

ATTACHMENTS FOR THE EVIDENCE OF FIONA SMITH

ATTACHMENT A. AREA 15 FILLING PLAN – INCOMING WASTE

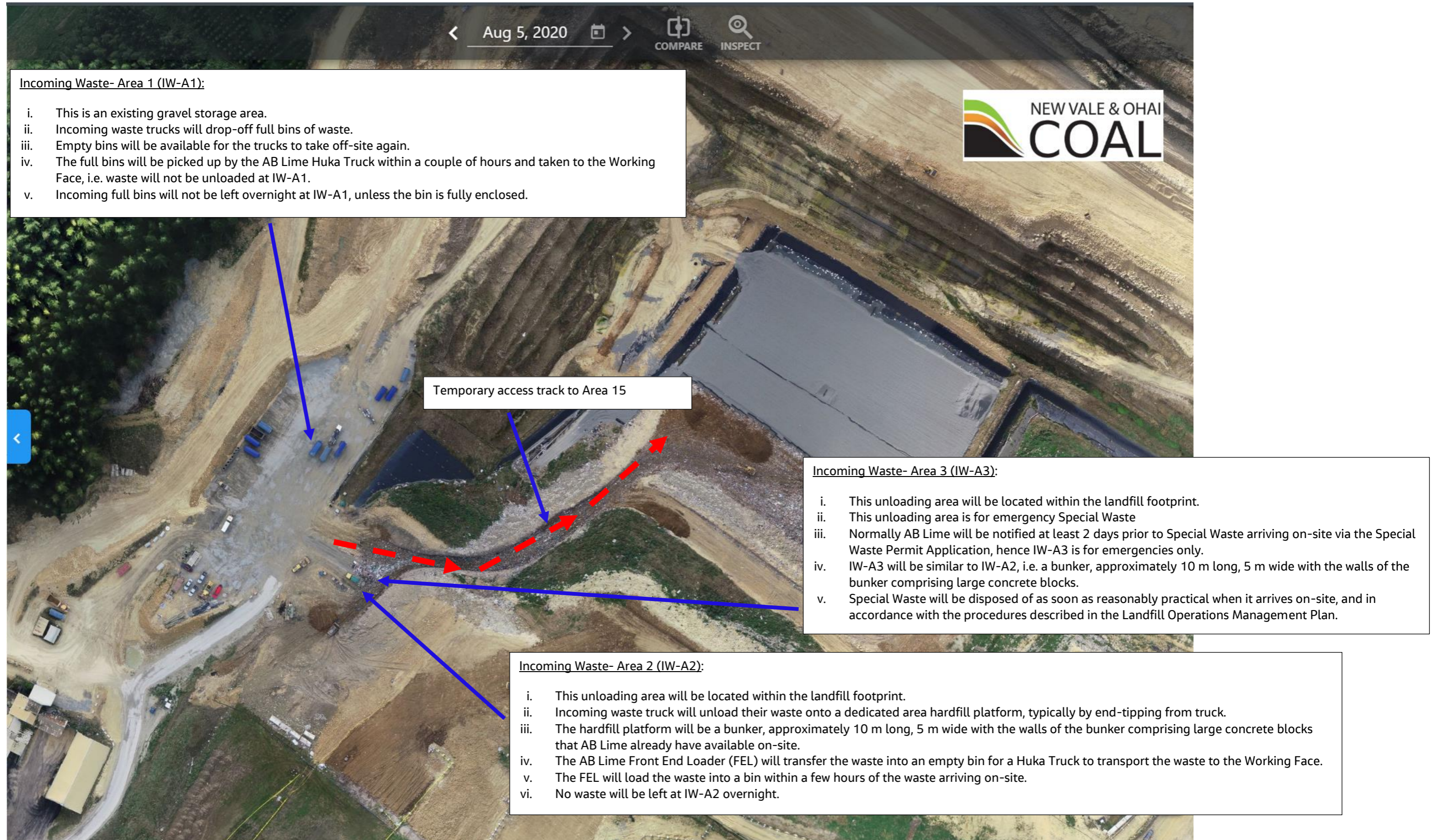


Figure 1: Incoming Waste and Access Track Temporary Locations

ATTACHMENT B. S 127 VARIATION FOR ALUMINIUM DROSS WASTE



PO Box 102
Kings Bend
Winton 9741
Southland
Phone: (03) 236 7577

14 November 2017

The Consents Manager
Environment Southland
Private Bag 90116
Invercargill 9840

Dear Michael,

Application to amend consent AUTH-201346-V2 and update Schedule 2 related to this consent

I wish to apply for an amendment to our consent to enable the disposal of Aluminium Dross Waste (ADW) and related contaminated materials. This waste is a by-product of the aluminium smelting process and contains high levels of aluminium and fluoride which classify it as a hazardous waste.

Current leachable concentration limits (determined by TCLP tests) listed in schedule 2 of consent AUTH-201346-V2 do not include aluminium and fluoride, which therefore are subject to condition 23 where the accepted limit is the lesser of:

- NZS9201 Trade Waste Bylaw limits; or
- 100 times the New Zealand drinking water standards; or
- 1000 times the ANZETCC Guidelines for protection of aquatic species of the consent.

However there is a Ministry for the Environment “*Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification, May 2004*” report that has accepted limits for both aluminium and fluoride. This report is not mentioned in the AB Lime Landfill discharge permit as the original consent was issued before this report was published.

Table 1 outlines the current TCLP guideline limits from consent AUTH-201346-V2 and the 2004 Ministry for the Environment Report for aluminium and fluoride acceptance

Parameter	Schedule 2: Consent AUTH-201346-V2	NZS9201 Trade Waste Bylaw limits	100x the NZ drinking water standards	1000 x the ANZETCC Guidelines	MfE 2004 Hazardous Waste Guidelines
Aluminium g/m ³	Not Mentioned	300	10	27	40
Fluoride g/m ³	150	30	150	Not mentioned	200

The TCLP test involves an extraction with acetic acid (2.88 or 4.93 pH) and is used to simulate most landfill leachate as acetic acid is the predominant acid generated from biological decay processes. However, a landfill that has limited organic matter and high levels of limestone rock will prevent the pH from turning acidic.

The AB Lime Landfill has limited green waste acceptance due to our contract with Wastenet and is built within an operational lime quarry and uses substantial amounts of limestone for odour control, daily cover, intermediate cover and part of the capping process. This gives our landfill an alkaline environment and an ability to buffer many acidic chemical processes within the waste mass.

When using the TCLP analysis to determine the potential metals leaching of a sample heading to a landfill with very little organic matter and significant amounts of limestone, the result will be an over-estimation of the leaching potential. Graham Corban, Client Services Manager, from Hills Laboratories has indicated that a more suitable test is the SPLP (Synthetic Precipitation Leaching Procedure) analysis, which uses deionised (DI) water (pH 5.7) as the leachate rather than acetic acid. The SPLP test is more likely to produce a more accurate estimation of the leaching potential for the AB Lime Landfill. It will still be conservative (over-estimate the leaching risk) because the carbonate buffering of the landfill leachate causing a lift in pH has not been taken into account.

This application request is two-fold:

- That in relation to Aluminium and Fluoride, Schedule 2 of consent AUTH-201346-V2 be replaced by the Ministry for the Environment *“Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification, May 2004”*
- That SPLP tests are used in place of TCLP tests to determine leachability concentrations of Aluminium and Fluoride for Taha Waste at the AB Lime Landfill as set out in the Ministry for the Environment *“Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification, May 2004”*.

The application is for the inclusion of the following condition:

“Aluminium dross waste (ADW) and material contaminated with this waste may be accepted into the landfill provided that the concentrations of aluminium and fluoride do not exceed the leachability limits or screening concentrations set out in Table 1 of “Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill

Classification, May 2004". The leachability limits shall be established using SPLP testing, with concentrations not to exceed a SPLP test result of 40 g/m³ of Aluminium and 200 g/m³ of Fluoride. The material that may be accepted includes gravels and soils that have been contaminated with dross.

The consent holder shall:

- (i) record the date, source, volume and nature of the material received;*
- (ii) keep a record of monitoring data that confirms the contamination level of the material; and*
- (iii) record the location where the material is placed within the landfill.*

The information recorded shall be made available to the consent authority or its representative on request."

Condition 23 will need to be amended if this condition is added as follows:

"With the exception of medical wastes, asbestos wastes, methamphetamine and aluminium smelter dross contaminated waste, disposed in accordance with conditions 19-21, no hazardous waste shall be ..."

Although not a reason on its own to grant this application, it is noted that options for the disposal of this contaminated hazardous material are very limited. It is not something that can be readily stopped and left in place as it poses short term and longer terms risk to the environment. Disposal at a secure landfill is an appropriate and reasonable option.

1. Description of the new activity

The AB Lime Landfill is a Class A¹ landfill, one of only two in the South Island (based on information from 2011). The standard of environmental protection is therefore very high, so the landfill is the first place considered for disposing of aluminium dross contaminated material. The site is substantial and the material, which will be a minor component of the total waste received each year, would be contained in a controlled environment. Full details of the landfill design and construction have already been provided to Environment Southland and reviewed by an appropriately qualified person to ensure that it complies with its consent conditions.

¹ Based on the criteria set out in the 2004 MfE publication "Module 2: Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification".

The amendment being applied for is to allow the disposal of degraded ADW and material contaminated with this waste into the landfill. There is no feasible remediation for these contaminated materials in Southland, nor can it be re-used in some other environment.

In the absence of any documented criteria for the disposal of ADW contaminated materials, AB Lime Landfill have sought advice from Jacobs New Zealand Ltd and Hills Laboratories to develop a standard for acceptance namely, SPLP result of **40 g/m³ for Aluminium** and **200 g/m³ for Fluoride**.

After it has been confirmed that the material is less than the acceptance criteria, it will be issued a special waste permit through WasteNet and transported via an approved carrier to the Landfill where it will be buried following Special Waste handling guidelines. The location will be recorded and will comprise part of the report on Special Waste that is reported to Environment Southland annually as per Condition 24.

2. Assessment of environmental effects

The main compounds of interest in raw dross are aluminium carbide that generates methane when wet, aluminium metal that generates hydrogen gas when wet and aluminium nitride that generates ammonia when wet. Fluoride is also present at high levels up to 7% by weight in some samples.

Generation of methane and hydrogen are generally at a low rate, and testing by Jacobs² has shown that the material does not meet the criteria to be considered a dangerous good. However, as gas is generated it could present a risk if large quantities are stored in a confined space. Although we note that hydrogen is not normally present in landfill gas in significant quantities, its effects as a flammable gas may not be significantly different from usual Landfill Gas issues. This will be assessed via landfill gas monitoring as currently undertaken at the landfill.

The generation of ammonia is also noted as a slow release process, which will introduce ammonia into the leachate. Ammonia levels in the leachate and groundwater perimeter monitoring wells will be measured and assessed as to potential effects. Fluoride from the aluminium dross also has the potential to enter into leachate. We therefore recommend that fluoride be added to the list of analytes in Condition 27 and Condition 30 of the current consent.

² Communications with Jacobs New Zealand Limited

Information on acceptance criteria for ADW contaminated materials to landfill is not available nationally or internationally, however the main environmental risk from this waste is the leaching of aluminium and fluoride to soil and water.

The AB Lime landfill contains large amounts of limestone that creates a neutral to alkaline environment producing a leachate pH of around 7.8. The dissolution of ammonia into leachate from ADW would also contribute to the pH to rise over time. This will help to ensure limited solubility of aluminium compounds that become soluble in acidic environments. Fluoride remediation of water is often done with limestone. Limestone is known to help remove fluoride from water due to absorption and precipitation due to creating a more alkaline environment³.

It should be noted that Hill Laboratories have indicated that high levels of aluminium cause a negative interference in fluoride at levels of aluminium $>3.0 \text{ g/m}^3$ and consequently the fluoride SPLP results may be under-estimated. However past SPLP testing completed on ADW indicate that the fluoride levels are generally higher than aluminium, and Hills Laboratories have indicated that a dilution scheme can be prepared to bring the aluminium levels to below 3 g/m^3 allowing for a more accurate assessment of fluoride levels.

Apart from the risk of aluminium and fluoride contaminated leaching, there are gaseous emissions from the material once it becomes wet. At the point of disposal, the risk is predominately a health and safety issue while contaminated material is being received. It is unlikely to be a wider environmental issue beyond the immediate landfill environs and certainly not at the property boundary. To mitigate the production of gas it is proposed to deep bury the material immediately and to receive the material whenever possible in bulk bags to eliminate the need for it to be watered down to suppress dust during disposal.

Allowing the contaminated material to come to the landfill provides the positive benefits of firstly, removing it from the environment to an appropriate disposal site and not to a less controlled environment, and secondly, removing it from the community where it may endanger human health.

3. Consideration of relevant statutory documents

The main documents relevant to this activity, apart from the Resource Management Act itself, are the operative and proposed Regional Policy Statements, the Regional Solid Waste

³ Nath, S. K and Dutta, R. K. 2010. "Fluoride removal from water using crushed limestone". Indian Journal of Chemical Technology Vol17, March 2010, pp. 120-125.

Management Plan and the Proposed Southland Water & Land Plan. There are no National Policy Statements or National Environmental Standards that have direct relevance to the proposed amendment.

4. Conclusion

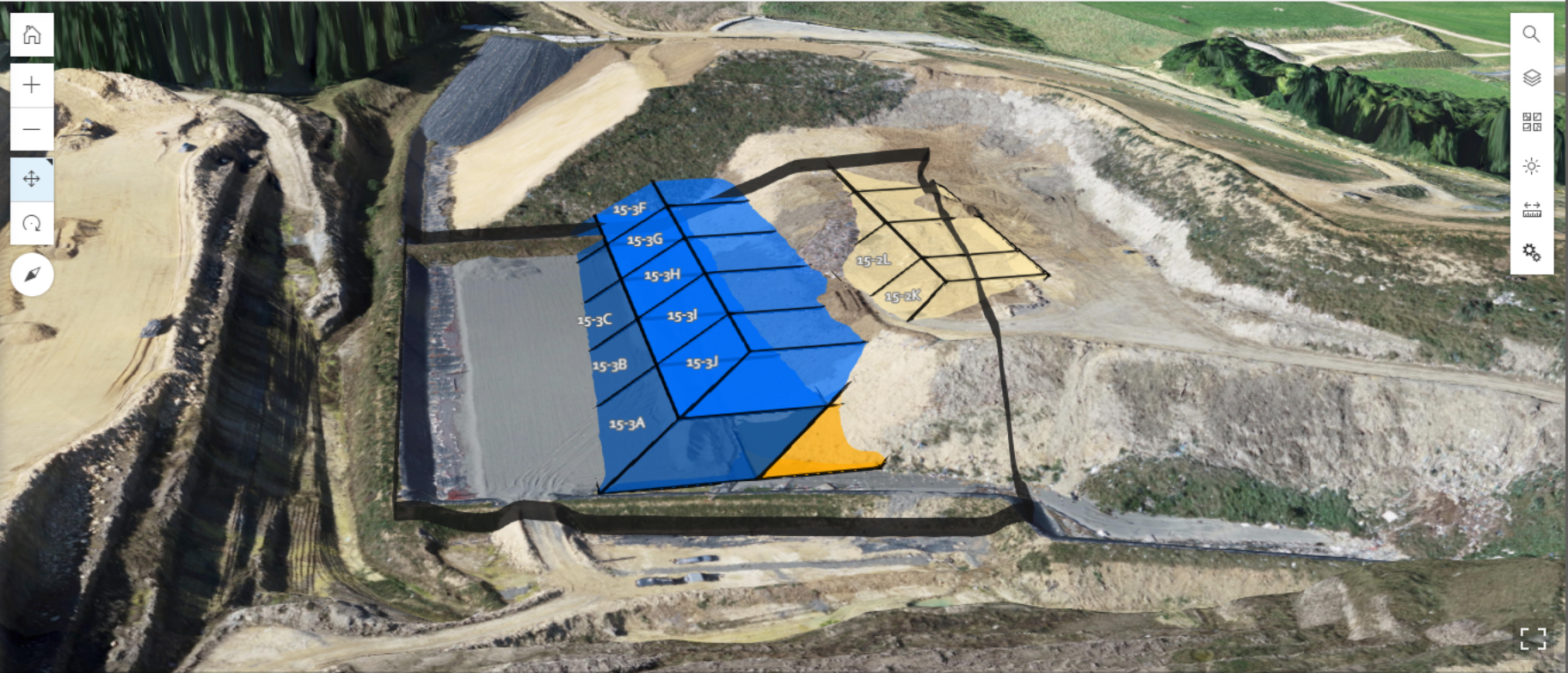
1. AB Lime Limited requests an amendment to be made to consent AUTH-201346-V2 for the inclusion of the acceptance of the hazardous waste, Aluminium Dross Waste (ADW), to the AB Lime Landfill with SPLP acceptance limits set as 40 g/m³ for Aluminium and 200 g/m³ for Fluoride, with subsequent amendment of Condition 21 for its inclusion.
2. AB Lime Limited requests an update of consent AUTH-201346-V2 *“Schedule 2: Waste Acceptance Criteria Leachable and Total Concentration Limits”* to bring it into line with Ministry for the Environment guidelines as outlined in *“Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification, May 2004”*

Yours faithfully,

Fiona Smith. B.Sc. M.Sc.

Environment Manager, AB Lime

ATTACHMENT C. AREA 15 FILLING PLAN – 3D MODEL



ATTACHMENT D. SURFACE GAS EMISSIONS WALKOVER DATA

Details | Basemap |

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Find address or place

About | Content | Legend

Legend

AB Lime Gastec Walkover March 2021 -
Gastec Walkover March 30 2021 -
Compliance

MethanePPM

- >5000
- 3000-5000
- 1000-3000
- <1000

ABLime Orthomosaic March 2021

ABLime210322_Orthomosaic_export_MonMa

- Red: Band_1
- Green: Band_2
- Blue: Band_3

