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# Resource Recovery Order under Section 286A of the *Protection of the Environment Operations Act 1997*

# The acid sulfate soil (ASS) order 2025

## Introduction

This order, issued by the Environment Protection Authority (**EPA**) under section 286A of *the Protection of the Environment Operations Act 1997* (**POEO Act**), imposes the requirements that must be met by a **supplier** of acid sulfate soil and should be read in conjunction with 'the acid sulfate soil (ASS) exemption 2025'. The requirements in this order apply in relation to the supply of acid sulfate soil for application to land for use as **earthworks**, or **engineering fill**. Any words or phrases set out in bold in this order are defined in condition 5 of this order.

## 1. Waste to which this order applies

1.1. This order applies to acid sulfate soil (**ASS**).

1.2. In this order, **ASS** means soil (including but not limited to sand, gravel, silt, clay and rock) that:

a) has either been affected by the oxidation of **reduced inorganic sulfur (RIS)** (such as **actual ASS**) or has the capacity to be affected by the oxidation of its **RIS** constituents (such as **potential ASS**, or **hyposulfidic materials**); and

b) may be treated by mixing **agricultural lime;** and

c) is either **Virgin excavated natural material** or **Excavated natural material**, as defined in this order.

In this order, **ASS** does not include **monosulfidic black ooze** or **acid mine drainage materials**.

## 2. Persons to whom this order applies

2.1. The requirements in this order apply to any person who supplies **ASS**, that has been generated, processed or recovered by the person.

2.2. This order does not apply to the supply of **ASS** to a **consumer** for land application at a premises for which the **consumer** holds an Environment Protection Licence (EPL) under the POEO Act that authorises the carrying out of the scheduled activities on the premises under clause 39 'waste disposal (application to land)' or clause 40 'waste disposal (thermal treatment)' of Schedule 1 of the POEO Act.

## 3. Duration

3.1. This order commences on 5 December 2025 and is valid until revoked by the EPA by notice published in the Government Gazette.

## 4. Supplier requirements

A person who supplies **ASS** must take the following steps in the provided sequence set out in these conditions.

### ASS investigation requirements

4.1. The **generator** (including any **environmental practitioner** engaged by the **generator**) must undertake an **ASS investigation** in accordance with **National Guideline A** and **National Guideline B** prior to the

removal of any **ASS** from the premises.

4.2. The **generator** may supply **ASS** to a **consumer** if the **net acidity** is less than 18 mol $H^+$/t after the **ASS investigation**. A **generator** that complies with this condition does not need to comply with conditions 4.4 to 4.14.

4.3. If the **generator** is supplying **ASS** in accordance with condition 4.2 and **incubation testing** was undertaken during the **ASS investigation**, the **generator** must ensure an **Expert** has confirmed in writing the **net acidity** is less than 18 mol $H^+$/t in the **Expert report (ASS Investigation**). A **generator** must obtain a copy of that **Expert report (ASS investigation)** and provide a copy to the **consumer** before each **transaction**. See Notes.

**Preparation of Acid Sulfate Soil Management Plan**

4.4. The **supplier** must engage an **environmental practitioner** to prepare an Acid Sulfate Soil Management Plan (**ASSMP**) and keep a copy of the **ASSMP**.

4.5. If the **environmental practitioner** is not an **Expert** under this order, the **supplier** must also:

a. engage an **Expert** to review and approve the **ASSMP** and prepare an **Expert report (ASSMP)**; and

b. keep a copy of the **Expert report (ASSMP)**.

**Undertaking the proof of performance (POP) trial**

4.6. To undertake a **POP trial** the **supplier** must prepare a **treated stockpile** up to a **nominated volume** in accordance with the **treatment method** and requirements of the **ASSMP**, and have an **environmental practitioner** collect representative samples from the **treated stockpile** in accordance with the **ASSMP** and Row 1 of Table 1. A **treated stockpile** must be stored separately until the **environmental practitioner** confirms the test results are compliant with Table 2 below.

4.7. A **supplier** must not undertake a reduced sampling frequency (i.e. Row 2 of Table 1) unless it has repeated condition 4.6 for three **consecutive treated stockpiles** and the **environmental practitioner** confirms in writing the test results are compliant with Table 2.

**After the POP trial**

4.8. After three **consecutive treated stockpiles** have been tested in accordance with condition 4.6 and the **environmental practitioner** confirms in writing those test results are compliant with Table 2, the **supplier** may prepare a **treated stockpile** in accordance with this condition and the requirements of the **ASSMP**. The **supplier** must engage an **environmental practitioner** to collect representative samples from each **treated stockpile** and can use the reduced sampling frequency set out in Row 2 of Table 1 for testing.

**Table 1**

| Row number | Column 1 | Column 2 | Column 3 |
|---|---|---|---|
| | **During or after POP trial** | **Sampling frequency** | **Attribute** |
| **Row 1** | During the POP trial | 1 discrete sample for every 50 $m^3$ | **Verification net Acidity** |
| **Row 2** | After the POP trial | 1 discrete sample for every 100 $m^3$ | **Verification net Acidity** |

**Table 2**

| Column 1 | Column 2 | Column 3 |
|---|---|---|
| **Chemical and other attributes** | **Results average** | **Any single result** |
| $pH_{KCl}$ | At least 6.5 and no greater than 9.0 | At least 6.5 and no greater than 10.0 |
| Verification Net Acidity[1] | No greater than 0 mol $H^+$/tonne | No greater than 0 mol $H^+$/tonne |

Note:

1. **Verification Net Acidity** means either:
- **potential sulfidic acidity** + **Actual acidity** + **Retained acidity** – (**post treatment ANC** – **initial ANC**); or
- **potential sulfidic acidity** + **Actual acidity** + **Retained acidity** – (**post treatment ANC**/Safety Factor). Safety Factor means a minimum of 1.5.

**Changing the treatment method, soil type and nominated volume**

4.9. If the **supplier** wants to change to a new **treatment method** and/or change to treating a new **soil type** that was not included in the **ASSMP**, the **supplier** must:
   a. engage an **environmental practitioner** to prepare an amended **ASSMP** for the new **treatment method** and/or new **soil type** and keep a copy of the amended **ASSMP**;
   b. If the **environmental practitioner** is not an **Expert** under this order, the **supplier** must also engage an **Expert** to review and approve the new **treatment method** and/or new **soil type** by preparing a new **Expert Report (ASSMP)** in accordance with condition 4.5; and
   c. undertake another POP trial by repeating condition 4.6 for the new **treatment method** and/or new **soil type**. See Notes.

4.10. A supplier cannot increase the **nominated volume** after a POP trial unless they have undertaken a new POP trial in accordance with condition 4.6 for the new **nominated volume**.

**Chemical requirements after treatment**

4.11. The **supplier** can supply **ASS** to a **consumer** if all the samples collected and tested from that **treated stockpile** in accordance with either condition 4. 6 or 4.8:
   a. Complies with the $pH_{KCl}$ values in Column 2 and Column 3 of Table 2, and complies with the **verification net acidity** in Column 2 and Column 3 of Table 2; or
   b. Complies with the $pH_{KCl}$ values in Column 2 and Column 3 of Table 2, and the **95% UCL verification net acidity** complies with Column 2 of Table 2. Column 3 of Table 2 is not required if the **95% UCL** is calculated.

4.12. If the samples collected and tested from that **treated stockpile** only complies with condition 4.11(b), the **supplier** can only supply that **treated stockpile** to one **consumer**. The **treated stockpile** must not be split into multiple stockpiles and supplied to more than one **consumer**.

**Segregation and re-treatment**

4.13. If a **treated stockpile** does not comply with the chemical requirements in condition 4.11, the **supplier**:

a. may segregate any **hotspot** from the **treated stockpile**, label the segregated **hotspot** as non-compliant waste and store it separately from the remainder of the **treated stockpile**; and

b. may either **re-treat** the **hotspot**, dispose of the **hotspot** to a place that can lawfully accept it, or retain the **hotspot** on the premises if it is a **non-licensed premises,** subject to having lawful authority**.**

4.14. If a **supplier** has segregated any **hotspot** in accordance with condition 4.13, the **supplier**:

a. must engage an **environmental practitioner** to prepare a **hotspot segregation report;** and

b. may supply the remainder of the **treated stockpile** after the **hotspot** has been segregated if:

i. The **treated stockpile** meets the chemical requirements in condition 4.11; and

ii. The **environmental practitioner** has confirmed in the **hotspot segregation report** they are satisfied with how the **supplier** has segregated the **hotspot**.

**Test methods**

4.15. Any testing of samples required by this order must be undertaken by analytical laboratories accredited by the National Association of Testing Authorities (**NATA**). The analytical laboratory must also be accredited by NATA to carry out the relevant test method.

4.16. Any **ASS** supplied by a **supplier** must be tested in accordance with the test methods specified below or other equivalent analytical methods for all chemicals and other attributes set out in Table 2 of this order. Where an equivalent analytical method is used the detection limit must be equal to or less than that nominated for the given method below.

4.17. The method for measuring **Net Acidity** from the **National Guideline A**:

a. **Potential Sulfidic Acidity** using the **chromium reducible sulfur suite** (NLM-2.1);

b. **Titratable Actual Acidity** (NLM-3.2);

c. **Retained Acidity** using Net Acid Soluble Sulfur (NLM-4.1) and the equations $S_{NAS}$ (%) = ($S_{HCl}$ – $S_{KCl}$) x 2.0, and $S_{RA}$ (mol $H^+$/t) = $S_{NAS}$ (%) x 467.8; and

d. **Acid Neutralising Capacity** ('ANC') using ANC back-titration (NLM-5.2).

4.18. The method for measuring $pH_{KCl}$ from the **National Guideline A**:

a. pH using KCl Extractable pH ($pH_{KCl}$) (NLM-3.1).

4.19. When reporting the results of any test methods under this order, a **supplier** must report:

a. **Net Acidity** as mol $H^+$/ tonne (oven-dry basis); and

b. pH as $pH_{KCl}$.

**Validation Report**

4.20. Prior to supplying any **ASS** that has undergone **treatment** to a **consumer**, the **supplier** must obtain and keep a copy of the **validation report** from the **environmental practitioner** for every **treated stockpile**.

**Independent Third-Party Expert ('Expert') Compliance Report**

4.21. If the **environmental practitioner** is not an **Expert** under this order, prior to supplying any **ASS** that has undergone **treatment** to a **consumer**, the **supplier** must:

a. Engage an **Expert** to prepare an **Expert compliance report**; and

b. Keep a copy of the **Expert compliance report**, which certifies that:

i. the **Expert** is satisfied that for each POP trial, each **treated stockpile**, including **consecutive treated stockpiles** and any **re-treated stockpiles**, are compliant with the applicable sampling requirements in Table 1, and the chemical and attribute requirements

in Table 2, including any calculation of the **95% UCL verification net acidity**, before it is supplied to a **consumer**.

ii. the **Expert** is satisfied there is proper documentation of sampling and testing results. Proper documentation of sampling and analysis results includes:
    - Laboratory reports;
    - Laboratory sample receipts;
    - Chain of custody documentation;
    - Summary chemical analytical results/data tables;
    - Calculations of net acidity, volume of soil treated and liming rates, including evidence that the minimum safety factor of 1.5 has been applied in calculating liming rates;
    - Receipts showing quantities of neutralising agent purchased, including evidence of the composition, purity and particle size of the neutralising agent used;
    - Treatment pad design (if relevant); and
    - Sufficient photographic evidence of incorporation of neutralising agent, e.g. thorough mixing on a treatment pad (if relevant);

4.22. An **Expert compliance report** is not required to certify any **treated stockpile** that has been prepared in accordance with condition 4.8.

**Information to be given to a consumer**

4.23. Before each **transaction** that has undergone **treatment**, the **supplier** must provide a written statement of compliance to the **consumer**. A written statement of compliance must include:

a. a certification that all the requirements set out in this order have been met with respect to a **treated stockpile**;

b. the **supplier**s name (and A.C.N if a corporation), address and contact details;

c. all **validation reports**;

d. if required, the **Expert compliance report**; and

e. the unique stockpile identifier, laboratory reports, chain-of-custody documentation, sample receipts.

**Record keeping and reporting**

4.24. At the time of supplying **ASS**, a **supplier** must record **supply information** and keep a written record of **documents** for at least six years.

4.25. On request, the supplier must provide to the **consumer** any sampling results for **ASS** supplied to that **consumer** of **ASS** and a copy of the **ASSMP**.

4.26. The **supplier** must make any **documents** available to the EPA upon request.

## 5. Definitions

In this order:

**95% UCL** means the 95% upper confidence limit (UCL) of the arithmetic mean and provides 95% confidence level that the true population mean will be less than, or equal to, this value. It is calculated by using the US EPA ProUCL ('ProUCL') Software. The recommended 95% UCL value that is determined by the ProUCL software must be used. A treated stockpile must have a minimum of 8 samples collected and used to calculate the 95% UCL.

**acid mine drainage materials** means mine waste materials, such as waste rock, tailings, overburden and other materials, that contain sulfide minerals such as pyrite that have been, or may be, exposed to oxygen and water**.**

**actual acidity** means the soluble and exchangeable acidity already present in the soil, often as a consequence of previous oxidation of RIS. It is measured in the laboratory using the Titratable Actual Acidity method. It does not include the less soluble acidity (that is Retained Acidity) held in hydroxy-sulfate minerals such as jarosite. Actual acidity in ASS may be confirmed by the presence of jarosite in these materials, or the location of other sulfuric or sulfidic materials within or in the nearby vicinity to the sampling location.

**actual ASS** means soils containing highly acidic soil horizons resulting from the oxidation of soil materials that are rich in RIS primarily pyrite. When this oxidation of RIS produces acidity in excess of the soil material's capacity to neutralise this acidity, the soil material will often acidify to a pH 4 or less, forming an actual ASS. The recognition of actual ASS materials can be confirmed by the presence of jarosite in these materials, or the location of other actual ASS or PASS materials within or in the nearby vicinity to the sampling location.

**agricultural lime** means alkaline calcium carbonate ($CaCO_3$) based neutralising agent with a particle size <500 micron used to treat ASS. It is recommended that the agricultural lime should be at least 95% calcium carbonate and hence has a neutralising value of 95. Agricultural lime must not include quick lime, burnt lime, or hydrated lime, where hydrated lime means calcium hydroxide created by adding calcium oxide to water.

**application or apply to land** means applying to land by:

- spraying, spreading or depositing on the land; or
- ploughing, injecting or mixing into the land; or
- filling, raising, reclaiming or contouring the land.

**ANC** means acid neutralisation capacity and is a measure of a soils inherent ability to buffer acidity and resist lowering of the soil pH.

**ASS investigation** means an investigation of ASS that must include a desktop assessment and make recommendations regarding the need for treatment. An ASS investigation may include site inspections, soil sampling, field testing, laboratory analysis and incubation testing.

**ASSMP** means an Acid Sulfate Soil Management Plan, which is a written plan that must be prepared in accordance with Appendix 2 of the Queensland Guideline to manage risks arising from the disturbance of ASS. The ASSMP must include a sampling plan, outline the findings of ASS investigations (including soil sampling and identification of sulfidic materials) and provide a clear rationale for selecting treatment methods. The ASSMP must specify the soil types that the treatment methods are able to treat. An ASSMP should also incorporate other key components, including but not limited to mitigation strategies, monitoring protocols and contingency measures.

**chromium reducible sulfur suite ('CrS suite')** means a laboratory test method that measures RIS content using iodometric titration after an acidic chromous chloride reduction. The method is not subject to interferences from organic sulfur. The suite also measures $pH_{KCl}$, actual acidity, PSA, and if necessary retained acidity.

**consecutive treated stockpiles** means treated stockpiles that follow a chronological sequence.

**consumer** means a person who applies, or intends to apply, ASS to land.

**discrete sample** means a sample collected and analysed individually that will not be composited.

**documents** means:

- all test results from the sampling of each treated stockpile.
- Expert report (ASS investigation).
- Expert report (ASSMP).
- the ASSMP.
- supply information.
- all laboratory reports including laboratory quality assurance and quality control performance records, laboratory chain of custody documentation, and laboratory sample receipts in relation to each treated

stockpile.

- Expert compliance report.
- Written statement of compliance (as required under condition 4.23).
- any other record or document required to be kept, provided or prepared under this order.

**earthworks** means filling to achieve the required topography subject to meeting appropriate engineering and geotechnical requirements. Earthworks does not include use of ASS as a growing medium, such as being used to grow vegetation.

**engineering fill** means material that is required to support structures or associated pavements, or for which engineering properties are to be controlled subject to meeting appropriate engineering and geotechnical requirements. Engineering fill does not include use of ASS as a growing medium, such as being used to grow vegetation.

**environmental practitioner** means a professional with relevant tertiary qualifications, training, and proven experience in soil sampling, ASS and waste classification in NSW. The environmental practitioner must have comprehensive knowledge of sampling principles for soil, ASS, and waste-derived materials. An environmental practitioner may meet the requirement for an Expert.

**excavated natural material** has the same meaning as defined in *The excavated natural material order 2014*, except for the reference to:

- acid sulfate soils, potential acid sulfate soils or sulfidic ores; and
- pH from Table 4 of the order.

**Expert** means a qualified environmental practitioner that can provide advice in ASS work. The Expert's role is to deliver independent, objective, and evidence-based analysis, advice, or determinations in accordance with this order. The Expert must meet the definition of an environmental practitioner under this order and hold certification from Soil Science Australia (SSA) Registered Soils Practitioner in Acid Sulfate Soils (ASS) (RSP-ASS).

**Expert compliance report** means a critical review of the information gathered by the supplier, or environmental practitioner in relation to the order. It must clearly explain and contain evidence regarding whether the supplier, or environmental practitioner has met the requirements of the order. It should not be a narrative summary of the work carried out by the supplier, or environmental practitioner. An Expert compliance report is not required if the environmental practitioner meets the definition of an Expert.

**Expert report (ASS investigation)** means a report that documents the review of the ASS investigation and incubation testing, and whether the Expert has approved the ASS investigation and incubation testing. An Expert Report (ASS Investigation) can be prepared by any person who meets the definition of an Expert, regardless of whether they are also the generator and/or an environmental practitioner.

**Expert report (ASSMP)** means a report that documents the review of the ASSMP, and whether the Expert has approved the ASSMP, the rationale for the selection of the treatment method, and the sampling plan.

**generator** means a person who generates ASS at the premises, such as a development site, and then supplies, or intends to supply it to a consumer or processor.

**hotspot** means:

- the sample location(s) in the treated stockpile that did not comply with Column 3 of Table 2, or Column 2 of Table 2; and
- has a minimum volume of 50 $m^3$ of ASS if it was sampled during the POP trial, or a minimum volume of 100 $m^3$ of ASS if it was sampled after the POP trial.

**hotspot segregation report** means a report:

- that confirms the volume of hotspot segregated is either 50$m^3$ or 100$m^3$ depending on whether it was sampled during the POP trial or after the POP trial;
- contains digital photographs of the segregated hotspot; and
- that concludes whether the environmental practitioner is satisfied with how the supplier has segregated

the hotspot. If the environmental practitioner is not satisfied, the environmental practitioner may make suggestions to the supplier so that the environmental practitioner is satisfied with how the supplier has segregated the hotspot.

**hyposulfidic materials** means sulfidic soil that would not become severely acidic if allowed to oxidise completely.

**incubation testing** means laboratory testing using either the Slab Incubation method (NLM-8.1) or Chip tray Incubation method (NLM-8.2) from the National Guideline A. Incubation test results must not drop below pH 6.5 at any time during the incubation test. ASS from sample locations that have the highest net acidity sample results and a minimum of 20% of net acidity sample results should be selected for incubation testing. The selection of samples for incubation testing should be discussed with an Expert. See Notes for further information.

**initial ANC** means ANC in ASS prior to treatment. The initial ANC can be represented by the arithmetic mean, or the 95% UCL of the ANC from the ASS investigation.

**insitu treated ASS** means ASS that exist on or below the ground level that has had agricultural lime mixed into it in accordance with the relevant treatment method.

**jarosite** means an acidic, pale yellow (straw- or butter-coloured) iron hydroxy sulfate mineral: KFe3(SO4)2(OH)6. Jarosite is a by-product of the ASS oxidation process, forms at pH less than 3.7, and is commonly found precipitated along root channels and other soil surfaces exposed to air. It is an environmentally important store of acidity as it can hydrolyse to release acidity relatively rapidly.

**monosulfidic black ooze** means black, gel-like materials (moisture content greater than 70%), often oily in appearance, greatly enriched in monosulfides (up to 27%), high in organic matter (usually 10% organic carbon) that can form thick (greater than 1.0 m) accumulations in waterways (including drains), in ASS wetlands.

**National Guideline A** means Sullivan, LA, Ward, NJ, Toppler, NR & Lancaster, G 2018a, *National Acid Sulfate Soils Identification and Laboratory Methods Manual*, Department of Agriculture and Water Resources, Australian Capital Canberra, available at: https://www.waterquality.gov.au/issues/acid-sulfate-soils/identification-and-laboratory-methods-manual.

**National Guideline B** means Sullivan, LA, Ward, NJ, Toppler, NR & Lancaster, G 2018b, *National acid sulfate soils sampling and identification manual*, Department of Agriculture and Water Resources, Canberra, Australian Capital Territory, available at: https://www.waterquality.gov.au/issues/acid-sulfate-soils/sampling-and-identification-methods-manual.

**natrojarosite** means a variant of the mineral jarosite, in which potassium is replaced by sodium. The chemical formula is $NaFe_3(SO_4)_2(OH)_6$ and it forms under similar conditions to jarosite but in areas where potassium is not available.

**net acidity** means either:

- potential sulfidic acidity plus Actual acidity plus Retained acidity minus ANC, if ANC has been corroborated by incubation testing; or
- potential sulfidic acidity plus Actual acidity plus Retained acidity, if ANC has not been corroborated by incubation testing.

**nominated volume** means:

- if it is during the POP trial, a minimum volume of ASS nominated by the supplier for treatment; or
- if it is after the POP trial, a maximum volume of ASS nominated by the supplier for treatment.

  For example, if Supplier has a nominated volume of 1,000 $m^3$, then it has a minimum volume of 1,000 $m^3$ during the POP trial, but has a maximum volume of 1,000 $m^3$ after the POP trial.

**non-licensed premises** means a premises that does not have an EPL associated with it.

**post treatment ANC** means the ANC in ASS after treatment.

**potential ASS ('PASS')** means soils that contain appreciable RIS that have not oxidised but will acidify to a pH

of less than 4.0 after oxidation. The soils are also known as hypersulfidic materials. The field pH of these soils in their undisturbed state is pH 4 or more, and may be neutral or slightly alkaline.

**potential sulfidic acidity ('PSA')** means the latent acidity in ASS that will be released if the RIS they contain are oxidised, and is measured after treatment using chromium reducible sulfur.

**POEO Act** means the *Protection of the Environment Operations Act 1997*.

**premises** has the same meaning as in the POEO Act.

**processor** means a person who receives ASS from offsite for processing. It may include a premises that holds an EPL to carry out Resource Recovery and/or Waste processing (non-thermal treatment) scheduled activities under the POEO Act.

**pugmill** means a soil mechanical mixer with paddle mixers.

**Queensland Guideline** means Dear SE, Williams KM, McElnea AE, Ahern CR, Dobos SK, Moore NG, and O'Brien LE 2024, *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines, Version 5.1*, Department of Resources and Department of Environment, Science and Innovation, Queensland, available at https://www.qld.gov.au/environment/land/management/soil/acid-sulfate/national-guidance.

**reduced inorganic sulfur** includes iron disulfides ($FeS_2$), most commonly pyrite but also marcasite and lower amounts of other compounds such as monosulfides (FeS) and elemental sulfur.

**retained acidity** means the less available fraction of the existing acidity (not measured by the TAA) that may be released slowly into the environment by hydrolysis of relatively insoluble sulfate salts such as jarosite, natrojarosite, schwertmannite and other iron and aluminium hydroxy sulfate minerals.

**re-treat** means undergo treatment again in accordance with condition 4.6 if it is part of the POP trial, or condition 4.8 if it is after the POP trial.

**re-treated stockpiles** means a hotspot(s) that have undergone treatment and are stockpiled.

**sampling plan** means a written procedure for suppliers that must be followed when sampling each treated stockpile. The sampling plan must include the information outlined in Appendix 1 of this order.

**schwertmannite** means an iron oxy-hydroxysulfate mineral with the formula $Fe_8O_8(OH)_6SO_4$ that forms in low-pH, iron-rich waters.

**soil types** includes soil such as silt, sand, clay and other soils.

**supplier** includes a generator, or processor, of ASS.

**supply information** means:

- the date the ASS was supplied;
- the name of each person (and A.C.N. if a corporation) the ASS was supplied to;
- the address of each premises the ASS was supplied to;
- the quantity of ASS (expressed in tonnes) supplied to each person at each premises;
- the stockpile identifier(s) for that ASS;
- the sample identifiers for that ASS; and
- the name and contact details of each person that transported the ASS, including the registration of the vehicle it was transported in.

**sulfidic** means sulfidic soil that contains greater than or equal to 0.01% RIS by mass.

**sulfidic ores or soils** means ASS that meets or exceeds 18 mol $H^+$/t.

**sulfuric** means actual ASS**.** These materials have been oxidised and are severely acidic with pH less than 4.

**TAA** means titratable actual acidity. The acidity measured by titration with dilute sodium hydroxide following

extraction with potassium chloride solution.

**transaction** means the supply of ASS to a consumer.

**treated stockpile** means:

- a stockpile of ASS that has had agricultural lime mixed into it in accordance with the relevant treatment method; or
- insitu treated ASS that has been prepared into a stockpile.

**treatment** means mixing agricultural lime with ASS.

**treatment method** means treatment using a method from the Queensland Guideline. It represents a singular method, meaning just one method.

**validation report** means a report prepared by the environmental practitioner that confirms whether treatment has produced compliant results under the order. It is prepared before ASS is supplied to a consumer. The report must include details of the sampling, such as site figures, sample locations and ID's, stockpile ID's, analytical results of samples taken after treatment, comparison to criteria, and conclusions about any treated stockpiles. The report must also include chain-of-custody documentation, laboratory reports and laboratory sample receipts. It must include the information outlined in Appendix 2. A validation report may contain multiple treated stockpiles.

**verification net acidity** means potential sulfidic acidity plus Actual acidity plus Retained acidity minus (post treatment ANC minus initial ANC).

**virgin excavated natural material** has the same meaning as in Schedule 1 to the POEO Act, except for the reference to sulfidic ores or soils**.**

**Karen Marler**

**Director, Technical (Chemicals, Land and Radiation)**

**Regulatory Practice and Service Division**

## Notes

The EPA may amend or revoke this order at any time. It is the responsibility of the **generator** or **processor** to complies with all relevant requirements of the most current order. The current version of this exemption will be available on www.epa.nsw.gov.au.

In gazetting or otherwise issuing this order, the EPA is not in any way endorsing the supply or use of this substance or guaranteeing that the substance will confer benefit.

The conditions set out in this order are designed to minimise the risk of potential harm to the environment, human health or agriculture, although neither this order nor the accompanying exemption guarantee that the environment, human health or agriculture will not be harmed.

It should be acknowledged that **ASS**, following treatment with agricultural lime, may undergo swelling over time due to the formation of secondary minerals such as gypsum and ettringite. Consequently, the material may not exhibit consistent geotechnical stability and may be unsuitable for use as a structural fill in certain construction situations.

While neutralised **ASS** may be utilised as backfill or for preloading purposes, its appropriateness for load-bearing applications or as engineered fill requires careful evaluation on a case-by-case basis.

A **consumer** of **ASS** should assess whether the material is fit for the purpose, and whether the use may cause harm. The **consumer** may need to seek professional engineering or technical advice.

Regardless of any exemption or order provided by the EPA, the person who causes or permits the application of the substance to land must ensure that the action is lawful and consistent with any other legislative requirements including, if applicable, any development consent(s) for managing operations on the site(s).

The supply of **ASS** remains subject to other relevant environmental regulations in the POEO Act and Waste Regulation. For example, a person who pollutes land (s. 142A) or water (s. 120), or causes air pollution through the emission of odours (s. 129), or does not meet the requirements for asbestos waste (s. 144AAB), regardless of this order, is guilty of an offence and subject to prosecution.

This order does not alter the requirements of any other relevant legislation that must be met in supplying this material, including for example, the need to prepare a Safety Data Sheet. Failure to comply with any condition of this order constitutes an offence under section 286A of the POEO Act. Failure to make or keep records in accordance with this order constitutes an offence under section 286B of the POEO Act. It is also an offence under section 286C of the POEO Act to fail to give another person information or records where required under this order.

**ASS Investigation & Incubation testing**

**Incubation testing** is not compulsory and is optional in an **ASS investigation**. **Incubation testing** may be used to demonstrate **ASS** may have inherent **ANC** that can self-neutralise acidity without **treatment**. **Incubation testing** is used to simulate the natural oxidation behaviour of **ASS**, to identify the presence of potential **ASS**, and to calculate liming requirements. Further information can be found in **National Guideline A**. **Incubation testing** may be considered if there is sufficient **ANC** in **ASS** as evidenced from the **CrS suite**. If test results from the **CrS suite** show there is insufficient **ANC**, a person should consider whether **incubation testing** is necessary.

If a person undertakes **incubation testing**, they must:

- undertake sampling and testing for **net acidity** using the **CrS suite**; and
- select **ASS** from sample locations that have the highest **net acidity** sample results and a minimum of 20% of **net acidity** sample results for incubation testing.

If the pH measured at any point during the incubation test drops below pH 6.5, then **ANC** must not be used in the determination of **net acidity**. It is important to note, the **National Guideline A** (Figure C2) classifies soil as 'non-ASS' after incubation of 19 weeks when the pH is ≥ 4. However, some soil materials with such a result may still be hyposulfidic and may still require neutralisation. Therefore, if at any point during the incubation test the pH drops below pH 6.5, then ANC must not be used to determine the **net acidity**.

The 'highest' **net acidity** sample results means sample results from the **CrS suite**. For example, if during an **ASS investigation** 10 samples were tested using the **CrS suite**, and the highest concentration for **net acidity** was 150 mol $H^+$/t (Sample 1), followed by 130 mol $H^+$/t (Sample 2), and the remainder of the 8 sample results were less than 130 mol $H^+$/t, then 20% would mean selecting **ASS** from sample locations Sample 1 and Sample 2 for incubation testing. Given an **Expert** is required under this order to prepare an **Expert Report (ASS Investigation)** where **incubation testing** is undertaken, **supplier**s are encouraged to contact an **Expert** first before undertaking any **ASS Investigation** and **incubation testing** to ensure the process satisfies the requirements of the **Expert**.

The rationale for selecting 20% of the highest **net acidity** sample results for **incubation testing** is to strike a balance between cost considerations and obtaining scientifically valid results. It is also to demonstrate that if the highest results pass the incubation test, i.e., pH measured at any point during the incubation test does not drop below pH 6.5, then the other samples not tested for **incubation testing** are likely to pass the incubation test. Conversely, if the highest **net acidity** sample results fail **incubation testing**, then it is likely that the other sample results are likely to fail **incubation testing**.

**Supplier**s should be made aware of the implications of **incubation testing**. **Incubation testing** can take a minimum of 8 weeks depending on which method is used. **Incubation testing** does not guarantee that test results will pass the incubation test, and **treatment** may still be required. **Supplier**s are encouraged to engage an **environmental practitioner** and to speak with an **Expert** before undertaking **incubation testing**.

**During the POP trial**

A POP trial is required to demonstrate a **supplier** can repeat **treatment** and reproduce consistent compliant analytical results over time. During the POP trial, a higher sampling frequency is required. The order sets out what is required before the **supplier** may reduce the sampling frequency.

It is important to understand the concept of '**nominated volume**' for a POP trial. If the **nominated volume** is 1,000 $m^3$, then there must be three **consecutive treated stockpiles** with a minimum volume of 1,000 $m^3$. These **treated stockpile**s must be compliant before undertaking a reduced sampling frequency.

For example, if the 1st and 2nd **treated stockpile**s are compliant, but the 3rd is not, a **supplier** cannot undertake a reduced sampling frequency under the Order. Similarly, if a **supplier** has failed the 1st, 2nd, and 5th **treated stockpile**s, but the 3rd, 4th and 6th are compliant, the **supplier** has not achieved 3 **consecutive treated stockpiles** that are compliant. As such, a **supplier** must continue treatment as per conditions 4.6 and 4.7 of this order.

**Changing the treatment method and soil type**

If the **supplier** changes the **treatment method**, for example, from using a **pugmill** that has undergone a successful POP trial, to an excavator, and changes back to a **pugmill**, the **supplier** does not need to repeat another POP trial for the **pugmill**. Following from this example (**pugmill** to excavator), if a **supplier** wishes to use another **pugmill** (pugmill B) that is different from the initial **pugmill** (pugmill A), then the **supplier** would need to undergo another POP trial for pugmill B.

If the **supplier** has selected multiple **treatment method**s, such as a **pugmill** and excavator, in the **ASSMP**, it must undertake a POP trial for both **treatment method**s. The **pugmill** and excavator must not be considered as a singular **treatment method**. The **ASSMP** may reference multiple **treatment method**s.

If the **supplier** proposes to treat a new soil type that is not covered by the **ASSMP**, then the **supplier** must amend the **ASSMP**, have an **Expert** approve the amendment, and undertake a new POP trial. For example, if a **supplier** has an **ASSMP** that allows it to treat the soil type 'sand' using a **pugmill** but then decides to treat 'clay' using the same **pugmill**, then it must have its **ASSMP** amended by an **environmental practitioner**, and an **Expert** approve the amendment. This is because the **treatment method** may not be suitable for the new soil type to be treated. As such, an **Expert** must approve the amendment, and if approved, a new POP trial is required for the new soil type.

**After the POP trial**

After obtaining compliant results for three **consecutive treated stockpiles**, a **supplier** may undertake a reduced sampling frequency as per row 2 of Table 1. However, it is important to understand how the **nominated volume** works.

For example, if the **nominated volume** during the POP trial was 1,000 $m^3$ and compliant results have been obtained for three **consecutive treated stockpiles**, then after the POP trial, the **supplier** may prepare a treated stockpile up to a maximum volume of 1,000 $m^3$. It may prepare a treated stockpile, for example, up to 200 $m^3$, 500 $m^3$, or 800 $m^3$. But it must not exceed 1,000 $m^3$. If it plans to exceed 1,000 $m^3$, then the **supplier** would need to repeat another POP trial for the new **nominated volume** and condition 4.7 applies. The reason being, although a successful POP trial may have been achieved for say 1,000 $m^3$, the **supplier** may not necessarily be able to upscale the treatment to say 50,000 $m^3$ after the POP trial due to a range of reasons. As such, after the POP trial, the **nominated volume** is up to a maximum volume of 1,000 $m^3$.

**Insitu treatment of ASS**

A **supplier** may choose to undertake insitu treatment of **ASS**. Insitu treatment may be a preferred option if the site has limited space. The **environmental practitioner** that prepares the **ASSMP** would need to specify an insitu treatment method using guidance from the **Queensland Guideline**. After **insitu treated ASS** has been prepared, it must be stockpiled for sampling and testing in accordance with this order. Insitu sampling is not permitted under this order. A potential challenge for insitu treatment is ensuring that any **insitu treated ASS** is not over-excavated into untreated insitu **ASS** during the stockpiling and excavation process. As such, stockpile sampling is required to be able to detect if any untreated insitu **ASS** is found in the stockpile and that adequate **agricultural lime** has been mixed into the **ASS**. If the **environmental practitioner** is not an **Expert** under this order, the **supplier** must also engage an **Expert** to review and approve the **ASSMP** and prepare an **Expert report (ASSMP)**.

## Appendix 1 – Sampling Plan

The sampling plan must be prepared in accordance with the **National Guideline B**, and must include the following information. A person must give clear reasons in the **sampling plan** to justify any deviations from the information below:

1. site information, such as site name or description, street address, property description (e.g. section, hundred, plan, parcel), site area and dimensions, local government authority, locality map
2. identify the position(s) responsible for implementing and overseeing sampling;
3. require the sampling and testing requirements in this order to be undertaken without contradiction;
4. list the chemicals and attributes to be tested, the corresponding laboratory testing methods to be employed, the appropriate sample containers and the holding times for those chemicals and attributes;
5. identify the sampling equipment required including decontamination equipment and personal protective equipment to ensure a representative sample is collected with negligible cross-contamination that produces reliable results;
6. describe the sampling methods employed for each chemical or attribute (as listed in Table 2 above), including the volume and quantity of each sample to be collected and the type of sample to be collected;
7. outline the sampling pattern, density and sampling location(s) selected to ensure the samples collected are representative of the **treated stockpile**, using appropriate illustrations;
8. describe the procedures for photographing and labelling each sample, using a unique sample identifier consisting of, but not limited to:
    a. the date and time the sample was collected;
    b. the stockpile identifier(s) the sample was taken from,
    c. references to other samples; and
    d. the details of the sampler;
9. describe procedures for handling, containment and transport of samples to ensure samples are delivered to the laboratory in required condition and within the timeframes required to maintain the quality of the sample for each chemical or attribute to ensure the quality of the testing. This includes:
    a. procedures necessary to ensure chain-of-custody for each sample, which detail the name of the sampler, collection date, testing to be performed, sample preservation method, departure time and condition of samples at dispatch;
    b. sample preservation and storage; and
    c. decontamination of sampling equipment.

## Appendix 2 – Checklist Validation Report

| Recommended report section | Required information |
|---|---|
| Introduction | Project background<br>Any conflicts of interest to be declared |
| | Site information including site name or description, street address, property description (e.g. section, hundred, plan, parcel), site area and dimensions, local government authority, locality map |
| | Objective |
| Scope of work | A brief summary of scope of work |
| Fieldwork | The date of fieldwork, site observation, and ASS treatment, the liming rate and nominated volume for validation |
| | Sample collection, analytical suite |
| Validation results and discussion | Summary of all results, in a table that shows all essential details such as sample identification numbers and sampling depth, post-treatment validation criteria and highlights all results exceeding validation criteria (not just highest) |
| | Summary of the whole POP trial work on the three consecutively treated stockpiles (if applicable) |
| | Summary of changing the **treatment method**, soil type or nominated volume (if applicable) |
| | Summary of hotspot segregation work and reference to hotspot segregation report (if applicable) |
| | Summary of retreatment work (if conducted, must be stated) |
| Conclusion | Summary of all findings |
| | Conclusion addressing the stated objectives |
| | Limitations and extent of the uncertainties in the results |
| Recommendation | A clear statement confirming whether the nominated volume subjected to post-treatment complies with the order. |
| Appendices | Laboratory reports; Laboratory sample receipts; Chain of custody documentation and relevant supporting documents |

# Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014

# The acid sulfate soil (ASS) exemption 2025

## Introduction

This exemption:

- is issued by the Environment Protection Authority (**EPA**) under clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 (**Waste Regulation**); and
- exempts a consumer of acid sulfate soil from certain requirements under the *Protection of the Environment Operations Act 1997* (**POEO Act**) and the Waste Regulation in relation to the application of that waste to land, if the consumer complies with the conditions of this exemption.

This exemption should be read in conjunction with 'the acid sulfate soil (ASS) order 2025'. Any words or phrases set out in bold in this order are defined in condition 7 of this exemption.

## 1. Waste to which this exemption applies

1.1. This exemption applies to acid sulfate soil (**ASS**).

1.2. In this exemption, **ASS** means soil (including but not limited to sand, gravel, silt, clay and rock) that:

a) has either been affected by the oxidation of **reduced inorganic sulfur (RIS)** (such as **actual ASS**), or has the capacity to be affected by the oxidation of their **RIS** constituents (such as **potential ASS**, or **hyposulfidic materials**); and

b) may be treated by mixing **agricultural lime**; and

c) is either **Virgin Excavated natural material** or **Excavated natural material**, as defined in this exemption.

In this exemption, **ASS** does not include **monosulfidic black ooze** or **acid mine drainage materials**.

## 2. Persons to whom this exemption applies

2.1. This exemption applies to any person who applies or intends to apply **ASS** to land as set out in condition 6.3 of this exemption.

## 3. Duration

3.1. This exemption commences on 5 December 2025 and is valid until revoked by the EPA by notice published in the Government Gazette.

## 4. Premises to which this exemption applies

4.1. This exemption applies to premises at which the consumer's actual or intended application of **ASS** to land is carried out.

## 5. Exemption

5.1. Subject to the conditions of this exemption, the EPA exempts each **consumer** from the following provisions of the POEO Act and the Waste Regulation in relation to the consumer's actual or intended application of ASS to land as **engineering fill** or for use in **earthworks** at the **premises**:

- section 48 of the POEO Act in respect of the scheduled activities described in clauses 39 and 42 of Schedule 1 of the POEO Act;
- Part 4 of the Waste Regulation;
- section 88 of the POEO Act; and
- clause 109 and 110 of the Waste Regulation

5.2. The exemption does not apply in circumstances where **ASS** is received at the **premises** for which the **consumer** holds a licence under the POEO Act that authorises the carrying out of the scheduled activities on the premises under clause 39 'waste disposal (application to land) or clause 40 'waste disposal' (thermal treatment) of Schedule 1 of the POEO Act.

## 6. Conditions of exemption

A **consumer** who applies or intends to apply **ASS** to land in accordance with this exemption must comply with the following conditions.

6.1. At the time **ASS** is received at the **premises**, it must meet all **supplier requirements** for ASS which are required under 'the ASS order 2025'.

6.2. Prior to receiving **ASS** at the **premises**, the **occupier** of the **premises** must have:

a) all necessary development consents under Part 4 of the **EP&A Act**;

b) all the necessary approvals to carry out the project or infrastructure under the former Part 3A or Division 5.2 of Part 5 of the **EP&A Act**; and

c) complied with any applicable requirements in Division 5.1 of Part 5 of the **EP&A Act** to receive waste subject to a resource recovery order and resource recovery exemption.

6.3. **ASS** can only be applied to land as **engineering fill** or for use in **earthworks**. See Notes about engineering and geotechnical considerations.

6.4. The consumer must keep a written record of the following for a period of six years:

a) the quantity of **ASS** received;

b) the name and address of the **supplier** of **ASS** received; and

c) any records the **consumer** receives from the **supplier** in connection with the supply of the **ASS**.

6.5. The **consumer** must make any records required to be kept under this exemption available to the EPA on request.

6.6. The **consumer** must ensure that any application of **ASS** to land must occur within a reasonable period of time after receipt.

## 7. Definitions

In this exemption:

**acid mine drainage materials** means mine waste materials such as waste rock, tailings, overburden and

other materials that contain sulfide minerals such as pyrite that have been, or may be, exposed to oxygen and water.

**actual ASS** means soils containing highly acidic soil horizons resulting from the oxidation of soil materials that are rich in RIS primarily pyrite. When this oxidation of RIS produces acidity in excess of the soil material's capacity to neutralise this acidity, the soil material will often acidify to a pH 4 or less, forming an actual ASS. The recognition of actual ASS materials can be confirmed by the presence of jarosite in these materials, or the location of other actual ASS or PASS materials within or in the nearby vicinity to the sampling location.

**agricultural lime** means alkaline calcium carbonate ($CaCO_3$) based neutralising agent with a particle size <500 micron used to treat ASS. It is recommended that the agricultural lime should be at least 95% calcium carbonate and hence has a neutralising value of 95. Agricultural lime must not include quick lime, burnt lime, or hydrated lime, where hydrated lime means calcium hydroxide created by adding calcium oxide to water.

**application or apply to land** means applying to land by:

- spraying, spreading or depositing on the land; or
- ploughing, injecting or mixing into the land; or
- filling, raising, reclaiming or contouring the land.

**consumer** means a person who applies, or intends to apply, ASS to land.

**earthworks** means filling to achieve the required topography subject to meeting appropriate engineering and geotechnical requirements. Earthworks does not include use of ASS as a growing medium, such as being used to grow vegetation.

**engineering fill** means material that is required to support structures or associated pavements, or for which engineering properties are to be controlled subject to meeting appropriate engineering and geotechnical requirements. Engineering fill does not include use of ASS as a growing medium, such as being used to grow vegetation.

**EP&A Act** means the *Environment Planning and Assessment Act 1979*.

**excavated natural material** has the same meaning as defined in *The excavated natural material order 2014*, except for the reference to:

- acid sulfate soils, potential acid sulfate soils or sulfidic ores; and
- pH from Table 4 of the order.

**hyposulfidic materials** means sulfidic soil that would not become severely acidic if allowed to oxidise completely.

**monosulfidic black ooze** means black, gel-like materials (moisture content greater than 70%), often oily in appearance, greatly enriched in monosulfides (up to 27%), high in organic matter (usually 10% organic carbon) that can form thick (greater than 1.0 m) accumulations in waterways (including drains), in ASS wetlands.

**potential ASS ('PASS')** means soils that contain appreciable RIS that have not oxidised but will acidify to a pH of less than 4.0 after oxidation. The soils are also known as hypersulfidic soil materials. The field pH of these soils in their undisturbed state is pH 4 or more, and may be neutral or slightly alkaline.

**premises** has the same meaning as in the POEO Act.

**reduced inorganic sulfur** includes iron disulfides ($FeS_2$), most commonly pyrite but also marcasite and lower amounts of other compounds such as monosulfides (FeS) and elemental sulfur.

**supplier** has the same meaning as set out in '*The acid sulfate soil (ASS) order 2025*'.

**supplier requirements** mean the conditions set out in Condition 4 of '*The acid sulfate soil (ASS) order*

*2025'*.

**virgin excavated natural material** has the same meaning as in Schedule 1 to the POEO Act, except for the reference to sulfidic ores or soils**.**

**Karen Marler**

**Director, Technical (Chemicals, Land and Radiation)**

**Regulatory Practice and Service Division**

## Notes

The EPA may amend or revoke this exemption at any time. It is the responsibility of the **consumer** to comply with all relevant requirements of the most current exemption. The current version of this exemption will be available on www.epa.nsw.gov.au.

In gazetting or otherwise issuing this exemption, the EPA is not in any way endorsing the use of this substance or guaranteeing that the substance will confer benefit.

The conditions set out in this exemption are designed to minimise the risk of potential harm to the environment, human health or agriculture, although neither this exemption nor the accompanying order guarantee that the environment, human health or agriculture will not be harmed.

It should be acknowledged that **ASS**, following treatment with agricultural lime, may undergo swelling over time due to the formation of secondary minerals such as gypsum and ettringite. Consequently, the material may not exhibit consistent geotechnical stability and may be unsuitable for use as a structural fill in certain construction situations.

While neutralised **ASS** may be utilised as backfill or for preloading purposes, its appropriateness for load-bearing applications or as engineered fill requires careful evaluation on a case-by-case basis.

A consumer of **ASS** should assess whether the material is fit for the purpose, whether the use may cause harm, and whether the use is appropriate in acidophilic environments. The **consumer** may need to seek professional engineering or technical advice.

Regardless of any exemption provided by the EPA, the person who causes or permits the application of the substance to land must ensure that the action is lawful and consistent with any other legislative requirements including, if applicable, any development consent(s) for managing operations on the site(s).

The receipt of **ASS** remains subject to other relevant environmental regulations in the POEO Act and the Waste Regulation. For example, a person who pollutes land (s. 142A) or water (s. 120), or causes air pollution through the emission of odours (s. 129), or does not meet the requirements for asbestos waste (s 144AAB), regardless of having an exemption, is guilty of an offence and subject to prosecution.

This exemption does not alter the requirements of any other relevant legislation that must be met in utilising this material, including for example, the need to prepare a Safety Data Sheet (SDS).

You will no longer receive the benefit of this exemption if you fail to comply with any condition of this exemption. Failure to make or keep records in accordance with this exemption constitutes an offence under section 286B of the POEO Act. It is also an offence under section 286C of the POEO Act to fail to give another person information or records where required under this exemption.

**Shoalhaven City Council**

***Coastal Management Act 2016***

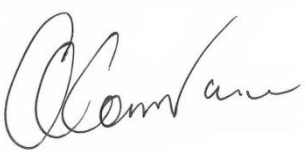
**Gazettal and Commencement of the St Georges Basin/Sussex Inlet, Swan Lake and Berrara Creek Coastal Management Program**

Notice is hereby given, under Section 17 of the *Coastal Management Act 2016* (NSW), that with the certification of the Minister for Climate Change, Energy, the Environment, and Heritage, Shoalhaven City Council has prepared and adopted the St Georges Basin/Sussex Inlet, Swan Lake and Berrara Creek Coastal Management Program.

The Coastal Management Program comprises a program of integrated management actions that are intended to address key issues, and harness new opportunities for the management of the St Georges Basin/Sussex Inlet, Swan Lake and Berrara Creek coastal zones. The Coastal Management Program will remain in force until such time as it is reviewed, amended or replaced by another Coastal Management Program.

The St Georges Basin/Sussex Inlet, Swan Lake and Berrara Creek Coastal Management Program may be viewed on Council's web site at: https://doc.shoalhaven.nsw.gov.au/LinkGeneratorAPI/record/9925672/preview_latest_final_version_pdf A hard copy may be viewed at Council's main office.

Dated: **02 December 2025**



Andrew Constance
**Chief Executive Officer**
**Shoalhaven City Council**