FORTIFY
GEOTECH

# Geotechnical Investigation Report – Addendum

Proposed Cinema

# MM Atelier Architects

## Proposed Cinema
## Warlters Street, Port Macquarie, NSW

## Geotechnical Investigation Report - Addendum

### SPOCAS (ACID SULPHATE) TEST RESULTS

Results of the acid sulphate testing are summarised in Table 1 below. Full details are provided on the NATA test certificates are attached.

**Table 1 - Laboratory Test Results Summary**

| Sample No. | 1A/1D | 3A/1D |
|---|---|---|
| **Depth Interval** | 0.4m – 0.5m | 1.0m-1.1m |
| **$pH_{Kcl}$ (before oxidation)** | 7.1 | 9.8 |
| **$pH_{ox}$ (after oxidation)** | 5.3 | 7.5 |
| **Total Actual Acidity (mol $H^+$/tonne)** | <5 | <5 |
| **Total Potential Acidity (mol $H^+$/tonne)** | <5 | <5 |
| **Total Sulphidic Acidity (mol $H^+$/tonne)** | <5 | <5 |
| **a-net Acidity (mol $H^+$/tonne)** | <5 | <5 |
| **Liming Rate (kg $CaCO_3$/tonne)** | <0.75 | <0.75 |

The in-situ pH (i.e pH before oxidation in air) of the tested soil was 7.1/9.8, and upon exposure to air, the tested soil had a pH value of 5.3/7.5. The tests suggest that the soil is neutral to basic and becomes more acidic upon exposure to air, and therefore, may contain iron sulphides or sulphidic material. Based on the ASSMAC 1998 “Acid Sulphate Soil Manual” guidelines, the level of environmental risk for this development is rated as “low” as pH>4.5. The duration of soil disturbance could last for several weeks, and surface run-off could drain directly into water bodies.

The acid sulphate tests established that the site soils are unlikely to produce sulphuric acid upon exposure to oxygen. To neutralise the soil during earthworks and for disposal and to reduce the risk of damage to concrete and steel structures, these excavated soils can be treated with lime during earthworks. The “Acid Sulphate Soil” manual provides guidelines on required lime dosages. Based on these tests, 1.0kg of $CaCO_3$ per tonne of disturbed soil would be required, which is approximately 2kg per $m^3$. Testing should be conducted during earthworks to confirm that the dosage rates are suitable. To protect natural waterbodies from acidic runoff, areas where earthworks and soil disturbance occurs should be totally bounded to retain the water. Crushed limestone can also be place in drainage lines. Acidic conditions are expected to be present in all site soils over the whole site, and above treatment should be carried out on all soil disturbed during earthworks.

If necessary, structures and in-ground services can be further protected by installation of water-proof membranes under slabs and against the back of retaining walls, and by insulating cables and pipes.

Should you require any further information, please do not hesitate to contact our office.

Yours faithfully,
**Fortify Geotech**

Allison Baillie
Geotechnical Engineer

**Report No: NAA18-1893** **Page 1 of 2**

**Date Received: 16/11/2018**

**Date Reported: 3/12/2018**

**Order No: COC dated 16/11/2018**

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**Attention: Allison Baillie**

**Fortify Geotech Pty Ltd.**
**7/80 George Street**
**Parramatta NSW 2150**

**Type of Samples: sPOCAS analysis of two soil samples identified as 'Wartlers Street, Port Macquarie' and as listed on pages 1 & 2. Samples in plastic bags were dispatched by customer on 16/11/2018. The analysis was performed by Envirolab laboratory at Sydney, NATA Accreditation No. 2901, Report No. 206457. Analysed 'as received'.**

| Tests | Units | 1A/1D 0.4 m - 0.5 m | 3A/1D 1.0 m - 1.1 m | Method: Analysed by Envirolab |
|---|---|---|---|---|
| pH KCl | pH Units | 7.1 | 9.8 | Envirolab: Inorg 064 |
| TAA pH 6.5 | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| s-TAA pH 6.5 | % w/w S | <0.01 | <0.01 | Envirolab: Inorg 064 |
| pH ox | pH Units | 5.3 | 7.5 | Envirolab: Inorg 064 |
| TPA pH 6.5 | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| s-TPA pH 6.5 | % w/w S | <0.01 | <0.01 | Envirolab: Inorg 064 |
| TSA pH 6.5 | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| s-TSA pH 6.5 | % w/w S | <0.01 | <0.01 | Envirolab: Inorg 064 |
| ANCE | % $CaCO_3$ | <0.05 | 0.44 | Envirolab: Inorg 064 |
| a-ANCE | moles $H^+$/t | <5 | 88 | Envirolab: Inorg 064 |
| s-ANCE | % w/w S | <0.05 | 0.14 | Envirolab: Inorg 064 |
| SKCl | % w/w S | <0.005 | <0.005 | Envirolab: Inorg 064 |
| SP | % w/w | 0.008 | 0.007 | Envirolab: Inorg 064 |
| SPOS | % w/w | 0.006 | 0.005 | Envirolab: Inorg 064 |
| a-SPOS | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| CaKCl | % w/w | 0.11 | 0.08 | Envirolab: Inorg 064 |
| CaP | % w/w | 0.12 | 0.30 | Envirolab: Inorg 064 |

**Note: Units: Measurements as per results table above. Analysed "as received".**
Sample will be disposed of 30 days after issue of this report unless otherwise notified. < Denotes 'less than'.
Envirolab: Method Inorg 064 summary: sPOCAS determined using titrimetric and ICP-AES techniques, based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1-June 2004.

Sarita Chand
Approved Signatory

Dhruba Subedi
Approved Signatory

NATA ACCREDITED FOR TECHNICAL COMPETENCE
Accredited for compliance with ISO/IEC 17025-Testing Laboratory No.11111

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| Tests | Units | 1A/1D 0.4 m - 0.5 m | 3A/1D 1.0 m - 1.1 m | Method: Analysed by Envirolab |
|---|---|---|---|---|
| CaA | % w/w | 0.006 | 0.22 | Envirolab: Inorg 064 |
| MgKCl | % w/w | <0.005 | <0.005 | Envirolab: Inorg 064 |
| MgP | % w/w | <0.005 | <0.005 | Envirolab: Inorg 064 |
| MgA | % w/w | <0.005 | <0.005 | Envirolab: Inorg 064 |
| SHCl | % w/w S | <0.005 | <0.005 | Envirolab: Inorg 064 |
| SNAS | % w/w S | <0.005 | <0.005 | Envirolab: Inorg 064 |
| a-SNAS | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| s-SNAS | % w/w S | <0.01 | <0.01 | Envirolab: Inorg 064 |
| Fineness Factor | - | 1.5 | 1.5 | Envirolab: Inorg 064 |
| a-Net Acidity | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| s-Net Acidity | % w/w S | <0.01 | <0.01 | Envirolab: Inorg 064 |
| Liming Rate | kg $CaCO_3$/t | <0.75 | <0.75 | Envirolab: Inorg 064 |
| s-Net Acidity without ANCE | % w/w S | <0.01 | <0.01 | Envirolab: Inorg 064 |
| a-Net Acidity without ANCE | moles $H^+$/t | <5 | <5 | Envirolab: Inorg 064 |
| Liming Rate without ANCE | kg $CaCO_3$/t | <0.75 | <0.75 | Envirolab: Inorg 064 |

**Note: Units: Measurements as per results table above. Analysed "as received".**
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# About us

We work with our clients to provide practical advice and solutions tailored to each project. Our professional services are reliable, responsive and efficient.

Our highly capable Geotechnical Engineers and Geologists have a comprehensive understanding of the industry. We provide the best engineering solution for complicated geotechnical engineering issues. This has earned us a solid reputation with our Construction Industry, Municipal and Government clients

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- Geotechnical Site Investigations and Reporting;
- Engineering Geology;
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- Dam Engineering; Embankment Design and Specification;
- Geotechnical Design Recommendations;
- Pavement Engineering and Design;
- Pavement Condition Surveys;
- Slope Stability and Risk Assessments;
- Geotechnical and Hydrological Instrumentation and Monitoring;
- Footing and Excavation Supervision and Certifications;
- Excavated soil/rock assessments and VENM assessments;
- Supervision and Certification of Earthworks and Controlled Fill, including Level 1 supervision;
- Geotechnical Construction Specifications;
- Deep Excavation Support; and
- Slope/Retaining Structure Analysis and Design