Preliminary Acid
Sulfate Soil Assessment at 28 and 35
Sugarmill Road, Sapphire Beach

R



3 November 2021

For: Mr Keiran Grimley and Dr Ian Martyn

Authored by: Strider Duerinckx

Ref	Ver	Date	Distribution
2021-165-04	А	3/11/21	Client, Planner

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1 Introduction

Earth Water Consulting Pty Limited (EWC) was engaged by Mr Keiran Grimley and Dr Ian Martyn (the "Client") to undertake a preliminary Acid Sulfate Soil Assessment (PASS) for 28 and 35 Sugarmill Road, Sapphire Beach (the "Site") (Figure 1).

2 Proposed Development

We understand that it is proposed to rezone and subdivide each property into 2 lots to be used for rural-residential living. Lots 120 and 121 would be locate don 28 Sugarmill Road and 910 and 911 on 35 Sugarmill Road.

3 Scope of Work

This report presents the results of PASS investigations, undertaken in reference to the Acid Sulfate Soil Manual (ASSMAC, 1998), and CHCC LEP Part 7 Acid Sulfate Soils. The scope of work included:

- A desktop review of surface, geology, hydrogeology, geomorphic and ASS risk conditions;
- A site inspection and walkover to assess for indicative ASS biomes and features;
- Drilling of one borehole per property to the depth of 1.2m;
- Collection of 4 soil samples at various soil profiles present and analysis for field pHf and pHox; and
- Preparation of this Preliminary ASS report which describes the results of our investigation.

4 Site Description

4.1 Site Identification

The Site details are provided in Table 1 and shown in Figure 1. The Site is zoned RU2, rural landscape.

Table 1 - Site Identification

Address	Lot ID	Approx Area (ha)
No. 28 Sugarmill Road, Sapphire Beach	Lot 12 DP 243972	20,336
No. 35 Sugarmill Road, Sapphire Beach	Lot 91 DP 786155	23,660

4.2 Location and Features

The properties are located either side of Sugarmill Road, with number 28 on the northern side, and 35 on the southern side.

These properties are located on undulating low hills separated by forested drainage lines and are mainly cleared.



Typical Site details are shown in **Photograph 1** (No. 28) and **Photograph 2** (No. 35).

Photograph 1 No. 28-Looking north across the proposed Lot 121 building envelope.



Photograph 2 No. 35 -. Looking west across proposed Lot 911 with an existing vegetation patch downslope of the of the proposed building envelope.

5 Geology and Hydrogeology

5.1 Geology

The Site is underlain by the Coramba beds. These are comprised of lithofeldspathic wacke, minor siltstone, mudstone, metabasalt, jasper and rare calcareous siltstone.

5.2 Soils

The properties are underlain by a combination of soils, which include the Ulong, Moonee and Megan soil landscapes. Generally, 28 Sugarmill Road is underlain by a combination of the Ulong (central portion) and Megan (southern portion) Soil Landscapes. Number 35 Sugarmill Road is almost entirely underlain by the Megan soil landscape, with a small section underlain by the Ulong landscape in the northwestern corner of the property.

The Ulong soil landscape is located on undulating to rolling low hills to hills on Late Carboniferousaged metasediments with local relief up to 90m. Soils are moderately deep (>100cm), red and brown earths, and red and yellow podzols.

The Megan Soil Landscape is located in a slightly elevated position in the landscape. Soils are moderately deep to deep, well drained structured red and brown earths and red and brown podzolic soils with moderately deep to deep (>100cm) structured yellow earths and yellow podzolic soils in drier situations, and moderately deep to deep well drained Krasnozems in moistest sites.



Photograph 3. Mapped soil landscape and subject properties (pink).

6 Acid Sulfate Soils

6.1 Mapped Occurrences of ASS

Coffs Harbour City Council Local Environmental Plan (LEP, 2013) and Coffs Harbour City Council Planning and Environment Spatial Maps- ASS layers that are derived from the published ASS risk mapping, indicates that the Site is underlain by mapped "Class 5" ASS risk. No.28 is completely underlain and No. 35 is partially underlain.

Class 5 denotes areas where acid sulfate soils are not typically found but is a 500m wide buffer zone created around mapped ASS risk soils. As such, a low probability of ASS exists at the Site and the PASS investigation is precautionary only.



Photograph 4. Mapped ASS risk and subject properties location (pink).

In accordance with Part 7 of the LEP, development consent is required for the carrying out of the following works;

Within Mapped Class 5 – Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.

As the lowest point of the Site is around 9.5mAHD, well above the 5m criteria, and standard ruralresidential development is not expected to permanently lower groundwater, it is unlikely that the proposed subdivision and future development would trigger any ASS provisions. Notwithstanding, this PASS investigation has been undertaken for confirmation of the local ASS risk. Mapped ASS probability mapping provided on eSpade 2.1m indicates that mapped low and high probably ASS soils are present east of the Pacific Highway only. The high probably pf ASS is at <1m below the groundsurface and low probability at 1-3m below the groundsurface.



Photograph 5. Published ASS probability mapping. Subject property's locations red outline.

7 Subsurface Conditions

Site soils were observed by drilling three (3) boreholes (BH1-BH3) to a maximum depth of 1.2m using a powered auger. The location of the boreholes are shown in Figure 2 and a copy of the borehole logs are presented in Appendix A.

Natural soil profiles were observed in the boreholes, and were found to be representative of their associated residual soil landscapes.

The lithology encountered included a pale brown clay loam underlain by pale red residual clay, grading with depth to white and grey mottling.

Alluvial soils were not encountered. Strong jarosite and iron mottling was also not observed in the natural soils. No rotten egg odours, shell pieces, dark grey to black anaerobic soils or muds were encountered.

No groundwater inflow was observed in the boreholes to the maximum depth of 1.2m drilled.

7.1 Biophysical Indicators

The proposed development is situated above 9.5mAHD on a moderately to gently sloping land surface. Dominant tree species in the lower forested zone included moist eucalypt forest. No vegetation strongly associated with ASS soil presence was observed.

No surface water seepage was observed or standing water swampy ground.

7.2 ASS Screening Test Results

Two soil samples were collected from BH1 (0.4-0.6 and 0.9-1.1m) and two soil samples were collected from BH2 (0.4-0.6 and 0.9-1.1m) were selected for field screening tests to determine their likelihood of containing Potential or Actual ASS (Pass/Aass) and whether further laboratory analyses would be necessary. The selected soil samples were placed in a chilled container (~4 C) and only removed when analysis was conducted.

Samples were forwarded to Eurofins laboratory at Sydney for initial screening analysis. The lab report is included in Appendix B and summarised in **Table 2**.

Sample Location	Sample Depth (m)	рН _f (1:5)	рН _{fox} (1:5)	pH Change	Reaction
BH1	0.4-0.6	6.1	4.8	-1.3	No reaction to
BH1	0.9-1.1	5.5	4.7	-0.8	slight
BH2	0.4-0.6	5.5	4.5	-1.0	
BH2	0.9-1.1	5.2	4.4	-0.8	
Typically, pHf readin Typically, pHfox read Typically changes of Oxidation reaction re	lings of <3.0-3.5 can >1 pH unit and prefe	indicate the pre rably >2 pH uni	esence of Potent ts can indicate t		

Table 2 – Summary of Field Screening

In summary, the pH_f and pH_{fox} of all analysed samples were found to be below the Aass and Pass indicator threshold limits and reaction rates were low.

8 Conclusions and Recommendations

The desktop review shows no ASS risk the residual clay subsoils. Biophysical indicators, field screening and soil profiles suggest that the properties are not underlain by ASS.

As such ASS are concluded to not be present at the Site that would be impacted by the proposed rural-residential developments, and no further investigations or plans of management are required.

If dark grey to black, odorous or waterlogged alluvial sands or clays are encountered during development, then works should be halted until confirmation of the presence of ASS is undertaken and/or remedial strategies developed at that time.

9 References

Coffs Harbour City Council Local Environmental Plan 2013.

Milford H.B, (1997), *Moonee Beach 1:25,000 Acid Sulfate Soil Risk Map*. Edition 2. Department of Land & Water Conservation.

Milford H.B, (1999), *Soil Landscapes of the Coffs Harbour 1:100,000 Sheet Report*. Department of Conservation and Land Management.

Stone Y, Ahern C.R., and Blunden B (1998), *Acid Sulfate Soil Manual 1998*. Acid Sulfate Soil Management Advisory Committee (ASSMAC), Wollongbar, NSW, Australia.











TITLE S	ite L	ocatio)n		tion for 28	CLIENT Grimley & Martyn		
^{Figure} Figure 1				and 35 Su Sapphire	ugarmill Road, Beach	5		
SHEET		ISSUE	AUTHOR	DATE	SCALE	PROJECT		
1 OF 1 A SD				3/11/21	1:8000	2021-165		



LEGEND



- Property Boundary
- Drainage Alignment

Dam

Contour Line (1m)

CHCC LEP ASS Class

Existing Building

Existing Driveway

Approximate BH Location

Site Layout	and Sam	ple Locations	Figure 2
5		'	sheet 1 of 1 ^{Issue} A
	<u> </u>	tion for 28 and apphire Beach	Grimley & Martyn
AUTHOR	DATE	SCALE	PROJECT
SD	3/11/21	1:800	2021-165





Soil Borelog

•		•					Borehole No: BH1			
်	VSUL	TING					Logged by:		NS	
	-501						Drilling date	:	25/05/2	2021
Project	ref:	2021-16	65				Drilling method: Power auger			
Client:							Borehole loo	cation:	Figure 2	
Addres	s:	28 Suga	rmill F	Rd Sapphire	Beach		Borehole co	ords:		
PROFI	LE DES	SCRIPT	ION							
Depth (m)	Sampling depth/name	Graphic Log	Horizon	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture Condition	Comments
0.1			A1	Clay Loam	Moderate	Black/Dark Brown	Nil	Nil	SM	Topsoil
0.2			A2	Clay Loam	Strong	Pale Brown	Pale Orange	Nil	SM	Transferral
0.3										
0.4										
0.5			B2	Light Clay	Strong	Pale Red	Pale Brown	Nil	SM	Residual
0.6	S									
0.7					<u></u>	Dala Dad		N.11	614	
0.8				Light Clay	Strong	Pale Red Orange	White	Nil	SM	Residual
0.9										
1.0										
1.1										
1.2					Boreh	ole terminated a	t 1.2m			
1.3										
1.4										
1.5										
	D	Dry			M VM	Moist Very moist		W	Wet /	saturated
			ondi Iy moi		M VM	Moist Very moist		W	Wet /	saturated



Soil Borelog

•		•					Borehole	No:	BH2	
်	VSUL	TING					Logged by:		NS	
	-501							Drilling date: 25/05/2021		
Project	ref:	2021-16	65				Drilling method: Power auger			auger
Client:					Borehole loo	cation:	Figure 2	2		
Address	s:	28 Suga	armill F	Rd Sapphire	Beach		Borehole co	ords:	513864,	, 6656545
PROFI	LE DES	SCRIPT	ION							
Depth (m)	Sampling depth/name	Graphic Log	Horizon	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture Condition	Comments
0.1			A1	Clay Loam	Moderate	Black/Dark Brown	Nil	Nil	SM	Topsoil
0.2			A2	Clay Loam	Strong	Dark Brown	Pale Orange	Nil	SM	Transferral
0.3										
0.4										
0.5	S		B2	Light Clay	Strong	Pale Red	Pale Orange, White, Grey	Nil	SM	Residual
0.6 0.7										
0.7				Light Clay	Strong	Pale Red Orange	White	Nil	SM	Residual
0.9										
1.0	S									
1.1										
1.2										
1.3					Boreh	ole terminated a	t 1.2m			
1.4										
1.5										
	<u>Mois</u> D	ture c Dry			М	Moist		W	Wet/	saturated
	SM		tly moi	st	VM	Very moist				



Soil Borelog

•		•					Borehole	No:	BH3	
်	VSUL	TING					Logged by:		NS	
	~501						Drilling date: 25/05/2021			2021
Project	ref:	2021-1	65				Drilling method: Power Auger			Auger
Client:							Borehole loo	cation:	Figure 2	
Address	s:	35 Suga	armill F	Rd Sapphire	Beach		Borehole co	ords:	513723,	, 6656354
PROFI	LE DES	SCRIPT	ION							
Depth (m)	Sampling depth/name	Graphic Log	Horizon	Texture	Structure	Colour	Mottles	Coarse Fragments	Moisture Condition	Comments
0.1			A1	Clay Loam	Strong	Dark Brown	Pale Brown	Nil	SM	Topsoil Charcoal
0.2			B1	Clay Loam	Strong	Pale Brown	Pale Red Orange	< 5%	SM	Transferral
0.3 0.4										
0.5										
0.6	S									
0.7			B2	Light Clay	Strong	Pale Orange Brown	Pale Red	Nil	SM	Residual
0.8										
0.9										
1.0 1.1			B3	Light Clay	Strong	Orange/Pale Red	White/Pale	Nil		Residual
1.2										
1.3					Boreh	ole terminated a	it 1.2m			
1.4										
1.5										
	Mois	ture c	ondi	tion						
	D SM	Dry	tly moi		M VM	Moist Very moist		W	Wet /	saturated

APPENDIX B



Earth Water Consulting Pty Limited 2-16 Lourdes Avenue Urunga NSW 2455





NATA Accredited Accreditation Number 1261 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection and proficiency testing scheme providers reports.

Attention:		

Strider Duerinckx

Report Project name Project ID Received Date **798700-S** SUGAR MILL RD 2021-165 May 27, 2021

Client Sample ID			BH1 0.4-0.6	BH1 0.9-1.1	BH2 0.4-0.6	BH2 0.9-1.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			S21-My56120	S21-My56121	S21-My56122	S21-My56123
Date Sampled			May 25, 2021	May 25, 2021	May 25, 2021	May 25, 2021
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.5	5.5	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	4.7	4.5	4.4
Reaction Ratings* ^{S05}	-	comment	1.0	1.0	1.0	1.0



Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Sydney	May 31, 2021	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			

🔅 eurofins			Australia					New Zealand				
	50 005 085 521 web: v	Env	ironment		Melbourne 6 Monterey Road Dandenong South VIC 31 Phone : +61 3 8564 5000 NATA # 1261 Site # 1254 & 14271	Ui 75 16 La Ph		Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600 NATA # 1261 Site # 20794	Perth 46-48 Banksia Road Welshpool WA 6106 Phone : +61 8 9251 9600 NATA # 1261 Site # 23736	Newcastle 4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293 Phone : +61 2 4968 8448 NATA # 1261 Site # 25079	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone: +64 9 526 45 51 IANZ # 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch Phone : 0800 856 450 IANZ # 1290
	ompany Name: Idress:	Earth Water 2-16 Lourdes Urunga NSW 2455	Consulting Pt s Avenue	y Limited			Order No.: Report #: Phone: Fax:	798700 0402 6083 96		Received: Due: Priority: Contact Name:	May 27, 2021 9:25 Jun 3, 2021 5 Day Strider Duerinckx	AM
	oject Name: oject ID:	SUGAR MIL 2021-165	L RD							Eurofins Analytical S	ervices Manager : Ar	drew Black
		Sa	Imple Detail			Acid Sulfate Soils Field pH Test						
Vell	oourne Laborato	ory - NATA Site	# 1254 & 142	271								
Sydney Laboratory - NATA Site # 18217						Х						
Brisbane Laboratory - NATA Site # 20794												
Perth Laboratory - NATA Site # 23736												
Mayfield Laboratory - NATA Site # 25079												
Exte	ernal Laboratory											
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	BH1 0.4-0.6	May 25, 2021		Soil	S21-My56120	Х						
2	BH1 0.9-1.1	May 25, 2021		Soil	S21-My56121	Х						
3	BH2 0.4-0.6	May 25, 2021		Soil	S21-My56122	Х						
1	BH2 0.9-1.1	May 25, 2021		Soil	S21-My56123	Х						
Tes	t Counts					4						



Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site 1. Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- 2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued. 9.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days. **NOTE: pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	ug/L: micrograms per litre
ppm: Parts per million	ppb: Parts per billion	%: Percentage
org/100mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms	
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
СР	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- 1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. Organochlorine Pesticide analysis where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 4. Organochlorine Pesticide analysis where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported 5. in the C10-C14 cell of the Report.
- 6. pH and Free Chlorine analysed in the laboratory Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- 7. Recovery Data (Spikes & Surrogates) where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- 8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- 9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
- 10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.



Comments

Sample Integrity	
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code

Description

Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction. S05

Authorised by:

Andrew Black

Analytical Services Manager

Glenn Jackson General Manager

Final Report - this report replaces any previously issued Report

- Indicates Not Requested
- * Indicates NATA accreditation does not cover the performance of this service
- Measurement uncertainty of test data is available on request or please click here.

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

