REGIONAL GEOTECHNICAL SOLUTIONS

Manning-Great Lakes
Port Macquarie
Coffs Harbour

RGS31785.1-AD Rev. 1

18 June 2019

Coffs Harbour City Council
2 Castle Street
COFFS HARBOUR NSW 2450

Attention: Ken Welham

Dear Ken,

RE: Proposed Cultural and Civic Space Project – 23 to 31 Gordon Street Coffs Harbour

Acid Sulfate Soil Management Plan - Preliminary

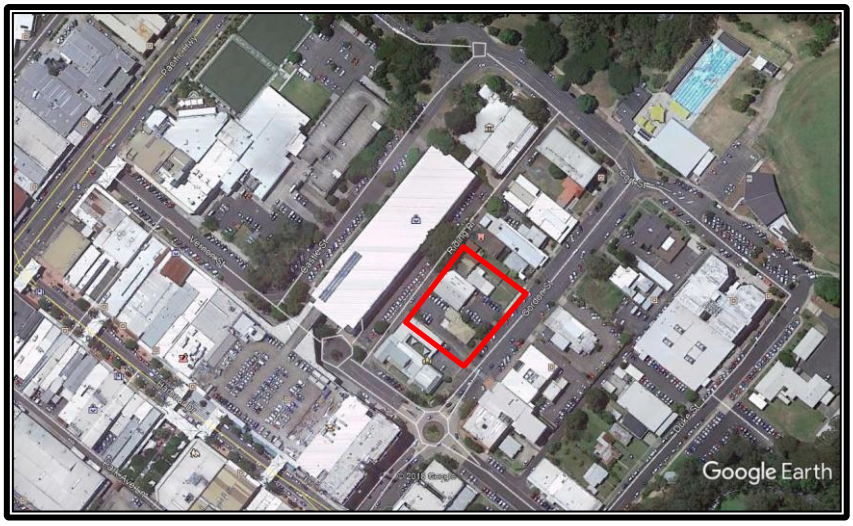
1 INTRODUCTION

This Preliminary Acid Sulfate Soil Management Plan (ASSMP) has been prepared for the proposed Coffs Harbour Cultural and Civic Space Project to be constructed at 23 to 31 Gordon Street, Coffs Harbour (Lot 20 DP758258, Lot B DP346105 and Lot 123 DP749233).

Further investigation is recommended to assist preparation of the Plan. In addition, the location of the ASS treatment area has implications for how the Plan will be undertaken. Consultation with the NSW EPA is recommended to assist in identifying where treatment can be undertaken.

The site is situated within the Coffs Harbour CBD within flat low-lying alluvial topography as illustrated in Diagram 1. The site encompasses an area of approximately 4,000m^2 and is currently occupied by single storey residential and commercial buildings with associated on grade car parking areas.

Diagram 1: Site Location and Setting



Regional Geotechnical Solutions Pty Ltd
ABN 51141848820

14 / 25-27 Hurley Drive
Coffs Harbour NSW 2450
Ph (02)66500010

Email adam.h@regionalgeotech.com.au
Web: www.regionalgeotech.com.au

2 PROPOSED DEVELOPMENT

The proposed building is expected to be multi-level (up to seven above ground floors) with a single level basement car parking area. Surface levels are approximately 4.7m AHD.

The basement excavation will cover most of the site – approximately 65m by 50m and will be up to about 4m in depth. Therefore approximately 13,000m^3 of material will require removal from site.

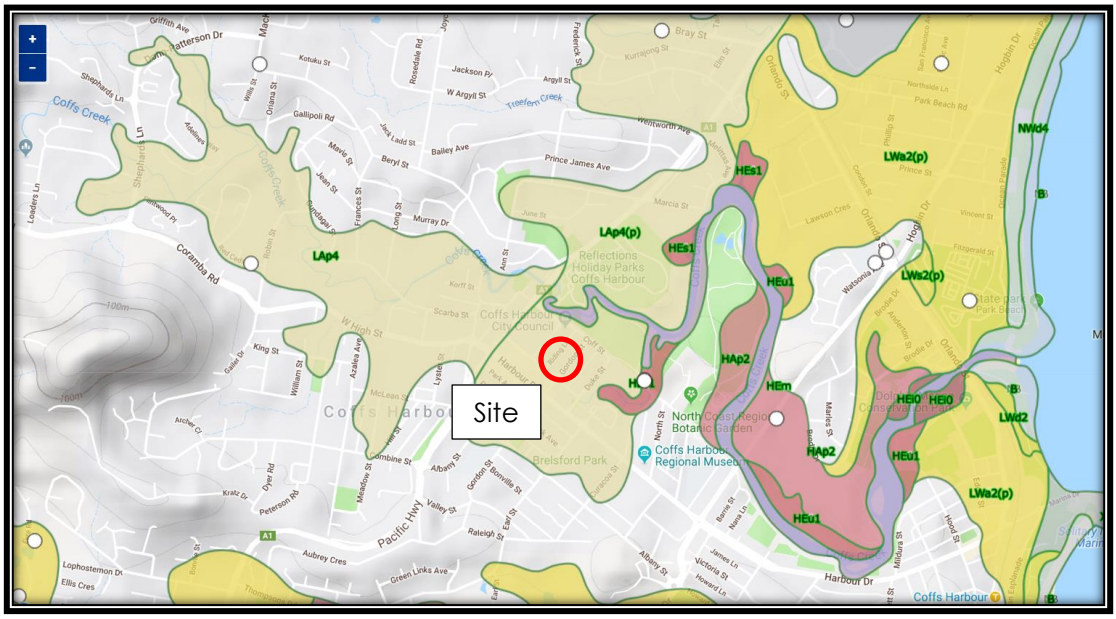
3 ACID SULFATE SOIL ASSESSMENT

An acid sulfate soil (ASS) assessment was undertaken as part of the geotechnical assessment completed for the project by RGS (Ref: RGS31785.1 – AC Rev. 1 dated 18 June 2019). The results of the assessment are summarised below.

The investigations encountered a subsurface profile comprising minor fill and topsoil overlying over-consolidated alluvial clays and silts to depths ranging from 9m to 12m, overlying residual clay soils.

An extract of the acid sulfate soils risk map for Coffs Harbour is presented below, the map indicates the site is situated on a Pleistocene alluvial plain of greater than 4m elevation within an area of low probability of acid sulfate soils below 3m from surface.

Diagram 2: Acid Sulfate Soil Risk Map for Site



Sourced from the NSW Government Environment and Heritage eSPADE website.

<u>Based on the published Coffs Harbour ASS Risk Map which indicated a low probability of ASS below 3m at the site there was only limited ASS analysis undertaken in the upper soil profile.</u>

The results of the analysis were compared against the action criteria as presented in Table 5.4 of the Water Quality Australia *National Acid Sulfate Soils Guidance National acid sulfate soils sampling and identification methods manual June 2018.*

The laboratory test results indicated:

- Net acidity concentrations exceeded the action criteria (18 moles H+/ tonne) for all samples tested;

- The bulk of the acidity present is natural acidity rather than ASS, potentially derived from organic acids or strong leaching of the profile. However, the soils also include traces of potential acidity (pyrite), retained acidity (e.g. jarosite) and sulfate derived actual acidity which in total exceed the action criteria;
- The potential sulfidic acidity (pyrite) concentrations were below the assessment criteria in all but one sample (BH4, 1.5 to 1.95m) which marginally exceeded the Potential ASS action criteria; and
- The actual acidity concentrations exceeded the action criteria for all samples tested and the soils are therefore considered Actual ASS.

Based on the assessment any alluvial clays and silts (Unit 2) that are disturbed by excavation works should be considered as Actual ASS and treated in accordance with this ASS Management Plan (ASSMP).

As noted above there was limited assessment of the upper profile undertaken based on the available information. Further assessment with close spaced sampling intervals to delineate the vertical extent of the ASS is therefore recommended.

4 RESPONSIBILITIES

The project superintendent is responsible for implementing the ASS management protocols detailed within this ASSMP. Only a suitably experienced ASS consultant may vary the procedures detailed herein.

The superintendent shall:

- Record a daily log showing the volume of material that has been excavated, and treated; and
- Ensure that validation testing is undertaken by an independent monitoring consultant on a regular basis.

The requirements of the ASSMP are in addition to, but do not override any other standard procedures such as safety considerations. Where conflict results, or may result from, the implementation of the ASS management as against other performance criteria, the project superintendent shall obtain directives from the project manager or the ASS consultant as appropriate.

5 NEUTRALISING MATERIALS

Fine Agricultural Lime (ag-lime) must be used for liming of excavated materials. Hydrated lime, Dolomatic ag-lime, or magnesium blend ag-lime, should not be used. The ag-lime grind shall have:

- At least 85% by weight passing 1mm, and 100% passing 2.5mm. In general, a finer grind is better; and
- Ag-lime shall have a Neutralising Value (NV) of 90% or better (i.e. NV>90).
- Given the estimated 13,000m3 of material requiring treatment, a preliminary estimate indicates that a total of 234,000kg of lime will be required to treat the inferred ASS materials.

6 MANAGEMENT AND TREATMENT

6.1 Options

The management and treatment of the Actual ASS will be dependent on where the material is treated. The proposed basement excavation will have limited work area available on site and treatment on site is therefore likely to require double handling of small quantities of materials for treatment with associated time restrictions and costs. Alternatively, removal of the untreated material to a suitable treatment site may allow more efficient treatment of the excavated materials.

NSW EPA requirements (Waste Classification Part 5 – ASS) note Actual ASS is to be treated on site prior to removal off site to a licenced waste disposal facility. Transport of ASS off site for treatment and then potential reuse of the material as a general fill will require a Site Specific Exemption application to NSW EPA for disposal at a nominated site that has a Development Approval for filling works. This process requires the material to be described in detail and an assessment on potential environmental risks the material poses. Based on previous experience with such applications, a minimum turn around time of three months is anticipated.

6.2 Treatment Area

The treatment area shall be fully enclosed by a bund wall to prevent runoff to other areas of the site. The bund must have a height of at least 0.5m that comprises of soils that are not ASS or are treated ASS. The size of the treatment area should be of sufficient size to treat the excavated materials at the proposed excavation rate and to store material for the period required to undertake the verification testing (approximately two (2) weeks). The treatment area should be lined with several layers of heavy duty plastic (HDPE). The lining should be replaced periodically as required, where it is damaged during the treatment process. Treatment may also be undertaken in an area underlain by low permeability material such as concrete or clay. Alternatively the material may be placed in a large metal skip bin for treatment. It is noted that this may not be efficient for treatment of large volumes of material.

The treatment area should always be covered with heavy duty plastic to prevent runoff, particularly when inclement weather is forecast.

The stockpile pad should grade to a low point where potential leachate can be captured within the bunded area for further treatment if required.

6.3 Treatment

The ASS shall be placed in the treatment area and spread in a layer of not more than 00mm thickness with approved ag-lime being applied across the treatment area at a rate of 10kg / tonne or 18kg / m^3. In calculating the quantity of lime required, the theoretical requirement has been multiplied by a factor of safety of 1.5 to account for the rate of lime reactivity and the possibility of non-homogenous mixing.

The following liming procedures (or equivalent) should be undertaken:

- Spreading of soil in thin (<200mm) layers at the prepared treatment pad;
- Addition of lime by a spreader or pug;

- Cultivate the lime thoroughly into the soil using a disc plough or cultivator before placement of next layer;
- Placement of second layer onto stockpile and addition of lime, repeating the process until the maximum height of the stockpile is achieved; and
- Removal of the material and disposal (Refer Section 6.6.

The soil undergoing treatment should be kept moist at all times but not wet.

6.4 Validation Testing

Validation testing shall be undertaken by an independent ASS consultant at the initial rate of one sample per 250m^3 or part thereof. The samples shall be submitted to a NATA accredited laboratory for validation testing using the Chromium Reducible Sulfur suite.

All records applicable to acid sulfate testing and treatment shall be collated to substantiate treatment.

It is noted that validation testing takes about 7 to 10 days, therefore this should be allowed in the earthworks management plan to reduce the potential for delays during construction.

Should leachate accumulate in the bunded area, the pH should be monitored daily. Neutralisation may be required should the leachate pH fall below background levels.

6.5 Monitoring

The following monitoring regime is recommended:

- Prior to commencement of works a round of water quality monitoring from adjacent surface waters and drains is recommended to confirm background parameters;
- Treated ASS should be assessed using validation techniques to ensure net acidity is less than Action Criteria (18 moles H+/ tonne):
    - *Action – Where net acidity > 18 moles H+/ tonne further lime treatment will be required*.
- Water quality monitoring should be undertaken on any leachate captured within the bunded areas. Representative background values are to be confirmed:
    - *Action – Where leachate water has a pH <background value it will require neutralisation which can be undertaken using a neutralising agent such as calcined magnesia or hydrated lime. Further pH monitoring of the treated water will be required to ensure neutralisation has occurred. Treated water should be discharged overland, away from surface water bodies, to allow infiltration into the soil;*
- Record details of all monitoring results.

6.6 Post Treatment

Once the ASS materials have been treated in accordance with this ASSMP, the materials may be reused onsite or disposed of in accordance with the relevant regulatory requirements. To comply with the NSW EPA Waste Classification Guidelines (2014) any material to be disposed of off-site requires waste classification. As the material will be treated acid sulfate soil it cannot be classified

as virgin excavated natural material (VENM) or excavated natural material (ENM). Therefore, the material will need to be disposed of at a licenced landfill.

This will have significant implications on the proposed development from a material disposal perspective. A site-specific exemption for the material could be sort from the EPA to enable the material to be used elsewhere, rather than having to be disposed of to landfill.

7 MANAGEMENT OF ONSITE DEWATERING

Full perimeter pre-support of the basement excavation is anticipated, therefore significant lowering of the groundwater profile outside the property boundary is not expected to occur.

However, the lowering of the groundwater table within the excavation will expose actual ASS materials.

The contractor must install and / or employ an appropriate groundwater monitoring and control system such that the surrounding groundwater table will be maintained at existing levels.

If lowering of the groundwater table outside the site occurs, the groundwater control system should be improved. Re-injection of groundwater may be necessary to stabilise groundwater levels outside the site.

7.1 Treatment of Water

Groundwater and surface water collected from within the site during excavation should be assessed prior to disposal. The following procedures will be required depending on the contamination status of the water.

- The water should be assessed for pH. If pH is below 6.5, the water will require treatment prior to discharge or disposal;
- pH change can take some time to occur, therefore, a suitable holding tank and a water pump should be installed to store collected water. The tank may fulfil a dual purpose and provide suspended solids removal prior to discharge; and
- Hydrated lime in a pre-mixed slurry should be added and the water thoroughly agitated. The pH of the water should be measured for one day to confirm stabilisation of water conditions, until pH is within the optimum level of 6.5 to 8.5 pH Units. The application of hydrated lime should continue until the water quality objectives are met.

Alternatively, the acidic waters can be disposed of to a licensed treatment facility in accordance with the NSW EPA Waste Classification Guidelines.

8 LIMITATIONS

If site conditions encountered during construction vary from those discussed, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.

If you have any questions regarding this acid sulfate soil management plan, or require any additional consultations, please contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Adam Holzhauser

Associate Geotechnical Engineer