Paynter Dixon

Proposed Alterations and Additions

C.ex Coffs Harbour – Vernon Street Coffs Harbour

Geotechnical Report

Report No. RGS31484.1 - AB

7 May 2018

REGIONAL GEOTECHNICAL SOLUTIONS

REGIONAL GEOTECHNICAL SOLUTIONS

Manning-Great Lakes
Port Macquarie
Coffs Harbour

RGS31484.1 - AB

7 May 2018

Paynter Dixon
Locked Bag 2219
North Ryde BC NSW 1670

Attention: Mark Lutowski

Dear Mark

RE: Proposed Alterations and Additions – C.ex Coffs Harbour, Vernon Street Coffs Harbour

Geotechnical Report

Regional Geotechnical Solutions Pty Ltd (RGS) has completed geotechnical investigations at C.ex Coffs Harbour, Vernon Street Coffs Harbour where alterations and additions to the existing building are proposed. This report presents the results of the assessment.

If you have any questions regarding this project, or require any further assistance with this or any other project, please do not hesitate to contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Adam Holzhauser

Associate Geotechnical Engineer

Regional Geotechnical Solutions Pty Ltd
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1 INTRODUCTION

This report presents the results of geotechnical investigations and assessment undertaken by Regional Geotechnical Solutions Pty Ltd (RGS) for the proposed alterations and additions at the C.ex Coffs Harbour, Vernon Street Coffs Harbour.

The drawings and brief indicate the development will include:

- Construction of a new Italian restaurant and bar on the ground floor, with associated kitchen, dining and terrace area;
- Construction of a new café with opening links to the Italian restaurant seating area, and Vernon St;
- Construction of new male and female toilets on level 1
- New male and female toilets on ground floor;
- Renovation of the existing club foyer and entrance on Vernon St, with new airlock, reception and sign in desk;
- Replacement of the existing lift car serving ground floor to level 3 within the Vernon St foyer;
- Upgrade of the foyer and walkway areas directly outside the lift landings with new finishes;
- Construction of a new bar on level 1 with new outdoor terrace areas to create a new "rooftop" lounge;
- Expansion of level 1 slab to include terrace areas and roof over the Italian kitchen below;
- Construction of a smoker's terrace on level 1.

The purpose of the geotechnical investigations and assessment was to obtain geotechnical information as the basis for providing comments and recommendations on the following:

- General site conditions and geology including:
    - Soil profile;
    - Depth to founding materials; and
    - Groundwater levels.

- Site earthworks including:
    - General site preparation;
    - Stripping and foundation preparation;
    - Fill material requirements including suitability for reuse of site won material;
    - Fill placement and compaction control;
    - Excavation conditions; and
    - Retention, including retaining wall options and design parameters.

- Alternative footing types and foundation design parameters including:
    - Site classification;
    - Shallow and piled footings as appropriate;
    - Allowable /ultimate bearing pressures; and
    - Data to calculate expected settlements.

- Assessment of durability requirements (aggressivity) for buried steel and concrete elements; and
- Assessment of acid sulfate soils (ASS) and preparation of ASS management plan if required.

2 FIELD WORK AND LABORATORY TESTING

2.1 Field work

Field work comprised a site walkover assessment and intrusive investigations. The site walkover included observation and mapping of relevant surface features and condition of the existing structures.

Intrusive investigations included the drilling of two boreholes, within the footprint of the proposed extensions. The boreholes were drilled using a truck mounted drill rig using auger drilling methods. Standard penetration tests (SPTs) were carried out within the soil profile at approximately 1.5m intervals to assess the strength of the soils. Hand penetrometer (HP) tests were undertaken in samples recovered from the SPT to assess the unconfined compressive strength of the silts and clays.

Samples were collected for laboratory testing as detailed in Section 2.2.

The field work was undertaken by a Geotechnical Engineer from RGS. Engineering logs of the boreholes are presented in Appendix A. The approximate locations, obtained by taped measurements from existing structures, are presented on Figure 1.

2.2 Laboratory Testing

Samples obtained during the field work would be sent to contract laboratories for analysis. The following testing was undertaken:

- Eight (8) acid sulfate soil screening tests;
- Two (2) acid sulfate soil CRS test suites; and
- One (1) aggressivity test suite as to durability requirements in accordance with AS2159 – 2009.

The results of the testing are presented and discussed in the relevant sections of this report. A copy of the laboratory test results sheets is provided in Appendix B.

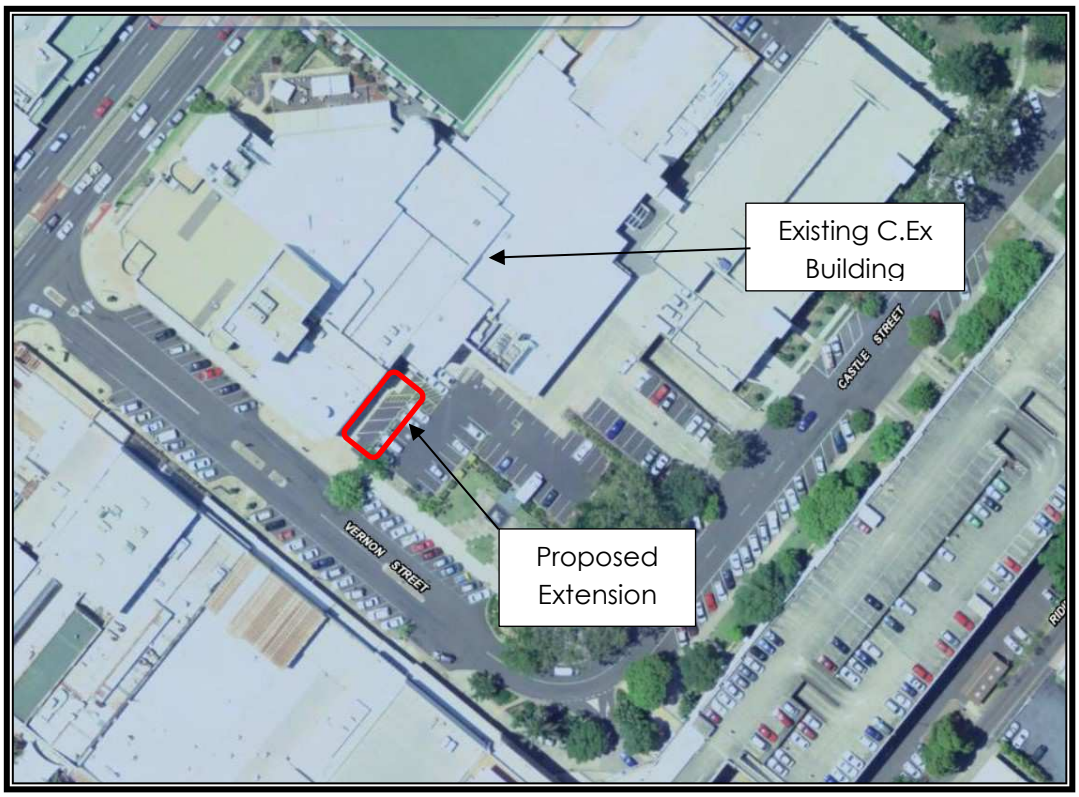
3 SITE CONDITIONS

3.1 Surface Conditions

Regionally the site is situated within flat low lying alluvial deposits associated with Coffs Creek. The site is located in the Coffs Harbour CBD with Coffs Creek located approximately 200m to the north of the site. The investigation was undertaken in the paved carpark/minibus loading area to the southeast of the south-eastern corner of the existing C.ex building.

The image below reproduced from Department of Lands NSW website (Six Maps) illustrates the site setting and features and location of the proposed new infrastructure.

Diagram 1: Aerial Image Illustrating Site location and Site Setting



3.2 Subsurface Conditions

The 1:250,000 Geology sheet for Coffs Harbour/Dorrigo indicates the site is underlain by Quaternary Alluvium comprising clay, silt, sand and gravel which in turn is underlain by the Brooklana Formation comprising Siliceous Argillite.

In summary the investigations encountered a variable subsurface profile that included:

Pavement: Concrete slab; over

Fill: Gravel/Sand depths of up to 0.4m; overlying.

Alluvial soils: Comprising silty Clay, medium to high plasticity stiff to very stiff to depths of up to at least the termination of the boreholes at 10.45m.

Groundwater

Groundwater seepage was not encountered during the drilling of the boreholes. No long-term groundwater monitoring was undertaken. Groundwater levels will vary with seasonal changes, rainfall and river level variations.

Detailed descriptions are provided in the engineering logs presented in Appendix A.

4 GEOTECHNICAL CONSIDERATIONS

The site is underlain by deep alluvial soils comprising silty clay. The upper profile is of stiff strength improving to very stiff and hard with depth. The assessment indicates the alluvial soils are actual acid sulfate soils, therefore any material excavated from the site should be treated accordingly. A preliminary Acid Sulfate Soil Management Plan is Provided in Appendix C.

It is understood the site will be raised by about 0.5 to 0.8m to elevate the ground floor level above existing site levels to tie in with existing ground floor levels. Therefore, disturbance of the underlying acid sulfate soil is anticipated to be low, but may occur in isolated areas due to service trench excavations or pile installation.

Specific details of the proposed development are unknown however it is assumed that building loads will be relatively high, therefore it is likely that the structure will be supported on piles. Pile types that reduce disturbance of the actual acid sulfate soils such as steel screw piles could be considered. Further advice regarding pile types and pile design parameters are provided in the Section 6.

5 EARTHWORKS

The extent of proposed earthworks are unknown but are anticipated to include filling in the order of about 0.5 to 0.8m. Earthworks should be undertaken in consideration of the comments and recommendations provided in following sections.

5.1 General Site Preparation and Site Drainage

Site preparations will require the removal of the existing concrete slabs and pavements and stripping of all uncontrolled fill. Any deleterious or visibly contaminated materials should also be stripped and disposed of. These materials are not considered suitable for reuse as engineered fill and should be disposed of offsite or stockpiled on site where appropriate for later reuse in landscaping areas only.

Site drainage is poor with low slope grades, therefore earthworks should be carefully planned and scheduled to maintain suitable cross-falls to promote controlled runoff of surface water. The upper alluvial soils will soften rapidly on exposure to moisture and will become untrafficable following rainfall.

5.2 Excavation Conditions

Excavations to anticipated depths of up to about 1m for the installation of services will generally encounter alluvial clay. Bulk excavation of these materials will be achievable using conventional earthmoving equipment such as small to medium excavators (5 to 12 tonne). Detailed excavations for services etc. within these materials will be achievable using small excavators (1.5 to5 tonne), backhoes and chain trenching plant.

Groundwater seepage into excavations is expected to be minor if at all. Groundwater inflows should be manageable by providing toe drainage at the base of the excavation, diverting water to either a drainage sump or downslope drainage paths with appropriate sediment control.

5.3 Retention

5.3.1 Batters

Localised excavations are anticipated to extend to depths of up to about 1.0m with proposed filling of up to about 0.5 to 0.8m.

Temporary batters though the existing material and controlled fill should be cut no steeper than 1H:1V. Permanent batters within these materials should be cut no steeper than 2H:1V.

Temporary batters should be trimmed smooth to reduce erosion. Permanent cut or fill batter slopes should be protected against erosion by rapidly establishing vegetation cover or covering with a proprietary product such as Enviromat, Jute Mesh, Grassroots or other similar products.

Trench excavations to depths of up to 1m should stand vertical within soils of stiff or better strength for short durations while the service is laid and backfilled. Trenches should only be excavated in short sections that enable backfilling within the same day of opening. Entry into unsupported excavations should be avoided and all excavation work should be undertaken in accordance with the Safe Work Australia '*Excavation Code of Practice (March 2015)*'.

5.3.2 Retaining Walls

Permanent batters are unlikely to be feasible given the site confines and permanent retaining walls may be preferable or required. It is anticipated that retaining walls will extend to maximum heights of up to about 0.8m. Conventional gravity retaining walls, such as reinforced concrete filled block walls or cantilevered retaining walls would be feasible for permanent support of cuts and fills.

Gravity or cantilever retaining walls should be designed based on a triangular lateral earth pressure distribution using the following parameters:

- All retaining elements should be uniformly founded within natural soil or controlled fill below any uncontrolled fill or topsoil. For bearing pressure recommendations refer to Section 6;
- For cantilever walls where movement is of little concern, an active earth pressure coefficient (ka) of 0.4 may be adopted for the fill and natural soils assuming a horizontal backfill surface;
- If the top of the wall is retaining areas which are sensitive to movement, an "at rest" earth pressure coefficient (ko) of 0.7 should be adopted;
- Soil Friction Angle (ǿ) - 24°
- Soil Cohesion (c') – 5kPa
- A bulk unit weight of 20kN/m3 should be adopted for the soil profile behind the retaining wall;
- Any surcharge affecting the walls (e.g. traffic loads, adjacent footings, retaining walls or inclined slopes, or construction loads or stockpiles) should be allowed for in the design.
- Even with appropriate drainage as described below it is recommended that an allowance for potential water pressure build-up equivalent to one third the wall height be made in the design.

The retaining walls should be designed as fully drained with measures incorporated to provide drainage of the ground behind the wall. The wall backfill should comprise free draining granular material such as 20mm drainage gravel. Subsoil drains should comprise a geocomposite drain or geotextile (Bidim A34 or similar) wrapped gravel drain at the toe of the back of the wall. The drains should discharge to the stormwater system. Where appropriate flushing points should be incorporated into the design.

5.4 Subgrade Preparation, Fill Placement and Compaction Control

Filling to an anticipated depth of 0.5 to 0.8m may be required to achieve proposed finished levels for the ground floor. The following general comments and recommendations are provided regarding subgrade preparation, fill placement and compaction control:

- The concrete slab, pavements, uncontrolled fill and any topsoil should be fully stripped. The concrete could be crushed and reused as fill along with the granular material recovered from below the slabs and pavement areas. Topsoil should be stockpiled for later reuse for landscaping purposes over the site or disposed offsite as it is not suitable for reuse as engineered fill.
- Following excavation to an appropriate foundation level, the exposed subgrade materials should be proof rolled to identify any wet, excessively deflecting or other deleterious material. Any such areas should be over-excavated down to a stiff base and backfilled with a clean select material.
- Filling below proposed structures should be carried out in accordance with Level 1 construction monitoring and testing as defined in AS3798 – 2007. Where footings and floor slabs are not supported in the fill, Level 1 may not be required and the fill could be placed in accordance with Level 2 requirements;
- Suitable fill should be placed in layers not exceeding 300mm loose thickness. Given the commercial nature of the project it is recommended that all fill be compacted to a minimum dry density ratio of not less than 98% Standard Compaction. Fill should be placed and maintained at ±2% of Standard OMC;
- In addition to the point above, beneath pavements the upper 300mm of the subgrade materials should be compacted to a minimum density ratio of 100% Standard compaction; and
- Filling below pavements should be carried out in accordance with Level 2 construction monitoring and testing as defined in AS3798 – 2007. Given the extent of filling required for practical reasons it may be more efficient to undertake all filling under Level 1 control and testing.

5.5 Fill Materials

Materials recommended for use as engineered fill include good quality well graded granular materials (such as crushed or ripped rock), free of deleterious materials and having a maximum particle size of 200mm. The concrete (when appropriately crushed) and granular materials would be suitable for reuse. Any material excavated from pile holes or service trenches could also be reused for general filling provided it is appropriately treated as detailed in the Acid Sulfate Soil Management Plan. Different fill material (crushed concrete, gravel, sand and clays) should be thoroughly mixed to create a homogeneous material. The extent of excavation proposed for the

development is not expected to meet the material requirements for filling. Therefore, imported material are expected to be required. Imported material should be used in the upper profile.

The use of the highly reactive clay soils should be avoided. These soils will require significantly more rigorous earthwork monitoring and compaction control, an increased potential for delays due to inclement weather and therefore greater eventual cost to earthworks compared with weathered rock materials. Further, the use of reactive clay soils will result in higher foundation costs due to the higher shrink- swell potential and subsequent increase in characteristic free surface movement (y_s) values.

5.6 Offsite Disposal

Where offsite disposal of material, or reuse of material at an alternative site is proposed it should be assessed in accordance with the requirements of the '*Department of Environment and Climate Change NSW Waste Classification* Guidelines *Part 1 Classifying Waste*' (July 2009) and / or the EPA Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014. The investigations have generally encountered fill and natural soils. The assessment indicates the natural clay soils are actual acid sulfate soil therefore do not meet the requirements of Excavated Natural Material (ENM) or Virgin Excavated Natural Material (VENM), Following treatment the natural soils could be reused on site with any material requiring off site disposal likely to classify as General Solid Waste. It is noted that further assessment will be required once disposal requirements and quantities are known to satisfy the requirements of the waste classification guidelines.

6 FOOTINGS

Shallow footings may not be viable due to high building loads but could be considered if they can be proportioned to support the building loads imposed. Shallow footings should only be founded with the natural soils or fill placed in accordance with Level 1 requirements as defined in AS3798 – 2007. Footings and floor slabs should be designed in consideration of the reactivity of the fill profile.

Piles can be adopted if building lads are high or shallow footings are not desirable.

6.1 Site Classification

The development is of a commercial nature therefore AS2870-2011 '*Residential Slabs and Footings*' does not strictly apply. Provided, however, that the performance expectations presented in AS2870-2011 are acceptable then AS2870 can be adopted.

In consideration of the existing soil profile, presence of trees and results of shrink-swell testing undertaken on other projects nearby with similar soil profiles, shrink-swell related movements are expected to be in the order of 30 -40mm (moderately reactive). It is noted that Ys values adopted for final design should be assessed once bulk earthworks are completed.

6.2 Alternative Footings and Foundation Design Parameters

Shallow footings could include pad and / or strip footings, stiffened raft slabs or waffle pods founded within the upper natural alluvial clay profile or controlled fill.

Table 1 provides foundation design parameters for shallow footings.

Table 1 : Shallow footing design Parameters

Founding Material	Minimum Founding Depth (m)	Minimum Footing Dimension (m)	Allowable Base Bearing Pressure (kPa)	Youngs Modulus E (MPa)
Alluvial Clay (Stiff or better)	0.5	0.5	125	30
Controlled Fill[1] (Granular)	0.5	0.5	150	30

NOTE:

1. *Fill placed in accordance with Level 1 requirements as defined in AS3798-2007.*

6.3 Piles

Pile types that limit the exposure of the underlying acid sulfate soils would include the use of steel screw piles. Driven piles have been omitted due to the risk of vibration induced damage to nearby structures. Open bored piles or grout injected (CFA) piles would also be suitable pile types. These pile types will impact the acid sulfate soils and therefore trigger the need for an acid sulfate soil management plan for the treatment of the excavated drilling spoil.

For pile design in accordance with AS2159-2009, 'Piling-Design and installation', the ultimate geotechnical strength ($R_{d,ug}$) can be calculated using the ultimate end bearing capacity values provided in Table 2. Calculation of the design geotechnical strength (Rd,g) requires an assessment of the geotechnical strength reduction factor (Φg), which is based on a series of project specific variables. In assessing a suitable geotechnical strength reduction factor for this project, the following assumptions have been made:

- Design of piles and pile groups will be undertaken in accordance with the recommendations presented in this report;
- Limited geotechnical involvement will occur during pile installation;
- Some performance monitoring of the supported structure would be undertaken during or after construction;
- No pile testing will be undertaken;
- The foundations will be designed by a designer of at least moderate experience in similar geotechnical profiles and pile design;
- Established pile design methods will be used.

Based on the above assumptions and in accordance with AS2159-2009 a risk rating of 2.93 is estimated. Therefore, assuming the pile configuration will have low redundancy a Geotechnical Strength Reduction Factor of Φ_g=0.52 would be appropriate for the site. If at least 5% of the piles are dynamically load tested the Geotechnical Strength Reduction Factor could be increased to 0.70. Alternatively if at least 5% of the piles are static load tested the Geotechnical Strength Reduction Factor could be increased to 0.80.

If any of the assumptions outlined above are not correct, the Geotechnical Strength Reduction Factor may change and further advice should be sought.

Table 2: Summary of Pile Design Parameters

Founding Material	Minimum Founding Depth (m)	Pile Type	Ultimate End Bearing Capacity [1] (MPa)	Ultimate Shaft Adhesion (MPa)	Allowable End Bearing Pressure [3] (MPa)	Young' s Modulus, E (MPa)
Alluvial Clay	3.0	Non-displacement	2.0	0.06	0.65	40
		Displacement	2.5	0.09	0.8	45

NOTES:

1. *Ultimate end bearing values occur at large displacements (approx. 5% of pile diameter).*
2. *Limit state design requires the piles to be designed for an acceptable level of serviceability, which typically assumes a maximum settlement of not more than 1% of pile diameter. If the structure is more sensitive or less sensitive to settlement than this value assumes, serviceability criteria should be re-assessed.*
3. *Allowable values based on factor of safety (FOS) of 3.*

At least the initial stages of pile installation should be observed by a suitably experienced geotechnical engineer to assess that the recommended founding material has been reached and to check initial assumptions about foundation conditions and possible variations between test locations.

7 AGGRESSIVITY TO BURIED STRUCTURAL ELEMENTS

The aggressivity test results presented in Table 3 were compared to the exposure classifications provided in Australian Standard AS2159-2009, *Piling Design and Installation*.

Table 3: Results of Soil Aggressivity Testing

Sample Location	Sample Depth (m)	Sample Type	pH	Soluble Sulfate (mg/kg)	Chloride (mg/kg)	Resistivity (ohm.cm)
BH2	4.3 to 4.45	Silty CLAY	4.1	196	24	9100

The laboratory results indicate the soil is moderately aggressive to concrete and non-aggressive to steel elements.

8 ACID SULFATE SOILS

An extract of the acid sulfate soils risk map for Coffs Harbour is presented below, the map indicates the site is in an area of low probability of acid sulfate soils.

Diagram 2: Acid Sulfate Soil Risk Map for Site

Eight samples were submitted to a contract laboratory for ASS screening. The results are summarised below:

- The samples revealed pHf values between 4.6 and 5.3 in distilled water. In this test, pH less than 4 is an indicator of Actual ASS;
- The samples revealed pHFox values between 2.7 and 3.8 in hydrogen peroxide. Values less than 3 in this test can be an indicator of Potential ASS.

To provide a more comprehensive assessment, two samples were submitted for Chromium Reducible Sulphur (CRS) analysis. A summary of the test results is presented in Table 4.

Table 4: Summary of ASS CRS Test Results

Test location	Depth (m)	Texture	TAA	Action Criteria(1)	Sulfur Trail (% S Oxidisable)		
					S_{cr}	S_{EQ}	Action Criteria(1)
BH1	4.0 to 4.45	Fine	**74**	62	0.01	**0.133**	0.1
BH2	2.8 to 2.95	Fine	**86**	62	<0.01	**0.143**	0.1

Notes: *1. Action criteria is based on less than 1000 tonnes of soil being disturbed*

Sulfur (S_{Eq}) values above 0.1% were measured in both samples which indicate sulphide is present within the soils and therefore there is the potential for acid generation as a result of acid sulfate soils. The results of the TAA analysis exceed that adopted action criteria indicating the soils are actual acid sulfate soils.

An Acid Sulfate Soils Management Plan (ASSMP) will be required were disturbance of the ASS will occur. A preliminary ASSMP is provided in Appendix C.

9 LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, 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 project, or require any additional consultations, please contact the undersigned.

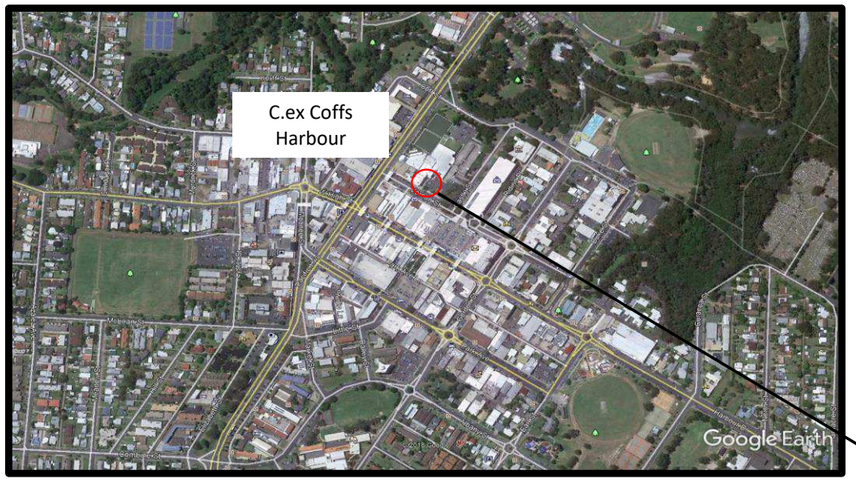
For and on behalf of

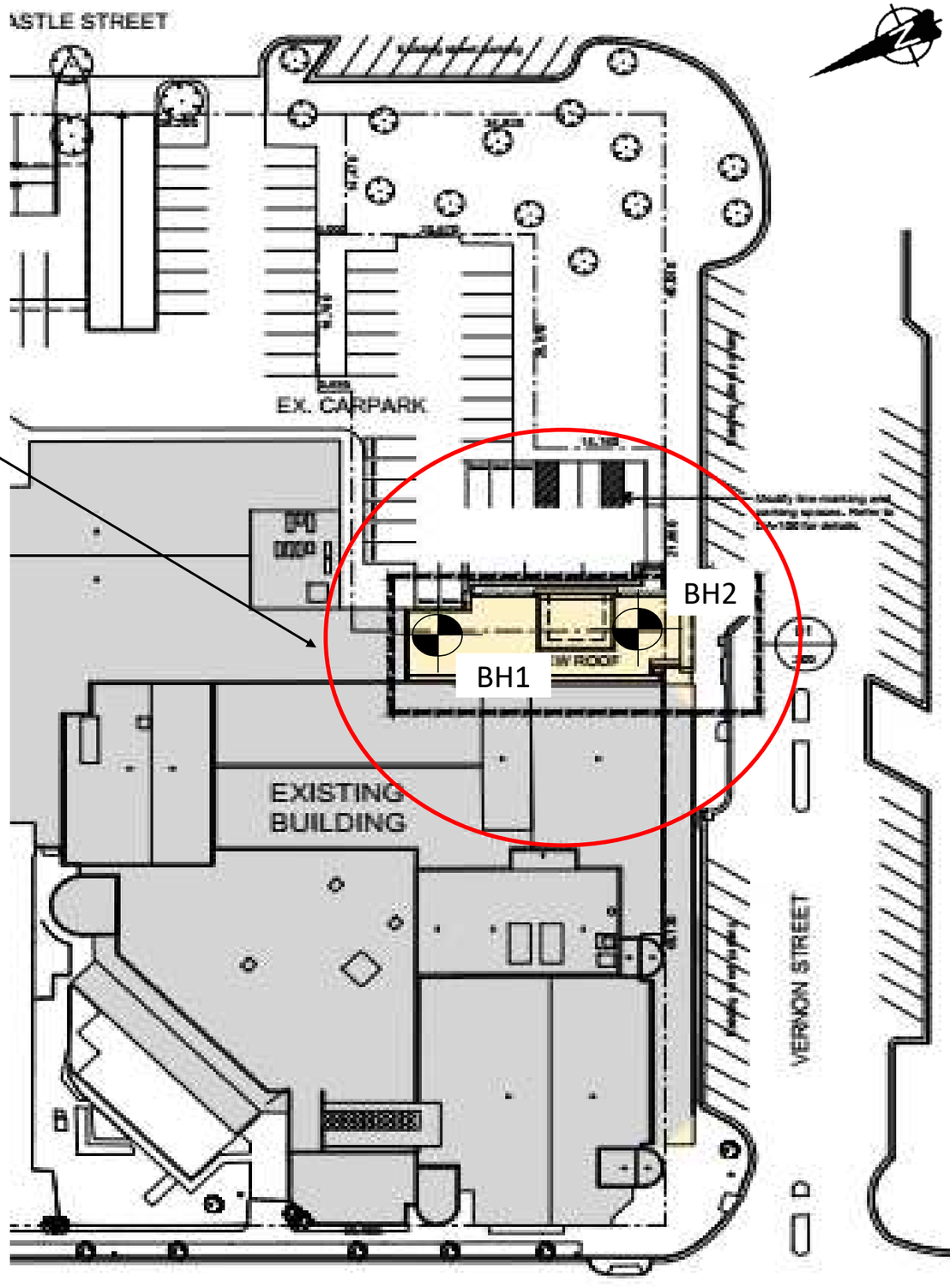
Regional Geotechnical Solutions Pty Ltd

Adam Holzhauser

Associate Geotechnical Engineer

Figures





NOT TO SCALE

REGIONAL GEOTECHNICAL SOLUTIONS	Client	Paynter Dixon	Job No.	RGS31484.1
	Project:	Proposed Alterations and Additions	Drawn By:	AH
		C.ex Coffs Harbour	Date:	7-May-18
	Title:	Borehole Location Plan	Drawing No.	**FIGURE 1**

Appendix A

Results of Field Investigations

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH1

CLIENT: Paynter Dixon
PAGE: 1 of 3
PROJECT NAME: Proposed Alterations & Additions
JOB NO: RGS31484.1
SITE LOCATION: C-ex Coffs Harbour
LOGGED BY: LD
TEST LOCATION: Refer to Figure 1
DATE: 6/4/18

DRILL TYPE: Truck Mounted (NCD Rig 7)
EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
NORTHING:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
DIATUBE	Not Encountered						**CONCRETE**					CONCRETE
							0.30m					
		0.40m					0.40m **FILL:** Gravelly CLAY, medium plasticity, pale brown		H			FILL
AD/TC		DS		0.5		CH	**Silty CLAY:** Medium to high plasticity, grey, orange-brown	M > w_P	St / VSt			ALLUVIAL
		0.50m										
		0.90m										
		DS										
		1.00m		1.0								
		SPT 3,5,7 N=12								HP	300	
										HP	320	
		1.45m		1.5								
WB-RR				2.0			2.00m					
						CH	**Silty CLAY:** Medium plasticity, grey, red, pale brown, with some fine angular Gravel					
		2.50m		2.5								
		SPT 3,9,14 N=23										
		2.95m		3.0								
		3.40m										
		DS		3.5								
		3.50m										
		4.00m		4.0					H			
		SPT 19,16,21 N=37								HP	500	
		4.45m		4.5								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH1

CLIENT: Paynter Dixon | **PAGE:** 2 of 3

PROJECT NAME: Proposed Alterations & Additions | **JOB NO:** RGS31484.1

SITE LOCATION: C-ex Coffs Harbour | **LOGGED BY:** LD

TEST LOCATION: Refer to Figure 1 | **DATE:** 6/4/18

DRILL TYPE: Truck Mounted (NCD Rig 7) | **EASTING:** | **SURFACE RL:**

BOREHOLE DIAMETER: 100 mm | **INCLINATION:** 90° | **NORTHING:** | **DATUM:** AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
WB-RR		5.50m SPT 8,17,25 N=42 5.95m		5.5 6.0		CH	**Silty CLAY:** Medium plasticity, grey, red, pale brown, with some fine angular Gravel *(continued)*	M > w_P	H			ALLUVIAL HP = >500kPa
				6.5		CH	6.50m **Silty CLAY:** Medium to high plasticity, grey, red	M < w_P				
		7.00m SPT 7,22,30 N=R 7.45m		7.0 7.5		CL	7.30m **Silty CLAY:** Medium plasticity, dark red, with some rock fragment	M < w_P	H			
		8.50m SPT 9,17,25 N=42 8.95m		8.0 8.5 9.0 9.5		CH	8.00m **Silty CLAY:** Medium to high plasticity, grey, red, pale brown, with some fine angular Gravel			HP HP	450 500	

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

REGIONAL GEOTECHNICAL SOLUTIONS

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BH1**

CLIENT: Paynter Dixon | **PAGE:** 3 of 3

PROJECT NAME: Proposed Alterations & Additions | **JOB NO:** RGS31484.1

SITE LOCATION: C-ex Coffs Harbour | **LOGGED BY:** LD

TEST LOCATION: Refer to Figure 1 | **DATE:** 6/4/18

DRILL TYPE: Truck Mounted (NCD Rig 7) **EASTING:** **SURFACE RL:**

BOREHOLE DIAMETER: 100 mm **INCLINATION:** 90° **NORTHING:** **DATUM:** AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
		10.00m										
WB-RR		SPT 9,17,23 N=40				CH	**Silty CLAY:** Medium to high plasticity, grey, red, pale brown, with some fine angular Gravel *(continued)*	M < w_P	H	HP	500	ALLUVIAL
		10.45m		10.5			10.45m Hole Terminated at 10.45 m					
				11.0								
				11.5								
				12.0								
				12.5								
				13.0								
				13.5								
				14.0								
				14.5								

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Moisture Condition	
D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

Density		
V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BH2

CLIENT: Paynter Dixon
PAGE: 1 of 2
PROJECT NAME: Proposed Alterations & Additions
JOB NO: RGS31484.1
SITE LOCATION: C-ex Coffs Harbour
LOGGED BY: LD
TEST LOCATION: Refer to Figure 1
DATE: 6/4/18

DRILL TYPE: Truck Mounted (NCD Rig 7)
EASTING:
SURFACE RL:
BOREHOLE DIAMETER: 100 mm
INCLINATION: 90°
NORTHING:
DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
DIATUBE	Not Encountered						**CONCRETE** 0.20m					CONCRETE
							FILL: Silty SAND, fine grained, dark grey 0.40m					FILL
AD/TC		0.50m DS 0.60m		0.5		CH	**Silty CLAY:** Medium to high plasticity, grey, brown	M > w_P	St			ALLUVIAL
		1.00m SPT 2,3,4 N=7		1.0						HP	150	
		1.45m		1.5						HP	170	
WB-RR				2.0			2.30m					
		2.50m SPT 6,12,15 N=27		2.5		CH	**Silty CLAY:** Medium to high plasticity, grey, red, pale brown, with some fine angular Gravel	M > w_P	VSt / H	HP	500	
		2.95m		3.0								
		4.00m SPT 8,15,20 N=35		4.0						HP	500	
		4.45m		4.5			5.00m					

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density		
	V	Very Loose — Density Index <15%
	L	Loose — Density Index 15 - 35%
	MD	Medium Dense — Density Index 35 - 65%
	D	Dense — Density Index 65 - 85%
	VD	Very Dense — Density Index 85 - 100%

Moisture Condition	
D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

ENGINEERING LOG - BOREHOLE

REGIONAL GEOTECHNICAL SOLUTIONS

BOREHOLE NO: BH2
PAGE: 2 of 2
JOB NO: RGS31484.1
LOGGED BY: LD
DATE: 6/4/18

CLIENT: Paynter Dixon
PROJECT NAME: Proposed Alterations & Additions
SITE LOCATION: C-ex Coffs Harbour
TEST LOCATION: Refer to Figure 1

DRILL TYPE: Truck Mounted (NCD Rig 7) **EASTING:** **SURFACE RL:**
BOREHOLE DIAMETER: 100 mm **INCLINATION:** 90° **NORTHING:** **DATUM:** AHD

Drilling and Sampling					Material description and profile information					Field Test		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics,colour,minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
WB-RR		5.50m SPT 8,18,27/140 N=R		5.5		CH	**Silty CLAY:** Medium to high plasticity, grey	M < w_P	H			ALLUVIAL
		5.94m		6.0		CL	**Silty CLAY:** Medium plasticity, dark red, with some rock fragment 5.80m	M < w_P	H			
		7.00m SPT 10,22,29 N=R		6.5		CH	**Silty CLAY:** Medium to high plasticity, grey, red, pale brown with some fine angular Gravel 6.50m					
		7.45m		7.5			Hole Terminated at 7.45 m 7.45m					
				8.0								
				8.5								
				9.0								
				9.5								

LEGEND:

Water
- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes
- Gradational or transitional strata
- Definitive or distict strata change

Notes, Samples and Tests

U_{50}	50mm Diameter tube sample
CBR	Bulk sample for CBR testing
E	Environmental sample
ASS	Acid Sulfate Soil Sample
B	Bulk Sample

Field Tests

PID	Photoionisation detector reading (ppm)
DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
HP	Hand Penetrometer test (UCS kPa)

Consistency

		UCS (kPa)
VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W_p	Plastic Limit
W_L	Liquid Limit

Appendix B

Laboratory Test results

www.biotrack.com.au
781 Mt Glorious Rd Highvale 4520

Biotrack Certificate of Analysis

Signatory: Ph:+617 3289 7179 ABN 91 056 237 275

Test Code/Name	[1] FIELD SCREEN SUITE		
Lab Reference (LR)	**120418.569**	Client Name	Regional Geotechnical Solutions Pty Ltd (Coffs Harbour)
SampleID	**All Samples**	Client Contact	Adam Holzhauser
		Project Name	Coffs C.ex
Report Date	13/04/2018	Job Number	RGS31484.1
Sample Received Date	12/04/2018	Order Number	
Sample Disposal Date	11/06/2018	Chain of Custody	
Sample Packaging	Plastic Bag	Client Email	adam.h@regionalgeotech.com.au
Temperature	Chilled	Client Address	1/21 Cook Drive Coffs Harbour New South Wales 2450

Analytical Method: Test Methodology for pH_f and pH_fox as per QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0 = No Reaction 2=Moderate 3=High 4=Very High (steam evolved).
TEMP: Surface temperature rise (C) oxidised sample at 5 minutes - cooling may occur for fast reaction.

S#	SampleID	pH_f	pH_Fox	Change	RATE	TEMP	Indication
1	BH1 1.3-1.45	5.0	3.3	-1.7	4	1	low TAA & moderate TPA
2	BH1 2.5-2.6	5.3	3.8	-1.5	4	2	low TAA
3	BH1 2.8-2.95	4.8	3.6	-1.2	4	0	low TAA
4	BH1 4-4.45	4.8	2.7	-2.1	2	3	low TAA & moderate TPA & sulphide possible
5	BH2 1-1.1	4.6	3.7	-0.9	4	2	low TAA & low sulphide
6	BH2 2.8-2.95	4.7	3.4	-1.3	0	2	low TAA & moderate TPA
7	BH2 3.4-3.5	4.8	3.5	-1.3	0	2	low TAA
8	BH2 4-4.1	5.0	3.6	-1.4	0	1	low TAA

www.biotrack.com.au
781 Mt Glorious Rd Highvale 4520

Biotrack Certificate of Analysis

Signatory: Ph:+617 3289 7179 ABN 91 056 237 275

Test Code/Name	[1] FIELD SCREEN SUITE		
Lab Reference (LR)	**120418.569**	Client Name	Regional Geotechnical Solutions Pty Ltd (Coffs Harbour)
SampleID	**All Samples**	Client Contact	Adam Holzhauser
		Project Name	Coffs C.ex
Report Date	13/04/2018	Job Number	RGS31484.1
Sample Received Date	12/04/2018	Order Number	
Sample Disposal Date	11/06/2018	Chain of Custody	
Sample Packaging	Plastic Bag	Client Email	adam.h@regionalgeotech.com.au
Temperature	Chilled	Client Address	1/21 Cook Drive Coffs Harbour New South Wales 2450

Analytical Method: Test Methodology for pH_f and pH_fox as per QASSIT 2004 Laboratory Methods. Indications based on pH data only.
RATE: 0 = No Reaction 2=Moderate 3=High 4=Very High (steam evolved).
TEMP: Surface temperature rise (C) oxidised sample at 5 minutes - cooling may occur for fast reaction.

S#	SampleID	pH_f	pH_Fox	Change	Rate	Indication
1	BH1 1.3-1.45	5.0	3.3	-1.7	4	low TAA & moderate TPA
2	BH1 2.5-2.6	5.3	3.8	-1.5	4	low TAA
3	BH1 2.8-2.95	4.8	3.6	-1.2	4	low TAA
4	BH1 4-4.45	4.8	2.7	-2.1	2	low TAA & moderate TPA & sulphide possible
5	BH2 1-1.1	4.6	3.7	-0.9	4	low TAA & low sulphide
6	BH2 2.8-2.95	4.7	3.4	-1.3	0	low TAA & moderate TPA
7	BH2 3.4-3.5	4.8	3.5	-1.3	0	low TAA
8	BH2 4-4.1	5.0	3.6	-1.4	0	low TAA

DETERMINATION OF ACID SULFATE SOIL PROPERTIES

CERTIFICATE OF ANALYSIS

Analysis By: Bio-Track Pty Ltd ABN 91 056 237 275 781 Mt. Glorious Road Highvale, Brisbane, Australia, 4520 Ph. 07 3289 7179

LAB REFERENCE LR130418.631 DATE OF REPORT 19 APRIL 2018 @09:48:37 Page 1 of 1 Report Pages.
CLIENT NAME Adam Holzhauser c/o Regional Geotechnical Solutions Pty Ltd (Coffs Harbour) 1/21 Cook Drive Coffs Harbour 2450
PROJECT NAME Coffs C.ex YOUR PROJECT/JOB REFERENCE RGS31484.1
SAMPLING DATE NUMBER OF SAMPLES 2 Samples supplied by client SAMPLE TYPE:Soil/Solid
DATE RECEIVED 13/04/2018 3:08:25 PM PACKAGING Plastic Bag Ground Oven Dry Samples DISPOSED ON 12/06/2018

Sample ID as received. METHODOLOGY: As per (DNR QASSIT May 2004), oven dried (85˚C), >1000 um shell removed, fine grind. All reported values gravimetric, dry mass.
%sEQ (equivalent sulphur) calculated as moles TAA/624 + %S Cr + %sNAS - sANC_BT (sNAS included irrespective of pH).
LIME1 rates calculated to neutralise TPA (or TAA if >TPA)+ aS_RAS -ANC_BT/1.5 LIME2 rates calculated to neutralise TAA + aS_POS or S_Cr + aS_RAS -ANC_BT/ 1.5
NB. Lime rates assume 97% lime neutralisation but DO NOT include any safety factors. Suggested factor=1.5-2. Rates are kg/ton. Multiply by bulk density to convert to kg/m3.
Fineness Factor (FF)=1.5 CBN POS= moles carbonate alkalinity released by oxidation assuming (Ca POS - Ca KCl) + (Mg POS - Mg KCl) is due to carbonate solution.
Blanks represent unmeasured values, zeros & <0.x represent measured values. If pH KCl>4.5 then s-RAS (calculated from acid extract) may be zero for undisturbed soil. Ca NAS is the acid reactive calcium calculated as the difference between 1 M KCl and 4 M HCl soluble Ca.

ID.	DEPTH	pH	pH	TAA	TPA	TSA	S KCl	S P	S POS	S Cr	s-NAS	s EQ	Ca KCl	Ca P	Mg KCl	Mg P	CBN POS	LIME1	LIME2	sANC_BT	Ca NAS
	m	KCL	ox	m/t	m/t	m/t	%	%	%	%	%	%	mg/kg	mg/kg	mg/kg	mg/kg	m/t	kg/t	kg/t	%	mg/kg
Analytical Method Codes		23A	23B	23F	23G	23H	23Ce	23De	23Ee	22B	s20Je	s	23Vh	23Wh	23Sm	23Tm	a23U&X			s19A2	20E
BH1	4-4.45	3.56		74			0.02			0.01	<0.01	0.133	12		60				4		<10
BH2	2.8-2.95	3.42		86			0.01			<0.01	<0.01	0.143	20		92				4		<10

Signatory

For and on behalf of Bio-Track Pty Ltd

CERTIFICATE OF ANALYSIS

Analysis By: Bio-Track Pty Ltd
ABN 91 056 237 275
Mt. Glorious Road
Highvale, Brisbane, Australia, 4520
Ph. 07 3289 7179 Fx. 07 3289 7155

DATE OF REPORT 19 APRIL 2018 Page 1 of 1 Report Pages.
CLIENT NAME Adam Holzhauser c/o Regional Geotechnical Solutions Pty Ltd (Coffs Harbour)
CLIENT ADDRESS 1/21 Cook Drive Coffs Harbour 2450
PROJECT NAME Coffs C.ex YOUR PROJECT/JOB REFERENCE RGS31484.1
SAMPLING DATE NUMBER OF SAMPLES 1 SAMPLE TYPE:Soil/Solid
PACKAGING Plastic Bag ** SAMPLES DISPOSED ON 11/06/2018
DATE RECEIVED 12/04/2018 1:30:56 PM LAB REF. LR120418.570

METHODOLOGY: EC Cl as 1:5, pH 1:2.5; air dried soil in water, 30 minute rolling shake, Cl by ion selective electrode. S as 1:40 IN KCl extract measured by ICP OES. RESIS:soil resistivity per AS1289.4.4.1 SO4 calculated as S x 3 SO3 calculated as S x 2.5

SAMPLE ID	EC	pH	Cl	S	SO4	SO3	RESIS
m depth	dS/m		mg/kg	mg/kg	%	%	ohm-cm
BH2 4.3-4.45	0.05	4.1	24	196	<0.1	<0.1	9100

Signatory

For and behalf of Bio-Track Pty Ltd

Appendix C

Acid Sulfate Soil Management Plan

REGIONAL GEOTECHNICAL SOLUTIONS

Manning-Great Lakes
Port Macquarie
Coffs Harbour

RGS31484.1-AC

7 May 2018

Paynter Dixon
Locket Bag 2219
North Ryde NSW 1670

Attention: Mark Lutowski

Dear Mark

RE: Proposed Alterations and Additions – C.ex Coffs Harbour, Vernon Street Coffs Harbour NSW

Acid Sulfate Soil Management Plan

1. INTRODUCTION

This Acid Sulfate Soil Management Plan (ASSMP) has been prepared for the proposed alterations and additions to the C.ex Coffs Harbour and should be read in conjunction with the Geotechnical Report prepared for the project by Regional Geotechnical Solutions (Pty Ltd) (RGS) (Ref: RGS31484.1 – AB dated 7 May 2018).

In summary, the report indicates the natural alluvial soil encountered below about 1m depth are actual acid sulfate soils (AASS). Therefore, where these soils will be disturbed as part of the development through excavation or pile installation they should be treated and this ASSMP implemented.

This ASSMP has been prepared for the development and outlines the measures that must be implemented on site during excavation works to control, treat and manage ASS.

It is noted that validation testing of the treated ASS will be required and testing generally takes about 10 working days, therefore this should be allowed in the earthworks management plan to reduce the potential for delays during construction.

2. 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;
- 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.

3. NEUTRALISING MATERIALS

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

- At least 85% by weight passing 1mm, and 100% passing 2.5mm. In general a finer grind is better; and
- Aglime shall have a Neutralising Value (NV) of 90% or better (i.e. NV>90).

4. MANAGEMENT AND PROCESSING OF ASS

4.1. Treatment Area

ASS shall be placed in a prepared treatment area, be it onsite or at an approved offsite location. Preferably the treatment area should be located close to the area where the materials will be excavated. 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. 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.

Alternatively, for small volumes of materials such as that expected for this project, treatment could be undertaken in a large skip.

The treatment area / skip should be covered with heave duty plastic at all times to prevent runoff, particularly when inclement weather is forecast.

4.2. Treatment

The ASS shall be placed in the treatment area and spread in a layer of not more than 300mm thick with lime being applied across the treatment area at the rate specified in the geotechnical report (10kg / tonne for the materials tested). The lime shall be evenly mixed and be applied the same day of excavation.

4.3. Validation Testing

Validation testing shall be undertaken by an independent ASS consultant at the initial rate of two samples per 100m^3 or part thereof. The sample shall be submitted to a NATA accredited laboratory for testing by the Chromium Reducible Sulfur suite.

If testing indicates reducible sulphur values that exceed ASSMAC Action Criteria in the processed soil the material will require reprocessing (potentially requiring variation in the processing methodology). Further validation testing should then be undertaken to assess that acceptable values have been obtained.

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

4.4. 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. It is noted that additional testing may be required to appropriately classify the materials for offsite disposal or reuse on another approved site.

5. LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical and pavement design practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, 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 project, or require any additional consultations, please contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

Adam Holzhauser

Associate Geotechnical Engineer