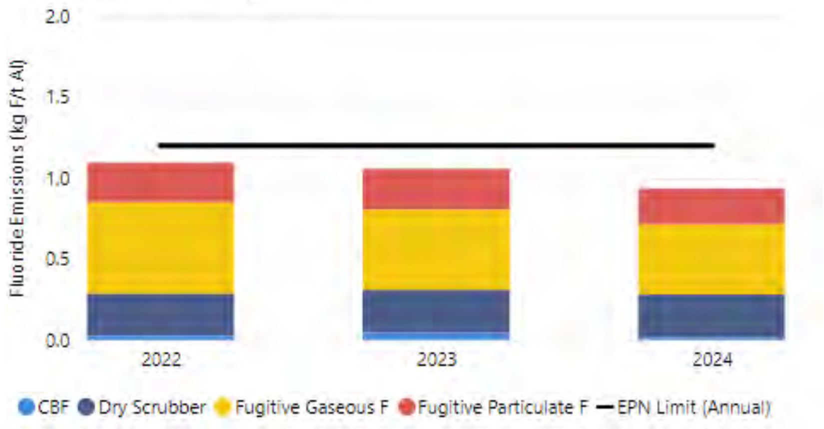

Figure 26: fluoride efficiency 2022-24

6.1.2 Potlines dry scrubber stack

The dry scrubber contribution to site fluoride efficiency is summarised in table 19.

Month	kgF/tAl
January 2024	0.30
February 2024	0.61
March 2024	0.27
April 2024	0.12
May 2024	0.27
June 2024	0.24
July 2024	0.24
August 2024	0.26
September 2024	0.22
October 2024	0.22
November 2024	0.23
December 2024	0.21
Year to date	0.27

Table 19: fluoride efficiency values at dry scrubber

Elevated values observed in February was due to an elevated stack testing result. An investigation was conducted and it was determined that the stack test was not representative of the scrubber performance throughout February. The elevated stack testing result was due to a low tonnage rate of 38t per hour instead of the normal 42t per hour and high gas temperatures of 110°C. Both resulted in elevated HF values. The stack testing value was still used in the fluoride emissions calculation for the month.

This elevated value did not exceed the stack testing limits stipulated in the EPN.

All fluoride metrics obtained from stack testing have remained below the limit as summarised in table 20.

Quarter	Parameter	License limit (mg/m3)	Detected value (mg/m3)
Q1	Gaseous fluoride (as HF)	N/A	7.5
	Particulate fluoride (as HF)	N/A	0.069
	Total fluoride (as HF)	20	7.5
Q2	Gaseous fluoride (as HF)	N/A	1.3
	Particulate fluoride (as HF)	N/A	0.041
	Total fluoride (as HF)	20	1.4
Q3	Gaseous fluoride (as HF)	N/A	2.6
	Particulate fluoride (as HF)	N/A	0.068
	Total fluoride (as HF)	20	2.7
Q4	Gaseous fluoride (as HF)	N/A	4.4
	Particulate fluoride (as HF)	N/A	0.04
	Total fluoride (as HF)	20	4.4

Table 20: stack testing results for potline dry scrubber

6.1.3 Potlines fugitive fluoride

Fugitive particulate and gas figures are derived using both the values from the Boreals and the results from the monthly roof louvre testing.

The fugitive particulate and fugitive gas contribution to site fluoride efficiency is summarised in table 21.

Month	Fugitive gas (kgF/tAl)	Fugitive particulate (kgF/tAl)
January 2024	0.50	0.22
February 2024	0.43	0.18
March 2024	0.46	0.23
April 2024	0.41	0.22
May 2024	0.44	0.23
June 2024	0.45	0.27
July 2024	0.41	0.22
August 2024	0.35	0.28
September 2024	0.48	0.14
October 2024	0.43	0.16
November 2024	0.44	0.23
December 2024	0.41	0.25
Year to date	0.43	0.22

Table 21: fugitive emissions

For the potrooms roof louvre contribution to site total fugitive fluoride emissions, monitoring is carried out using eight personal sampling pumps suspended from every third roof beam in the West End of G-bay in Potline 3. Particulate sampling is carried out over a 72-hour period.

While there is no applicable limit on the roof louvre testing, the monthly performance is captured in table 22.

Month	Number of valid samples	Fluoride (mg/m^3)	Particulates (mg/Am^3)	Comments if number of samples were <6
January	6	0.268	1.06	
February	7	0.210	0.82	
March	6	0.262	0.98	
April	6	0.255	0.85	
May	6	0.273	0.98	
June	8	0.316	1.17	
July	Approval sought for no sampling being conducted in July due to implementing change in sampling procedure. Average from January to June used in calculation			
August	6	0.322	1.055	
September	7	0.154	0.567	
October	5	0.180	0.604	EPA informed of minimum sampling requirement not being met due to timer discrepancy
November	6	0.262	0.86	
December	6	0.293	1.08	

Table 22: roof louvre sampling compliance

For July, the sampling run was not completed after gaining approval from the EPA. The reason was due to implementing a change in sampling procedure to:

- improve the safety for the team member conducting the sampling run
- bring the procedure up to standard with current working at heights and energised work standards.

The average value from January to June was used for the monthly total fluoride reporting this month.

In October, there were only five authorised samples as opposed to the six that are required for a sampling run to be deemed as valid. Upon investigation it was found that, though one of the pumps had demonstrated an invalid run, it was a timer fault and not a pump error. The results were consistent with previous results at the same sampling position, however since that result could not be validated, it was not used in the average calculation for the month.

6.2 Ambient fluoride monitoring

Bell Bay Aluminium monitors ambient gaseous HF at six sites in the Tamar Valley. Two sites (Met Station and Golf Club) are within and four are outside the air quality compliance limit boundary. These are marked in the map below:

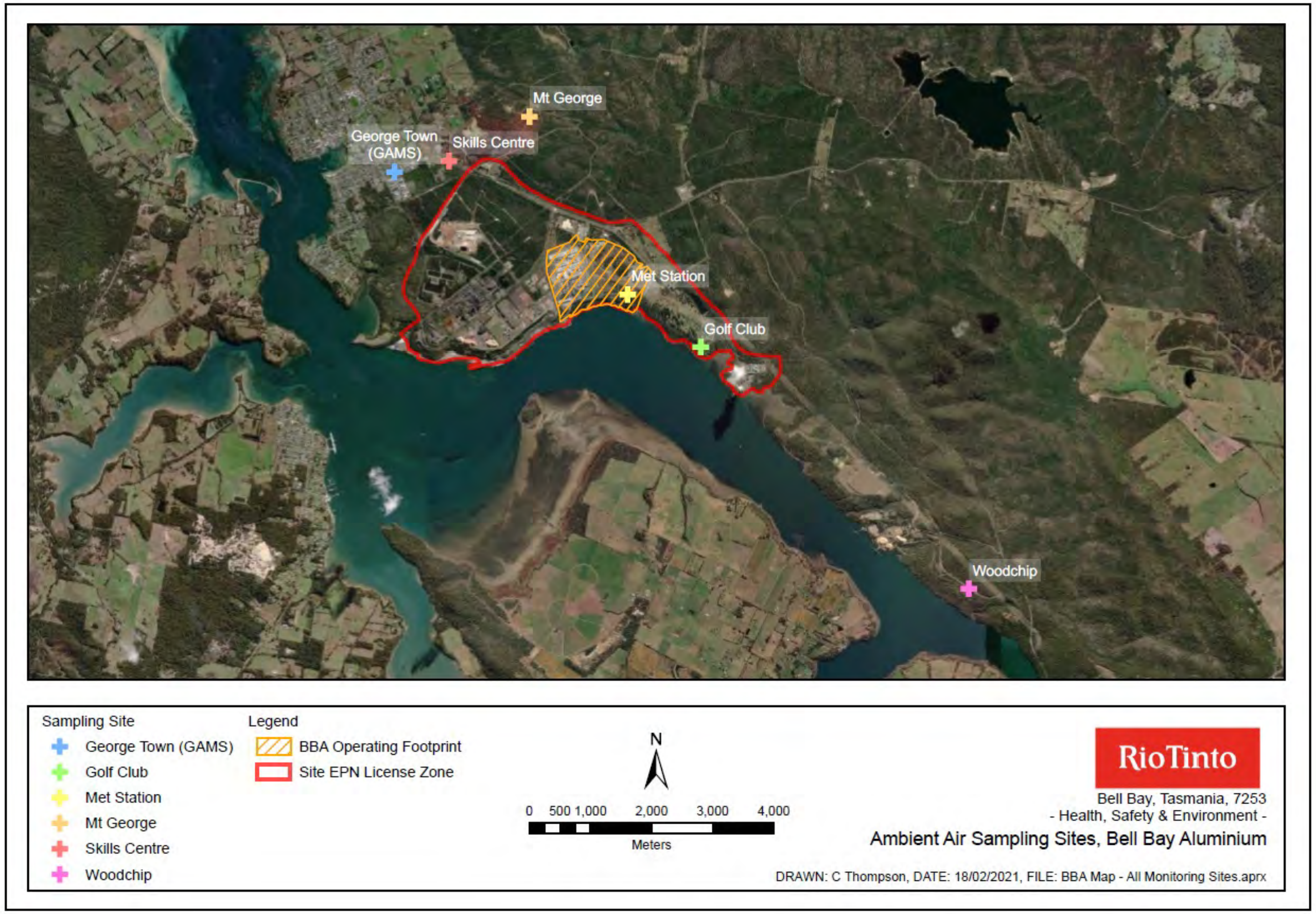

Figure 27: ambient air sampling sites

6.2.1 Compliance to weekly sampling frequency condition

Table 23 demonstrates compliance on minimum sampling frequency (weekly) at each ambient air site.

Boundary	Sampling site	Sampling frequency compliance
	Met Station – 1A	85%
Within compliance limit boundary	Golf Club – 3A	92%
Beyond compliance limit boundary	GAMS – 10A	94%
	Skills Centre – 5A	87%
	Woodchip – 8A	83%
	Mount George – 9A	94%

Table 23: compliance to sampling frequency for ambient air

Common mechanisms of failure in acquiring weekly samples were due to power trips at the station, minimum sample volume not achieved due to faulty gas meters, faulty pumps or temperature variances.

6.2.2 Result overview within the air quality compliance limit boundary

The Met Station and Golf Club are both within the air quality compliance limit boundary. The Met Station – 1A sampling site displays the highest ambient concentration due to its proximity to the main HF sources.

It should be noted that the EPN limits apply to the locations outside this boundary. The seven-day, 30-day and 90-day averages of monitoring stations within the compliance boundary are summarised in figures 28, 29 and 30 below:

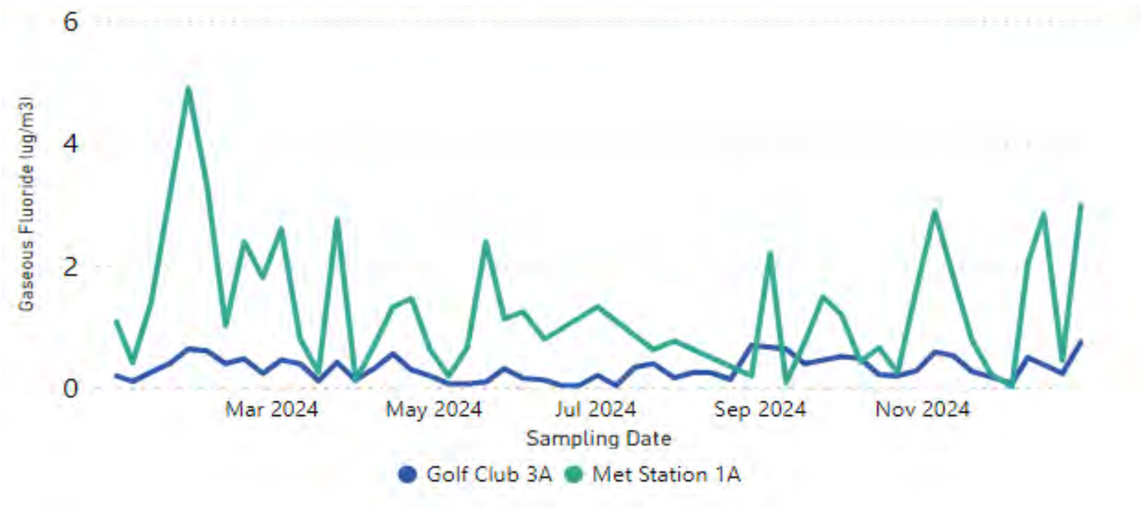

Figure 28: seven-day average ambient air results for sites with Bell Bay Aluminium's compliance limit boundary

Figure 29: 30-day average ambient air results for sites with Bell Bay Aluminium's compliance limit boundary

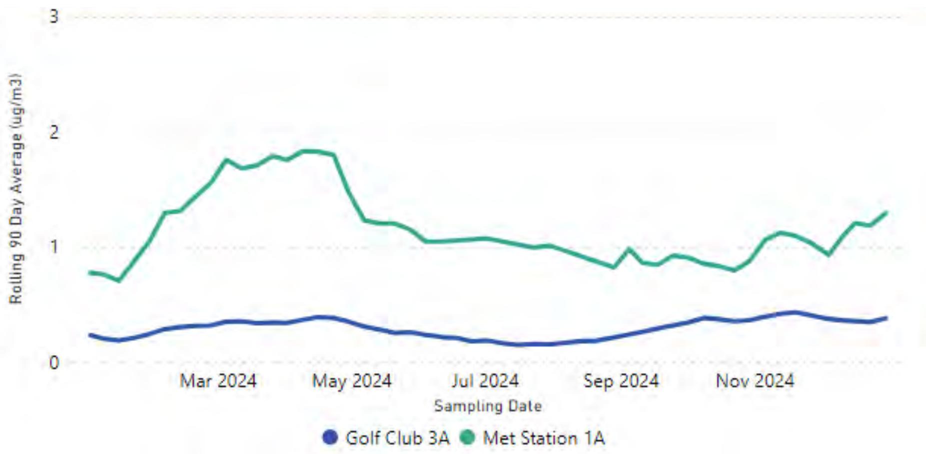

Figure 30: 90-day average ambient air results for sites with Bell Bay Aluminium's compliance limit boundary

6.2.3 Compliance to seven-day average air quality limit

Figure 28 demonstrates that for 2024 all four sites outside the air quality compliance limit boundary were below the limit of 1.7µg/m^3.

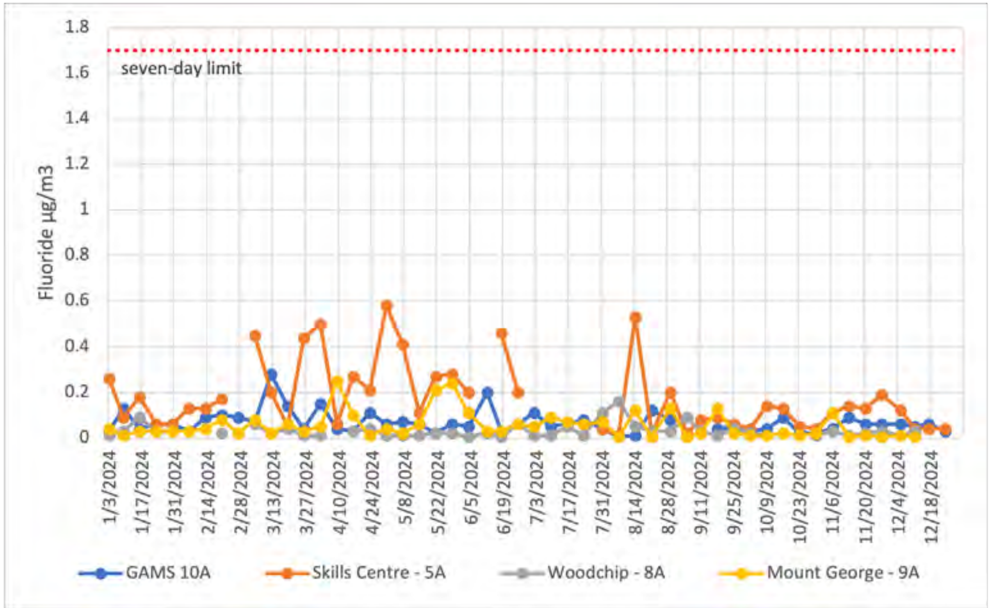

Figure 31: seven-day average ambient air results outside boundary

6.2.4 Compliance to 30-day average air quality limit

Figure 29 demonstrates that for 2024 all four sites outside the air quality compliance limit boundary were below the limit of 0.84μg/m³.

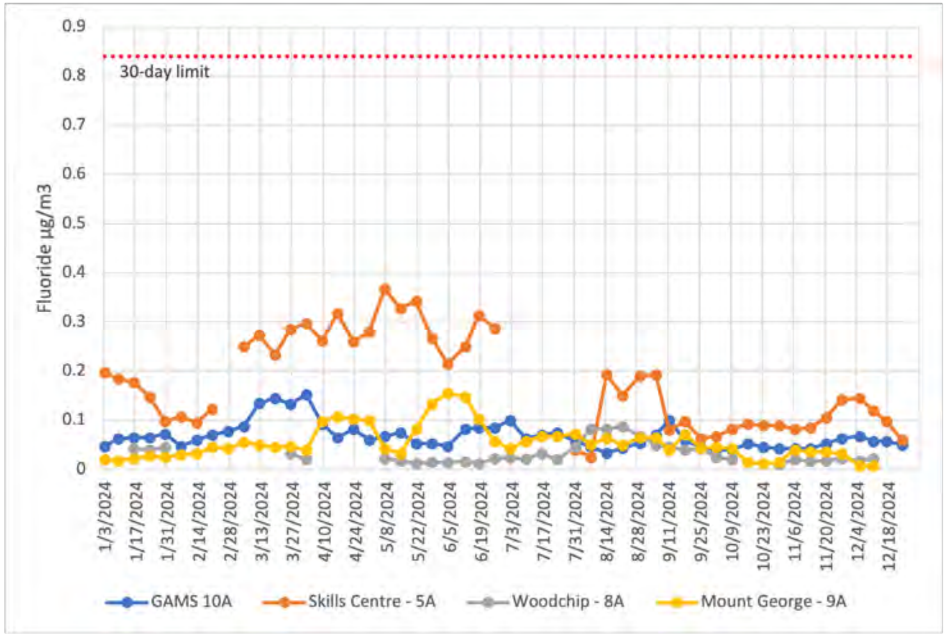

Figure 32: 30-day average ambient air results outside boundary

6.2.5 Compliance to 30-day average air quality limit

Figure 30 demonstrates that for 2024 all four sites outside the air quality compliance limit boundary were below the limit of 0.5μg/m³.

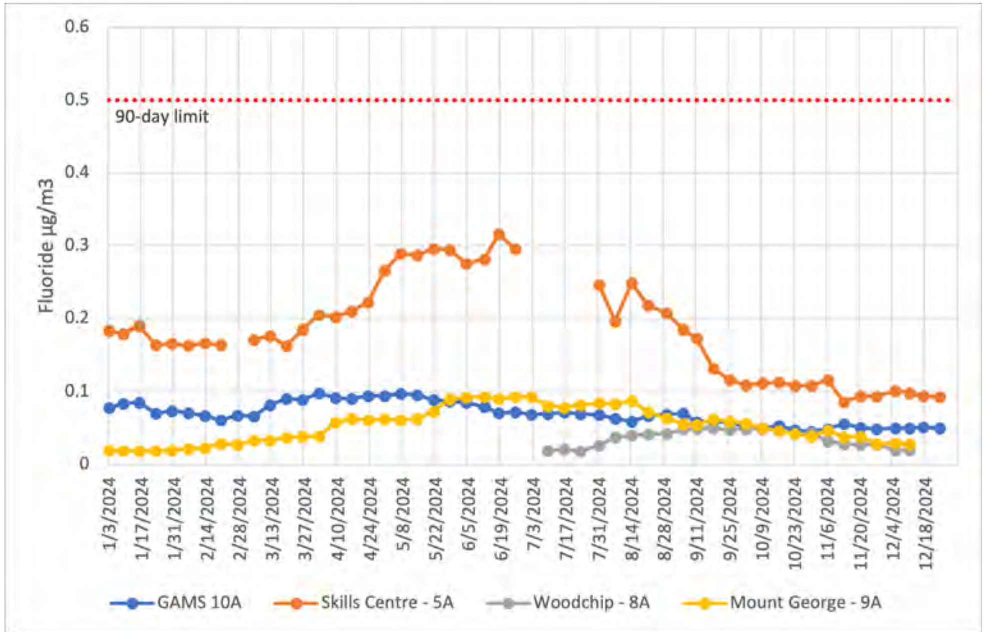

Figure 33: 90-day average ambient air results outside boundary

6.3 Vegetation fluoride monitoring

Monitoring of the fluoride concentration in grazed pastures at sites both within and beyond the air quality compliance limit boundary is conducted in accordance with EPN 7047/2 Attachment 1 as per figure 34.

Fluoride in forage dry unwashed target values:

- 40mg/kg average for any 12 consecutive months
- 60mg/kg average per month for more than two consecutive months
- 80mg/kg average more than once in any two consecutive months

Figure 34: target values for vegetation analysis

The map in figure 35 summarises the highlights the sampling locations.

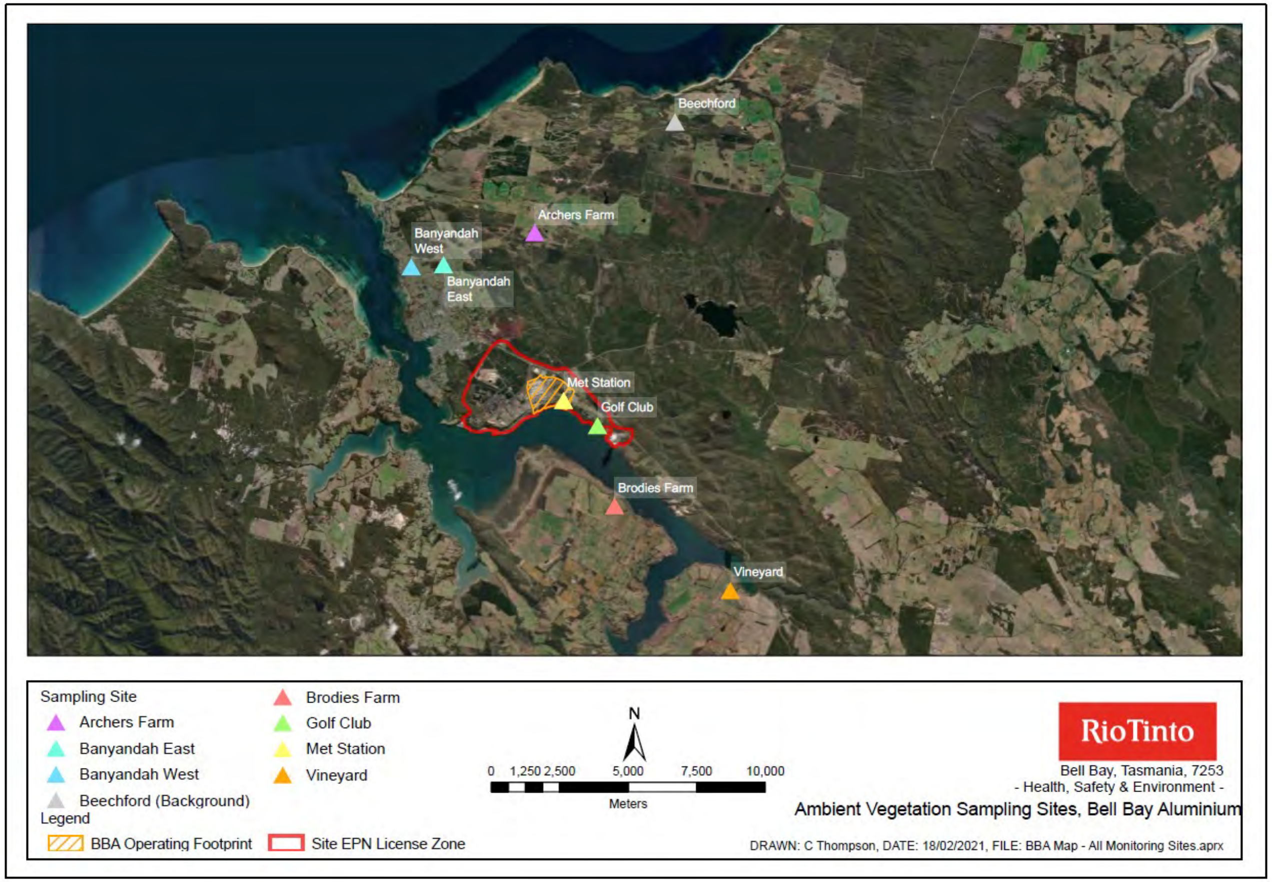

Figure 35: vegetation monitoring sites

The intent of the grass-sampling program is to provide information on the potential impact of the smelter's HF emissions on the surrounding environment, particularly grazing properties. Results from the vegetation monitoring program for the reporting period are presented in table 24.

Sample month	Vegetation fluoride concentration (mg F/kg)							
	Within Bell Bay Industrial Zone		Outside Bell Bay Industrial Zone					
	Met Station - 1A	Golf Course - 3A	Brodies Farm - FX6	Vineyard - Y3	Banyandah West - Z2	Banyandah East - Z3	Archers - G2	Beechford - B1
Jan	33	24	10	17	14	11	7	6
Feb	329	131	30	26	31	10	23	11
Mar	394	68	25	26	27	8	9	13
Apr	99	44	8	15	13	18	13	10
May	139	59	17	20	68	19	14	19
Jun	216	59	16	28	84	35	11	12
Jul	395	54	8	9	23	142	9	12
Aug	118	61	23	15	142	35	15	18
Sep	249	44	16	9	35	9	55	38
Oct	371	120	22	5	9	17	49	12
Nov	202	34	12	16	15	29	7	8
Dec	116	38	15	16	12	65	23	7

Table 24: fluoride in vegetation analysis results

Banyandah West and Benyandah East had observed elevated readings in June and July, which when compared to site total fluoride performance and surrounding sampling sites in the vicinity, could be deemed as not due to smelter performance. These elevated results, however, did not result in any targets being exceeded throughout the course of the year.

The 2024 annual performance of vegetation, compared to the 2023 results, has shown a decrease in fluoride levels at most sampling sites with the exceptions being Archers - G2 and Beechford - B1.

Sample month	Vegetation fluoride concentration (mg F/kg)							
	Within Bell Bay Industrial Zone		Outside Bell Bay Industrial Zone					
	Met Station - 1A	Golf Course - 3A	Brodies Farm - FX6	Vineyard - Y3	Banyandah West - Z2	Banyandah East - Z3	Archers - G2	Beechford - B1
2023	254.42	87.75	19.58	18.67	28.75	41.33	14.42	12.58
2024	226.92	67.17	15.5	16.5	27.42	29.09	20.18	14

Table 25: fluoride in vegetation 2023-24

6.3.1 Compliance to 80mg/kg average per month more than once in any two consecutive months condition

Figure 36 demonstrates that for 2024 all six sites outside the air quality compliance limit boundary were compliant to the 80mg/kg average per month more than once in any two consecutive months condition.

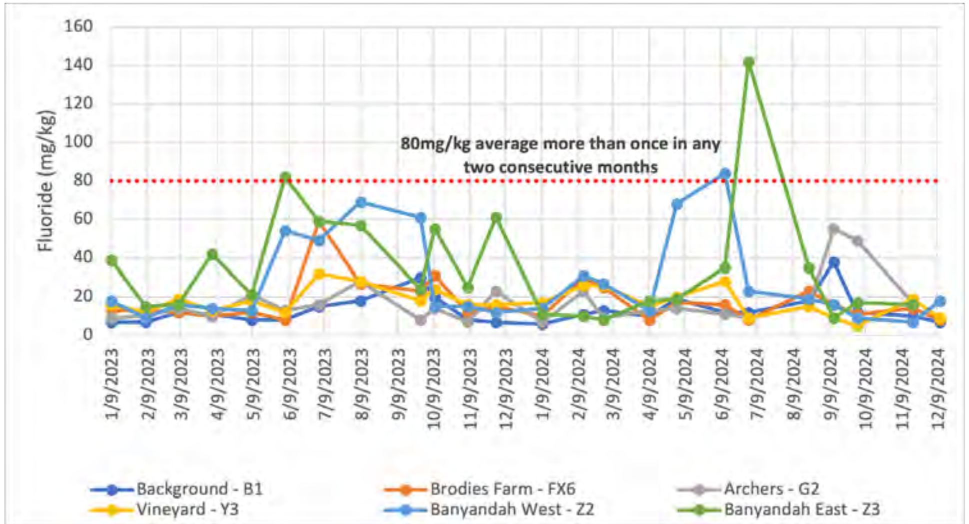

Figure 36: fluoride in vegetation results in comparison to EPN target

6.3.2 Compliance to 60mg/kg average per month for more than two consecutive months condition

Figure 37 demonstrates that for 2024 all six sites outside the air quality compliance limit boundary were compliant to the 60mg/kg average per month for more than two consecutive months condition.

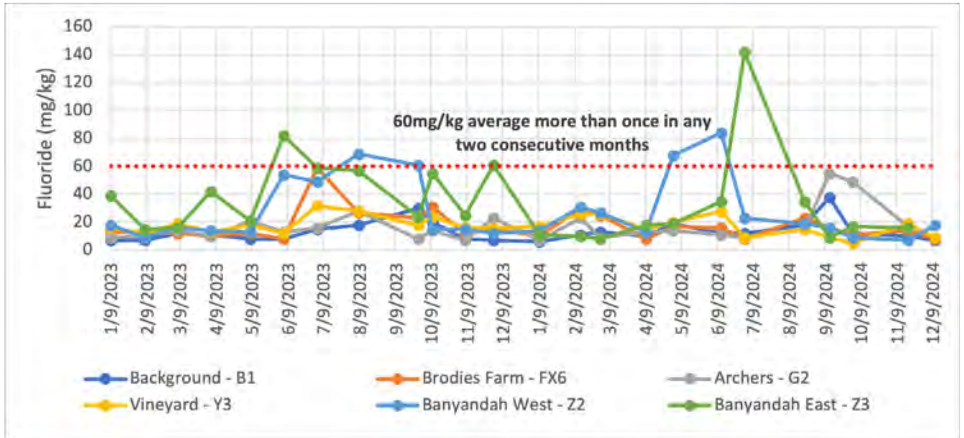

Figure 37: fluoride in vegetation results in comparison to EPN target

6.3.3 Compliance to 40mg/kg average for any 12 consecutive months condition

Banyadah East - Z3 was above target for this condition in January 2024. This was due to the impact of elevated readings in the Banyadah East sampling area in 2023, which was shown to be not smelter related due to prevailing winds and trends of other sampling areas in the vicinity. Following on from this there was a steady decrease, until a sole elevated value in July 2024.

All other sites remained compliant as can be seen in figure 38:

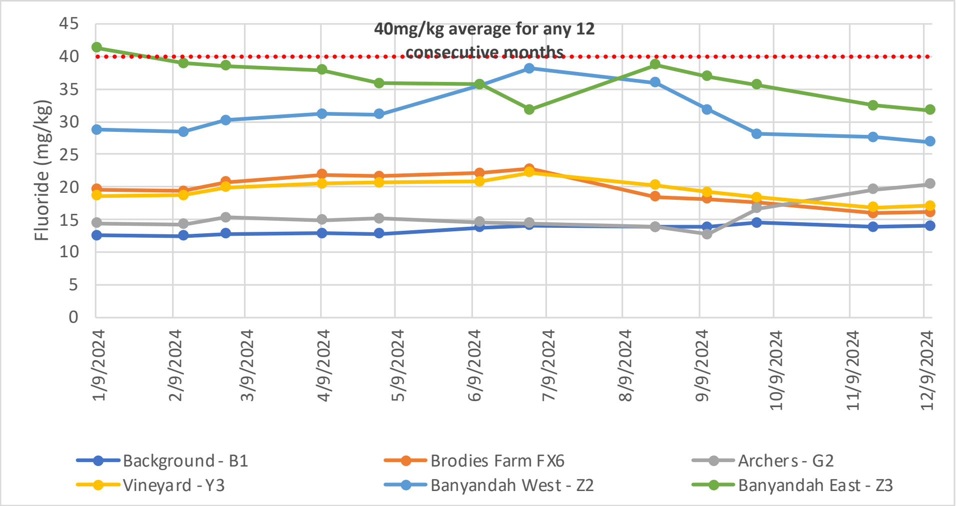

Figure 38: fluoride in vegetation results in comparison to EPN target

7.0 Greenhouse gas emissions and energy use

Bell Bay Aluminium's greenhouse gas emissions are calculated using methodologies approved by the Intergovernmental Panel on Climate Change, greenhouse gas protocol and the Australian National Greenhouse energy determination. The methodologies calculate the tonnes of carbon dioxide equivalents (CO_2-eq) produced by the smelter from:

- fuel consumption (diesel, natural gas and petrol)
- carbon anode consumption
- perfluorocarbon emissions
- electrical energy usage.

Bell Bay Aluminium has two measures of greenhouse gas emissions: on-site and total. On-site emissions include sources such as fuel use, rate of carbon consumption and perfluorocarbon gases generation. Total emissions include all on-site sources plus electrical energy use.

Total efficiency was **3.97tCO_2-eq/tAl** in 2024, which was better than the previously reported **4.23tCO_2-eq/tAl** in 2023. The site achieved an on-site greenhouse gas efficiency of **1.88tCO_2-eq/tAl** in 2024, which was better than the efficiency of **1.98tCO_2-eq/tAl** reported in 2023. The graph in figure 39 summarises this trend.

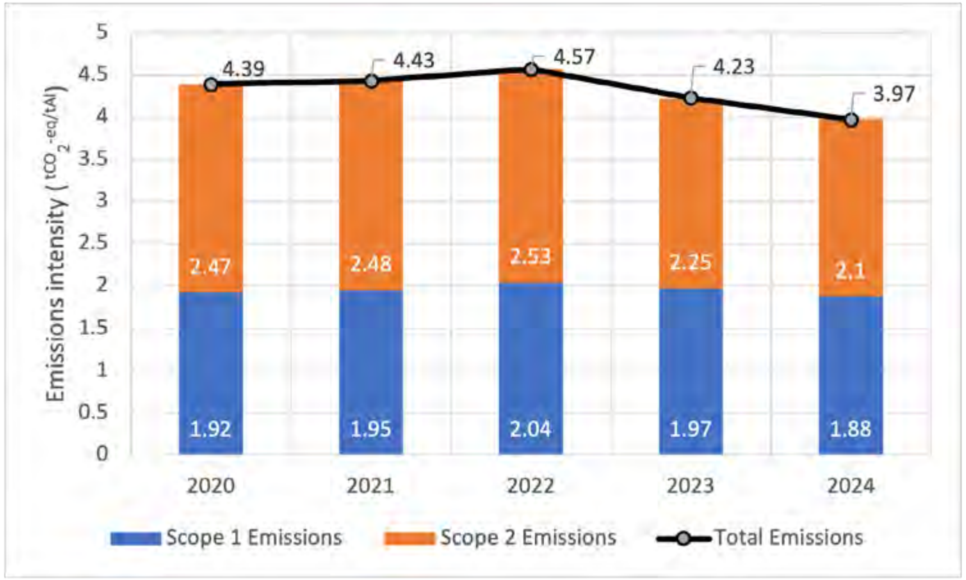

Figure 39: greenhouse gas emissions intensity 2020–24

7.1 Scope 1 – on-site emissions

7.1.1 Carbon anode consumption

Bell Bay Aluminium forms green anodes that are baked in refractory lined pits to form baked anodes, which are used in the electrolysis process to make aluminium. Anodes comprise petroleum coke, liquid pitch and recycled anodes. Carbon dioxide emissions from anode baking occur due to combustion of pitch volatiles and impurities within the petroleum coke. Emissions also occur from the consumption of carbon anodes during the electrolysis process.

The emissions are calculated using National Greenhouse and Energy Reporting Measurement Determination Method 1. The emissions from carbon consumption contributed to **1.64tCO_2-eq/tAl**, representing 87% of on-site emissions.

7.1.2 Fuel consumption

Emissions from fuel consumption contributed to **0.14tCO_2-eq/tAl**, representing 4% of on-site emissions.

Diesel, petrol and liquefied petroleum gas (LPG) are used on-site for vehicle use. Bottled LPG is also used for maintenance activities. There is on-site storage for diesel and LPG, which is serviced by tankers. Petrol is sourced from a third-party bowser off site. Usage of these have remained consistent throughout the year.

Natural gas is supplied to the site via a single metered pipeline from an external gas provider. The main uses of natural gas on site are:

- baking anodes in the carbon baking furnace
- metal furnaces in metal products.

In terms of energy use, both the carbon baking furnace and metal products remained below plan in 2024, and is summarised in figure 40.

Metric	Plan	Actual
Energy use GJ/t baked anode	3.00	2.74
Energy use GJ/t cast product	0.70	0.60

Figure 40: energy use plan versus actual

7.1.3 New generation rebuilds

As mentioned in section 3.1.2, two more new generation zones were installed in the carbon baking furnace bringing the total number of new generation zones in the bake to six. This resulted in an increase in the quantity of anodes that can be produced, which further improved the energy use per tonne of baked anode.

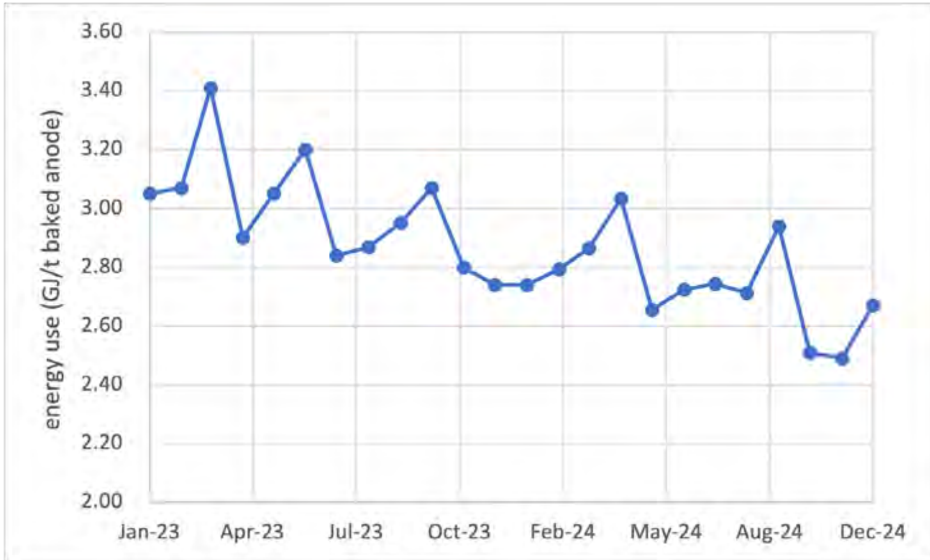

Figure 41: energy use (GJ/t baked anode)

7.1.4 Perfluorocarbons

Perfluorocarbon (PFC) emissions are produced during the smelting process when anode effects occur. Anode effects occur when either there is:

- a low concentration of alumina in the cell and it falls below the levels needed for normal electrolytic reaction
- high anode current density.

Bubbles form under the base of the anodes and a voltage increase results. The PFC emissions released are tetrafluoromethane (CF_4) and hexafluorethane (C_2F_6).

The emissions are calculated using National Greenhouse and Energy Reporting Measurement Determination Method 2. This is the tier two method for estimating perfluorocarbon emissions as set out in the Intergovernmental Panel on Climate Change Perfluorocarbon Protocol using slope factors. Bell Bay Aluminium uses pre-baked cell technology Point Feed Pre-Baked cells.

PFC emissions through reduction line anode effects contributed **0.11tCO_2-eq/tAl**, representing **5%** of site scope one emissions.

Annual performance for PFC emissions in 2024 has been excellent with one outlier during September 2024. The high PFC gas generation in September was caused by the extended power outage in Potline 4. When power is lost to a potline for an extended period, the cell temperature falls. The drop in temperature caused liquid bath to begin freezing, thereby lowering the level of anode immersion. The loss of anode immersion caused high current density, which is the condition for anode effect when energy is restored. As expected, Potline 4 experienced a very high anode effect frequency upon re-energisation.

8.0 Dust

8.1 Stack performance summary

Total particulate matter is a stack testing parameter with the limit set at 100mg/m^3. Table 26 demonstrates that all stacks complied with this limit.

Location	Parameters	License Limit	Detected values
EPN-01 Potline dry scrubber stack – Q1	Total particulate matter		3.1
EPN-01 Potline dry scrubber stack – Q2	Total particulate matter		1.6
EPN-01 Potline dry scrubber stack – Q3	Total particulate matter		7.6
EPN-01 Potline dry scrubber stack – Q4	Total particulate matter		1.3
EPN-02 Green carbon scrubber stack – Q2	Total particulate matter		2.3
EPN-03 Green carbon scrubber stack	Total particulate matter		<1
Dross processing stack	Total particulate matter		10
EPN-07 Green carbon D26 butt system	Total particulate matter		<2
EPN-08 Green carbon D29	Total particulate matter	100	<2
EPN-11 Reconstruction delining shed	Total particulate matter		<2
EPN-12 Casting shop crucible cleaner	Total particulate matter		<3
EPN-14 Rodding room induction furnace	Total particulate matter		<2
EPN-04 Rodding room butt cleaning machine	Total particulate matter		<4
EPN-05 Rodding room bath receiving station	Total particulate matter		2.9
EPN-06 Tower 2 Rod room bath processing	Total particulate matter		8.4
EPN-13 Rodding room tray tipping-unloading	Total particulate matter		28
EPN-15 SCL processing system	Total particulate matter		<3

Table 26: total particulate matter stack performance summary

9.0 Other emissions

9.1 Sulphur dioxide emissions

9.1.1 Stack emissions

The dry scrubber stack is monitored for sulphur dioxide (SO2) emissions annually.

Table 27 shows a summary on stack performance against EPN requirements.

Location	Parameters	License limit	Detected values
EPN-01 Potline dry scrubber stack – Q1 2023	Sulphur dioxide SO2 (mg/m3)	N/A	210
EPN-01 Potline dry scrubber stack – Q1 2024			200

Table 27: sulphur dioxide emission summary

9.1.2 Ambient monitoring

Ambient SO_2 concentrations are monitored at a site adjacent to the Bell Bay Aluminium wetlands (1A), which is within the Bell Bay Aluminium Scheduled Premises. The results from the SO_2 monitoring from the wetlands site for 2024 are shown in figure 42

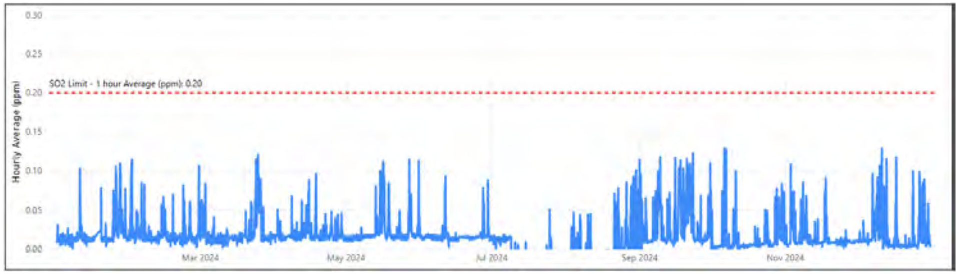

Figure 42: ambient SO2 monitoring compliance to one-hour limit

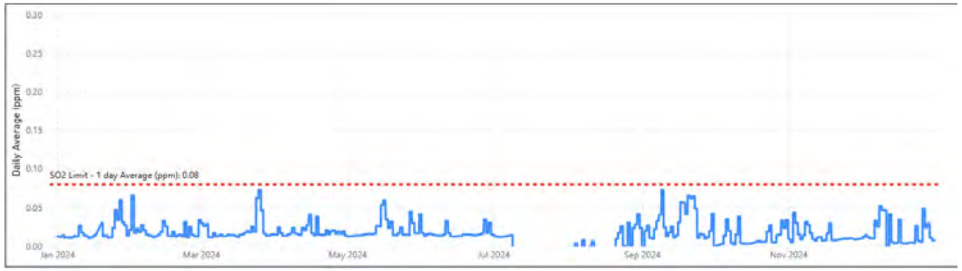

Figure 43: ambient SO2 monitoring compliance to 24-hour limit

In 2024, the monitoring data from Bell Bay Aluminium indicates that emissions remain below the one-hour and 24-hour ambient air quality criteria outside of the air quality compliance limit boundary. However, it should be noted that the integrity of the data from the monitoring station has been compromised due to the long-standing challenges in obtaining external calibration with the original equipment manufacturer.

An EPA site visit was conducted in February 2025 to review the current monitoring practices for site and come to an agreed pathway forward. Working in collaboration with the EPA, the next steps will be to:

- identify a suitable location for SO_2 monitoring that satisfactorily addresses the monitoring requirement in the permit
- assess alternative suppliers for a monitoring station with proven reliability.

9.2 Nitrogen oxide emissions

The carbon baking furnace and dry scrubber stack are monitored for nitrogen oxide emissions emissions annually. Table 28 summarises stack performance against EPN requirements.

Location	Parameters	License Limit	Detected values
EPN-01 Potline dry scrubber stack – Q1 2023	Nitrogen oxide (mg/m_3)	N/A	<4
EPN02 Carbon bake dry scrubber - Q1 2023	Nitrogen oxide @ 7% O_2 (g/m_3)	2	0.8
EPN02 Carbon bake dry scrubber – Q3 2023	Nitrogen oxide @ 7% O_2 (g/m_3)	2	0.78
EPN-01 Potline dry scrubber stack – Q1 2024	Nitrogen oxide (mg/m_3)	N/A	<4
EPN02 Carbon bake dry scrubber – Q2 2024	Nitrogen oxide @ 7% O_2 (g/m_3)	2	0.85

Table 28: oxide stack performance summary

9.3 Noise emissions monitoring

Bell Bay Aluminium engaged a consultant to conduct noise emission monitoring, in compliance with EPN 7047/2 clause N2. The noise monitoring survey was completed in December 2024. Clause N2 stipulates that noise surveys must be carried out recurrently, with no longer than 14 months since the previous survey. The previous survey was undertaken in December 2023, meaning the length of time between surveys is compliant with EPN 7047/2 Clause N2. The same nine noise measurement locations previously used in the Bell Bay area and its surrounds were chosen to be measured for environmental noise.

Environmental noise measurement positions		
Number	Location	Coordinates (Datum: GDA94, Zone 55)
1	Northern Boundary (bore hole p28)	488833E / 5447699N
2	Western Boundary (end of Temco Rd)	488726E / 5447353N
3	Eastern Boundary (bore hole p33)	490251E / 5447426N
4	George Town – Edgar St (southern end)	485739E / 5448311N
5	George Town – Victoria St and Targett Ave	486219E / 5448913N
6	East Tamar Hwy (nearest residence)	487729E / 5448837N
7	North Rowella (end of Westwood Rd)	490392E / 5442730N
8	Old Waste Dump	489508E / 5447114N
9	Beauty Point (Flinders St)	485187E / 5443339N

Noise sensitive locations.

Table 29: environmental noise measurement positions

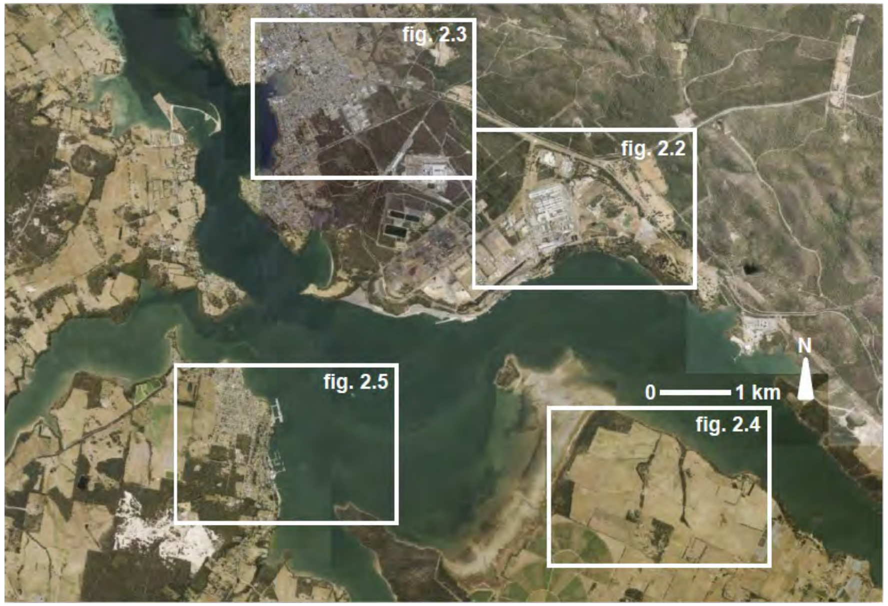

Figure 44: 2-1 aerial view of all noise monitoring sites

Figure 46: 2-3 aerial view of environmental noise survey positions 4-6

Figure 45: 2-2 aerial view of environmental noise survey positions 1-3 and 8

Figure 47: 2-4 aerial view of environmental noise survey positions 7

Figure 48: 2-5 aerial view of environmental noise survey positions 9

Table 30 summarises the results from the environmental noise survey at each position.

Position	Period	Average LAeq, 10min (dBA)	Average LA90, 10min (dBA)	EPN limit (dBA)	Potential breach	Comment
1	Day	56.9	55.0	N/A	N/A	Not a noise sensitive location
	Evening	58.5	57.6		N/A	
	Night	58.6	57.7		N/A	
2	Day	67.3	61.0	N/A	N/A	Not a noise sensitive location
	Evening	62.8	60.4		N/A	
	Night	62.1	60.6		N/A	
3	Day	63.6	56.6	N/A	N/A	Not a noise sensitive location
	Evening	60.2	47.0		N/A	
	Night	54.6	45.9		N/A	
4	Day	45.0	40.2	50	No	EPN limit not exceeded
	Evening	43.0	40.0		No	
	Night	32.3	26.7		No	
5	Day	54.1	42.7	50	No	EPN limit not exceeded. Local traffic dominant, Bell Bay Aluminium not audible
	Evening	54.6	42.4		No	
	Night	47.9	28.3		No	
6	Day	67.2	48.1	50	No	Highway traffic dominant
	Evening	63.3	43.5		No	Highway traffic dominant
	Night	59.6	39.1		No	LAeq elevated by traffic
7	Day	39.3	29.9	50	No	EPN limit not exceeded
	Evening	39.6	28.0		No	
	Night	32.0	23.5		No	
9	Day	55.6	42.3	50	No	Local traffic dominant. Bell Bay Aluminium not audible
	Evening	49.2	29.7		No	EPN limit not exceeded. BBA not audible
	Night	47.7	28.4		No	

Table 30: noise monitoring results summary 2023

Note: LAeq = equivalent continuous sound level, LA90 = noise level for 90% of the measurement period, dBA = A-weighted decibel

The key findings are detailed from the report are:

- Exceedances of the EPN limit (50dBA) were recorded at positions 5, 6 and 9, however these did not constitute breaches of the EPN conditions. At these locations, traffic and other noise sources external to the smelter dominated the noise environment.
- A tone at 199 hertz, with harmonics at 399 hertz, from the dry scrubber fans was measured at locations adjacent to Bell Bay Aluminium. These frequencies were noted at some of the noise sensitive locations, however, were not a dominant component of the noise environment. These tones relate to the blade pass frequency of the dry scrubber fans.
- Several tones from the Bell Bay Industrial Precinct are present in the environment that are not associated with Bell Bay Aluminium.
- Noise levels were consistent with surveys completed in 2021, 2022 and 2023, with any slight changes due to external sources such as wind and traffic frequency. This indicates that there are no changes in the emission of environmental noise from the Bell Bay Aluminium smelter.

10.0 Environment improvement plans 2025

Stormwater system	Better understanding of capacity of stormwater network
	Wetlands system performance review and management
	Settling pond capacity increase
Byproducts management	Approvals obtained for pathways for high-risk stockpiles – butt bath and burn-off butts
	Commence burn-off butt trial and butt bath trials
Ambient data monitoring review	Improvements to ambient SO_2 monitoring practices including upgrades to monitoring equipment (in collaboration with the EPA)
	Audit and repair of ambient air monitoring stations to allow better reliability of sampling data

Figure 49: summary of Bell Bay Aluminium's environmental improvement plans 2025