Monterey Equity Pty Ltd
C/- Centurion Group

Acid Sulfate Soil Assessment:
119 Barton Street, Monterey, NSW

martens consulting engineers

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

P1706332JR03V02
February 2021

Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty Ltd is to complete an acid sulfate soil assessment in accordance with the scope of services set out by Monterey Equity Pty Ltd C/- Centurion Group (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

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All enquiries regarding this project are to be directed to the Project Manager.

Contents

Abbreviations

AASS – Actual acid sulfate soil

ASS – Acid sulfate soil

ASSMAC – Acid Sulfate Soil Management Advisory Committee

ASSMP - Acid sulfate soil management plan

BH – Borehole

DA – Development application

DP – Deposited plan

IA – Investigation Area

LEP – Local Environmental Plan

LGA – Local government area

MA – Martens & Associates Pty Ltd

mAHD – Metres Australian height datum

mBGL – Metres below ground level

NATA – National Association of Testing Authorities

NSW – New South Wales

PASS – Potential acid sulfate soil

sPOCAS – Suspension Peroxide Oxidation Combined Acidity and Sulfur

1 Introduction

1.1 Overview

This Acid Sulfate Soils (ASS) Assessment has been prepared by Martens and Associates Pty Ltd (MA) for Monterey Equity Pty Ltd C/- Centurion Group (the Client) as part of a development application (DA) to Bayside Council (Council) for a proposed aged care facility at 119 Barton Street, Monterey, NSW (the site).

1.2 Proposed Development

The proposed development (Centurion Group, 2020) will include:

1. Demolition of all existing structures at the site.
2. Construction of a three-story aged care facility with single level basement carpark which will require bulk excavation down to 0 mAHD.
3. Landscaped areas with deep soil planting around the perimeter of the proposed structure.

Proposed development plans are provided in Attachment C.

1.3 Scope of Work

The scope of work for this ASS assessment included the following:

- Undertake preliminary ASS assessment of the site (desktop assessment).
- Conduct site walkover survey to assess existing site conditions.
- Excavate three boreholes (BH201 – BH203) to a maximum depth of 5.7 metres below ground level (mBGL) using a ute mounted drill rig, and two boreholes (BH204 – BH205) to a maximum delpth of 1.8 mBGL using a hydraulic hand push tube in areas without vehicular access.
- Collection of representative soil samples for laboratory testing.

1.4 Guidelines

This investigation was undertaken in general accordance with the following guidelines:

- Acid Sulfate Soil Management Advisory Committee (1998), *Acid Sulfate Soil Manual*. Referred to as ASSMAC (1998)
- Qld Natural Resources, Mines and Energy (2004) *Acid Sulfate Soils Laboratory Methods Guidelines*

2 Site Information

Site information is summarised in Table 1.

Table 1: Site background information.

Item	Details
Site address	119 Barton Street, Monterey, NSW
Legal identifier	Lot 2, DP 857520
Approximate area	7,218 m^2 (Project Surveyors, 2020)
Local Government Area	Bayside Council
Site description and land use.	The site currently contains two unused lawn bowl fields at the central and western portion, an unused grass field at the south eastern portion and carpark at the eastern and northern portion. A former bowling club building is located in the southern portion, which was used by a church at the time of preparing this investigation.
Surrounding land uses	The site is bordered by Barton Street to the north and residential properties to the east, south and west.
Topography	Site is generally flat. Site elevations range from 3.68 mAHD at the central portion of the site to approximately 4.88 mAHD along the north eastern border of the site (Project Surveyors, 2020).
Geology and soil mapping	The Sydney 1:100,000 Geological Series Sheet 9130 (1983) indicates that the site is underlain by quaternary deposits comprised of quartz sand, minor shell content, interdune (swale) silt and fine sand. The NSW Environment and Heritage eSPADE website identifies the site as having soils of the Tuggerah soil landscape, consisting of deep (>200 cm) podzols on dunes and podzols/humus podzol intergrades on swales.
Surface hydrology	A stormwater planning assessment completed by ADG Engineers Australia Pty Ltd (2016) concluded that all stormwater runoff generated at the site is contained within the site boundaries and is discharged via infiltration into sandy soils.

3 Desktop ASS Assessment

3.1 ASS Risk Class

The Rockdale Local Envrionmental Plan (LEP) ASS risk map (2011) classifies the site as Class 4 land, as shown in Figure 2, Attachment A.

3.2 Hydrogeological Assessment

Review of Water NSW Realtime Water Database indicated that there were 137 groundwater bores within 500 m of the site, with the the 5 closest groundwater bores summarised in Table 2.

Table 2: Available hydrogeological information.

Groundwater Bore Identification	Direction and Distance	Standing Water Level (m)	Intended Use	Water Bearing Zone Substrate
GW100520	On site	NE[1] (7 mBGL)	Recreation	ND[2]
GW106456	Approximately 15 m south	NE[1] (6 mBGL)	Domestic	ND[2]
GW108549	Approximately 10 m east	5.0 mBGL	Domestic	Sand
GW108550	Approximately 10 m east	5.0 mBGL	Domestic	Sand
GW108652	Approximately 15 m east	5.0 mBGL	Domestic	Sand

Notes

[1] NE – Groundwater not encountered (maximum depth of well).

[2] ND – No data available.

Given the site's topography, elevation and expected soil profile, it is expected that an unconfined aquifer would be located on the site at depths between 2 to 4 metres below existing grade.

3.3 Geomorphic Setting

The likelihood of ASS occurrence at a site is a function of various geomorphic parameters, in particular those listed in Table 3 as derived from ASSMAC (1998). Each is an indicator that ASS may be present onsite.

Table 3: Site geomorphic features indicative of ASS.

Geomorphic Feature	Present On Site?
Holocene sediments	Yes
Soil horizons less than 5 m AHD	Yes
Marine / estuarine sediments or tidal lakes	No
Coastal wetland; backwater swamps; waterlogged or scalded areas; inter-dune swales or coastal sand dunes (i.e. deep excavation is required)	No
Dominant vegetation is mangroves, reeds, rushes and other swamp or marine tolerant species.	No
Geologies containing sulfide bearing material / coal deposits or former marine shales/sediments	No
Deep older (Holocene or Pleistocene) estuarine sediments > 10 mBGL (if deep excavation or drainage is proposed)	No

Two of the geomorphic features listed are present at the site. It was therefore recommended that a detailed assessment (i.e. intrusive investigation, soil sampling and laboratory testing) be undertaken to further assess site ASS risk.

4 ASS Assessment

4.1 Field Investigation

Intrusive investigation of five boreholes to a maximum investigation depth of 5.7 mBGL revealed:

- Site soils consisting of:
  - Imported gravelly sand fill material in all boreholes, apart from BH201, up to 0.5 mBGL.
  - Yellow brown sands in all boreholes up to 4.8 mBGL.
  - Red brown sandy clay observed only in BH202 between 1.4 and 1.9 mBGLl.
  - Pale grey sand in BH201 to BH203 up to 5.7 mBGL.
- Shells were observed at 5.0 mBGL in BH203 within pale grey sand.
- No sulfuric odours or mottled soils representative of ASS were encountered during the investigation.
- Groundwater was encountered at 3.5 mBGL (approximately between 0.5 to 1.0 mAHD) during borehole drilling.

Borehole logs are provided in Attachment B.

4.2 Laboratory Analytical Suite

12 soil samples considered to be representative of the subsurface soil profile were selected and sent to Envirolab Sevices for the Suspension Peroxide Oxidisable Combined Acidity and Sulfur (sPOCAS) carried out by Envirolab Pty Ltd, a NATA accredited laboratory.

4.3 Soil Action Criteria

As more than 1000 tonnes of soil will be disturbed, ASSMAC (1998) indicates that an ASS management plan (ASSMP) will be required if the criteria in Table 4 are exceeded.

Table 4: Action criteria based on ASS soil analysis for more than 1000 t soil disturbance and coarse grained soils.

Texture	Sulfur Trail (S_{POS}) (%)	Acid Trail (Net Acidity) (mol H+/tonne)
All Texture	0.03	18

4.4 Soil Analytical Results

Analytical analysis indicated:

- All samples (apart from BH202/1.5-1.7) were below laboratory detection limits for:
    1. Total Actual Acidity (TAA) (moles H^+/t)
    2. Total Potential Acidity (TPA) (moles H^+/t)
    3. Total Sulfuric Acidity (TSA) (moles H^+/t)
    4. sPOS (%w/w)
    5. Net Acidity (moles H^+/t)
- Sample BH202/1.5.1.7 had TAA of 18 moles H^+/t, TPA of 19 moles H^+/t, but TSA and sPOS were below laboratory detection limit.
- All samples, apart from TAA of BH202/1.5-1.7, were below the soil action criteria as detailed in Section 4.3.
- Soil samples had acid neutralising capacity between 0 and 0.12% CaCO3.

A summary table of the laboratory results are provided in Attachment D and laboratory certificates are provided in Attachment E.

5 Conclusion and Recommendations

sPOCAS laboratory analysis indicates that all samples were below laboratory detection limit apart from one sample (BH202/1.5-1.7) which was representative of the sandy clay layer, which exceeded the TAA soil action criteria of the ASSMAC (1998) guidelines. Howvever, given that this sandy clay layer was only observed in BH202, and sPOS and TSA were below laboratory detection limits, this soil layer is considered an acidic soil but not an acid sulfate soil. Additionally, sPOCAS results from sample BH202/3.5-3.7 collected from the sand layer directly below sample BH202/1.5-1.7 reported results below laboratory detection limits for TAA, TSA and sPOS. Therefore site soils are not identified as actual acid sulfate soil (AASS) or potential acid sulfate soil (PASS).

The site is considered suitable for the construction of the proposed aged care facility and no further investigation or assessment regarding ASS is considered necessary.

Given groundwater is approximately 3.5 mBGL (approximately between 0.5 to 1.0 mAHD) and proposed development involves excavation up to 4.5 mBGL, the proposed basement may intercept the permanent groundwater table. Groundwater drawdown which could have adverse environmental impacts on neighbouring Class 1 to Class 4 areas is to be avoided.

If any unexpected finds are encountered during site works or if excavation below 5.0 mbgl is proposed, assessment by MA will be required to determine requirements for additional investigation and / or management action.

6 References

Ahern C R, Stone, Y, and Blunden B (1998) *Acid Sulfate Soils Assessment Guidelines*, published by the Acid Sulfate Soil Management Advisory Committee, Wollongbar, NSW, Australia (ASSMAC,1998).

Centurion Group (2020) Summitcare – 119 Barton Street, Moneterey. NSW, 2217, Job No. 2014, Drawing No. DA 03 – 08.

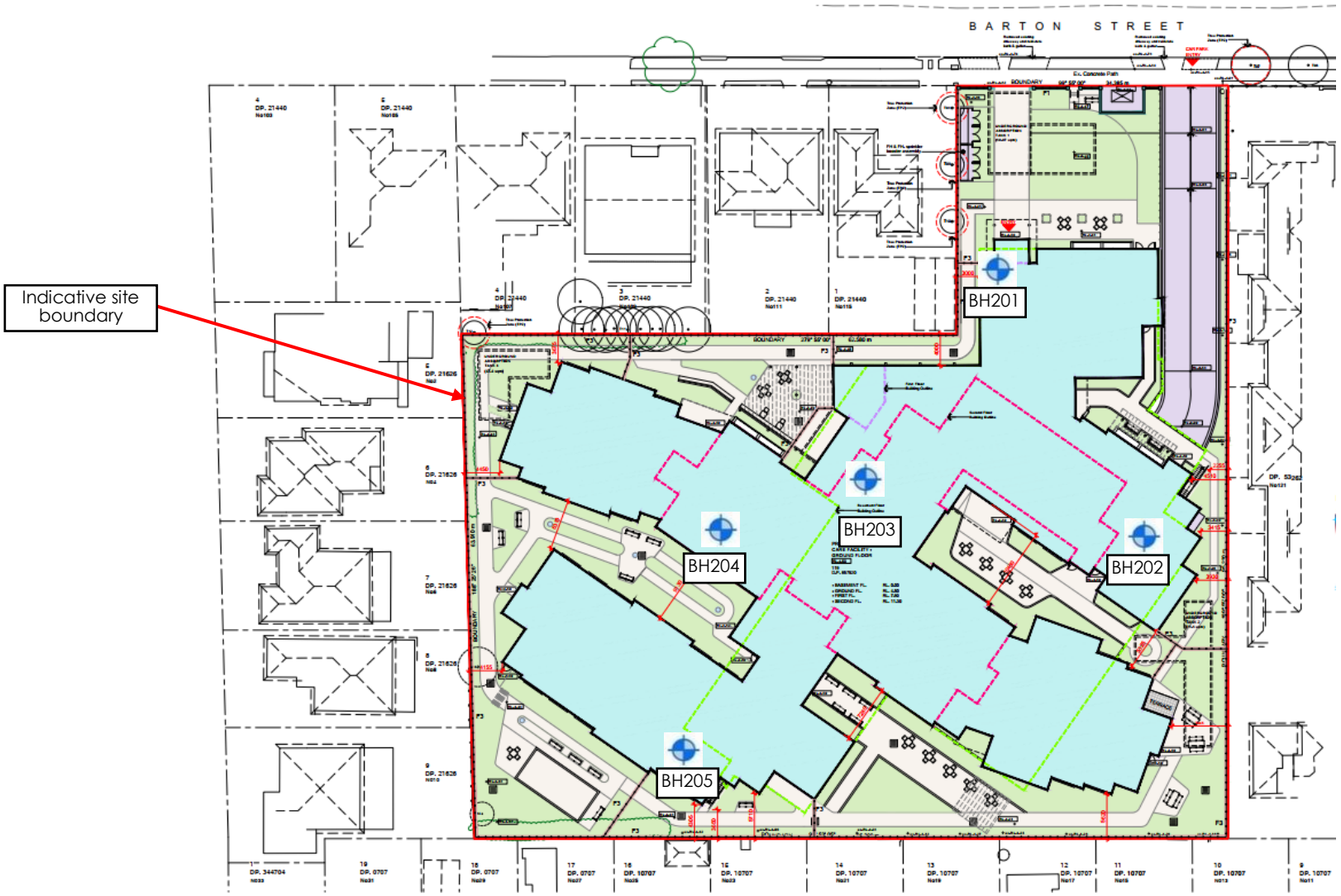
Herbert C. (1983) *Sydney 1:100 000 Geological Sheet 9130*, 1st edition, Geological Survey of New South Wales, Sydney.

NSW Department of Environment & Heritage eSPADE, NSW soil and land information (www.environment.nsw.gov.au).

Rockdale Local Environment Plan (2011) *Acid Sulfate Soils Map_005.*

Project Surveyors (2020) Plan of 119 Barton Street, Monterey, NSW, 2217, Job Ref. 80968, Drawing No. B1958 – 1 to 4 – B

7 Attachment A – Figures



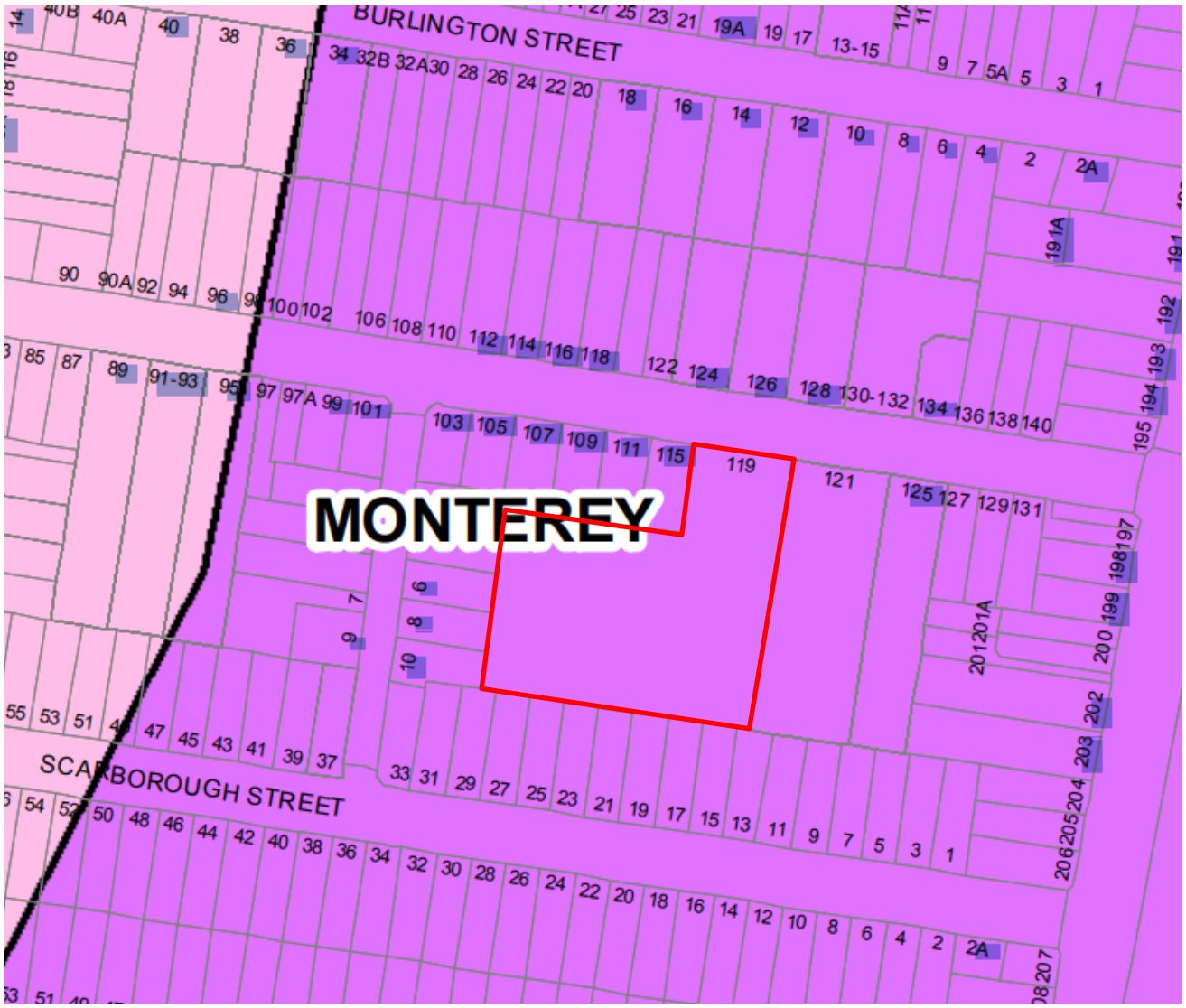
Key:

Approximate borehole test location

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	WX	**Acid Sulfate Soils Testing Plan** 119 Barton Road, Monetery, NSW (Source: Centurion Group, 2020)	Drawing No: **FIGURE 1**
Approved:	JF		
Date:	11.02.2021		
Scale:	NA		Project Number: P1706332JR03V01

Acid Sulfate Soils

- 1 Class 1
- 2 Class 2
- 3 Class 3
- 4 Class 4
- 5 Class 5



Indicative Site Boundary

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	WX	**Rockdale LEP, 2011: ASS risk map, showing site relative to risk classes** (Source: Rockdale LEP, 2011)	Drawing No: **FIGURE 2**
Approved:	JF		
Date:	11.02.2021		
Scale:	Not to Scale		File No: P1706332JR03V01

8 Attachment B – Borehole Logs

CLIENT	Monterey Equity Pty Ltd		COMMENCED	27/01/2021	COMPLETED	27/01/2021	**REF BH201**
PROJECT	Acid Sulfate Soil Assessment		LOGGED	WX	CHECKED	JF	Sheet 1 OF 1
SITE	119 Barton Street, Monterey, NSW		GEOLOGY	Quaternary	VEGETATION	None	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.148924	RL SURFACE	4.34 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 5.70 m depth	NORTHING	-33.974094	ASPECT	South East	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
				4.34					ASPHALT;			PAVEMENT
				0.15								
AD/V	L			4.19	0.15-0.3/S/1 D 0.15-0.30 m			SP	SAND; fine to medium grained; yellow-brown.			
					0.5-0.7/S/1 D 0.50-0.70 m							
			1		1.0-1.2/S/1 D 1.00-1.20 m							
					1.5-1.7/S/1 D 1.50-1.70 m					D		
			2		2.00-2.2/S/1 D 2.00-2.20 m							
					2.5-2.7/S/1 D 2.50-2.70 m							
				3.00								
			3	1.34	3.00-3.2/S/1 D 3.00-3.20 m				Pale yellow-brown.			
		27/01/21								M		
					3.5-3.7/S/1 D 3.50-3.70 m							
			4		4.00-4.2/S/1 D 4.00-4.20 m							
				4.30								
				0.04					Pale grey.			
					4.5-4.7/S/1 D 4.50-4.70 m					W		
			5		5.0-5.2/S/1 D 5.00-5.20 m							
					5.5-5.7/S/1 D 5.50-5.70 m							
				5.70								
			6						Hole Terminated at 5.70 m (Target depth reached)			

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	27/01/2021	COMPLETED	27/01/2021	**REF BH202**
PROJECT	Acid Sulfate Soil Assessment		LOGGED	WX	CHECKED	JF	Sheet 1 OF 1
SITE	119 Barton Street, Monterey, NSW		GEOLOGY	Quaternary	VEGETATION	None	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.149122	RL SURFACE	3.9 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 5.70 m depth	NORTHING	-33.974517	ASPECT	South	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V	L	27/01/21	1	3.90					ASPHALT.			PAVEMENT
				0.20								
				3.70	0.2-0.4/S/1 D 0.20-0.40 m				FILL: Gravelly SAND; fine to medium grained; dark grey-brown.			FILL
				0.50								
				3.40	0.5-0.7/S/1 D 0.50-0.70 m			SP	SAND; fine to medium grained; dark brown.	D		
					1.0-1.2/S/1 D 1.00-1.20 m							
				1.40								
				2.50	1.5-1.7/S/1 D 1.50-1.70 m			SC	Sandy CLAY; low plasticity; red-brown.	M (<PL)		
				1.90								
			2	2.00	2.0-2.2/S/1 D 2.00-2.20 m			SP	SAND; fine to medium grained; pale yellow-brown.			
					2.5-2.7/S/1 D 2.50-2.70 m					D		
			3		3.0-3.2/S/1 D 3.00-3.20 m					M		
					3.5-3.7/S/1 D 3.50-3.70 m							
			4		4.0-4.2/S/1 D 4.00-4.20 m							
				4.40								
				-0.50	4.5-4.7/S/1 D 4.50-4.70 m				Pale grey-brown.	W		
				4.80								
				-0.90	5.0-5.2/S/1 D 5.00-5.20 m				Pale grey.			
			5		5.5-5.7/S/1 D 5.50-5.70 m							
				5.70								
			6						Hole Terminated at 5.70 m (Target depth reached)			

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	27/01/2021	COMPLETED	27/01/2021	**REF BH203**
PROJECT	Acid Sulfate Soil Assessment		LOGGED	WX	CHECKED	JF	Sheet 1 OF 1
SITE	119 Barton Street, Monterey, NSW		GEOLOGY	Quaternary	VEGETATION	None	PROJECT NO. P1706332
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.148633	RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø100 mm x 5.70 m depth	NORTHING	-33.974403	ASPECT	South	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V				3.70	0.00-0.2/S/1 D 0.00-0.20 m			SM	FILL: Gravelly SAND; fine to medium grained; dark grey-brown.			FILL
				0.50								
				3.20	0.5-0.7/S/1 D 0.50-0.70 m			SP	SAND; fine to medium grained; pale yellow.			
			1		1.0-1.2/S/1 D 1.00-1.20 m							
				1.50								
				2.20	1.5-1.7/S/1 D 1.50-1.70 m				Pale yellow brown.	D		
			2		2.0-2.2/S/1 D 2.00-2.20 m							
				2.50								
				1.20	2.5-2.7/S/1 D 2.50-2.70 m				Pale grey.			
			3		3.00-3.2/S/1 D 3.00-3.20 m							
										M		
		27/01/21			3.5-3.7/S/1 D 3.50-3.70 m							
			4		4.0-4.2/S/1 D 4.00-4.20 m							
					4.5-4.7/S/1 D 4.50-4.70 m					W		
			5		5.0-5.2/S/1 D 5.00-5.20 m							5.00: Shells observed.
					5.5-5.7/S/1 D 5.50-5.70 m							
				5.70					Hole Terminated at 5.70 m (Target depth reached)			
			6									

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	27/01/2021	COMPLETED	27/01/2021	**REF BH204**
PROJECT	Acid Sulfate Soil Assessment		LOGGED	WX	CHECKED	JF	Sheet 1 OF 1
SITE	119 Barton Street, Monterey, NSW		GEOLOGY	Quaternary	VEGETATION	None	PROJECT NO. P1706332
EQUIPMENT		Push tube	EASTING	151.148394	RL SURFACE	3.7 m	DATUM AHD
EXCAVATION DIMENSIONS		⌀75 mm x 1.80 m depth	NORTHING	-33.974372	ASPECT	Flat	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT		Not Encountered	0	3.70	0.00-0.2/S/1 D 0.00-0.20 m			SP	FILL: Gravelly SAND; fine to coarse grained; pale grey.			FILL
				0.10								
				3.60				SP	SAND; medium grained; pale grey.			
			0.2									
				0.30								
				3.40				SP	Gravelly SAND; medium to coarse grained; grey.			
			0.4	*0.40*								
				3.30					Black.			
				0.50								
				3.20	0.5-0.7/S/1 D 0.50-0.70 m			SP	SAND; fine to medium grained; pale grey.			
			0.6									
				0.70								
				3.00					Dark grey.			
			0.8									
				0.90								
				2.80					Grey.	D		
			1.0		1.0-1.2/S/1 D 1.00-1.20 m							
			1.2									
				1.30								
				2.40					Brown.			
			1.4									
					1.5-1.7/S/1 D 1.50-1.70 m							
			1.6									
				1.80								
			1.8						Hole Terminated at 1.80 m (Target depth reached)			
			2.0									
			2.2									
			2.4									

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Engineering Log - BOREHOLE

CLIENT	Monterey Equity Pty Ltd		COMMENCED	27/01/2021	COMPLETED	27/01/2021	**REF BH205**
PROJECT	Acid Sulfate Soil Assessment		LOGGED	WX	CHECKED	JF	Sheet 1 OF 1
SITE	119 Barton Street, Monterey, NSW		GEOLOGY	Quaternary	VEGETATION	None	PROJECT NO. P1706332
EQUIPMENT		Push tube	EASTING	151.148353	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		Ø75 mm x 1.80 m depth	NORTHING	-33.974636	ASPECT	South	SLOPE <2%

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
PT		Not Encountered	0	4.00	0.00-0.2/S/1 D 0.00-0.20 m			SM	FILL: Silty SAND; fine grained; brown.	D		FILL
			0.4	*0.40* 3.60				SP	FILL: Gravelly SAND; fine to medium grained; dark grey.			
				0.50 3.50	0.5-0.7/S/1 D 0.50-0.70 m			SP	SAND; fine to medium grained; pale grey.			
			1.0		1.0-1.2/S/1 D 1.00-1.20 m							
			1.2	*1.30* 2.70					Brown.			
			1.4		1.5-1.7/S/1 D 1.50-1.70 m							
			1.8	*1.80*					Hole Terminated at 1.80 m (Target depth reached)			

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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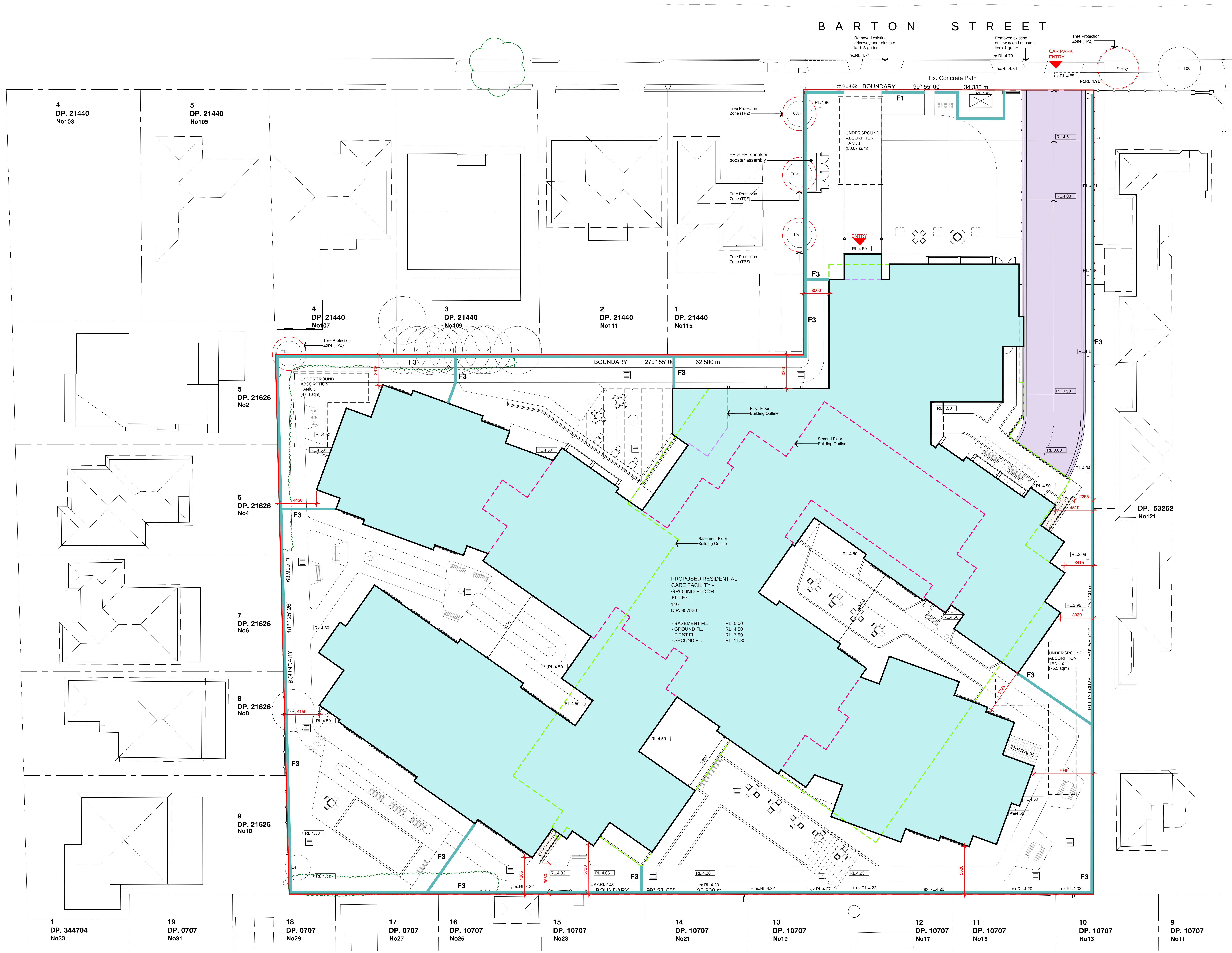
Suite 201, 20 George St. Hornsby, NSW 2077 Australia
Phone: (02) 9476 9999 Fax: (02) 9476 8767
mail@martens.com.au WEB: http://www.martens.com.au

Engineering Log - BOREHOLE

9 Attachment C – Proposed Development Plans



BARTON STREET
Removed existing driveway and reinstate kerb & gutter
CAR PARK ENTRY
Tree Protection Zone (TPZ)
Ex. Concrete Path
BOUNDARY 99° 55' 00" 34.385 m
UNDERGROUND ABSORPTION TANK 1 (50.07 sqm)
FH & FH. sprinkler booster assembly
ENTRY
4 DP. 21440 No103
5 DP. 21440 No105
4 DP. 21440 No107
3 DP. 21440 No109
2 DP. 21440 No111
1 DP. 21440 No115
BOUNDARY 279° 55' 00" 62.580 m
UNDERGROUND ABSORPTION TANK 3 (47.4 sqm)
5 DP. 21626 No2
6 DP. 21626 No4
7 DP. 21626 No6
8 DP. 21626 No8
9 DP. 21626 No10
First Floor Building Outline
Second Floor Building Outline
Basement Floor Building Outline
PROPOSED RESIDENTIAL CARE FACILITY - GROUND FLOOR
RL.4.50
119 D.P. 857520
- BASEMENT FL. RL. 0.00
- GROUND FL. RL. 4.50
- FIRST FL. RL. 7.90
- SECOND FL. RL. 11.30
BOUNDARY 188° 25' 26" 63.910 m
DP. 53262 No121
UNDERGROUND ABSORPTION TANK 2 (75.5 sqm)
TERRACE
BOUNDARY 99° 53' 05" 95.300 m
1 DP. 344704 No33
19 DP. 0707 No31
18 DP. 0707 No29
17 DP. 0707 No27
16 DP. 10707 No25
15 DP. 10707 No23
14 DP. 10707 No21
13 DP. 10707 No19
12 DP. 10707 No17
11 DP. 10707 No15
10 DP. 10707 No13
9 DP. 10707 No11

LEGEND

(cyan fill)	PROPOSED RCF
(red line)	BOUNDARY
(light green fill)	SOFT LANDSCAPE
(grey fill)	HARD LANDSCAPE
(fence line)	FENCE TYPE 1
(fence line)	FENCE TYPE 2
+ ex RL.16.00	EXISTING LEVEL RL.
+ RL.16.00	NEW FINISHED LEVEL RL.
+ TOW RL.	PROPOSED TOP OF WALL LEVEL
(green dashed line)	BASEMENT FLOOR
(purple dashed line)	FIRST FLOOR
(red dashed line)	SECOND FLOOR
(grey fill, heavy outline)	PROPOSED ROADS AND DRIVEWAYS
(solid circle)	EXISTING TREES TO REMAIN
(dashed circle)	EXISTING TREES TO BE REMOVED
F1	1800H POWDER COATED STEEL BLADE SECURITY FENCE ON MASONRY WALL RENDERED AND PAINTED WITH 400 X400 X1950H MASONRY COLUMN POST RENDERED AND PAINTED FINISH + EXISTING FENCE
F2	1800H COLORBOND STEEL FENCING & RETAINING WALL + EXISTING FENCE
F3	1800H COLORBOND STEEL FENCING + EXISTING FENCE

NOTE:
- ALL EXISTING FENCING EXCEPT FOR BARTON STREET BOUNDARY TO REMAIN. NEW FENCING TO BE BUILT INSIDE THE BOUNDARY ADJACENT

SOCIAL IMPACT RECOMMENDATION

Recommendation 1: Provide complying ramps at the signalised crossing of The Grand Parade at the south side of Barton Street.

Recommendation 2: Provide a complying ramp at the Queens Road entrance to the medical practice at 279 Bay Street.

Recommendation 3: Provide a complying ramp at the entrance to the Post Office.

PRELIMINARY

0m 2 5 10 15m
SCALE: 1:200

No.	Amendment	Date
1	Preliminary Issue For Review	27.11.2020

Project
SUMMITCARE - MONTEREY
119 Barton Street, Monterey, N.S.W 2217

Drawing
Site Plan

CENTURION GROUP
YOUR TRUSTED ADVISOR

SUMMITCARE
WARMTH WORTH WELLBEING

boffa robertson group
architecture, health and aged care planning, project management
Suite 7, Level 1 Epica, 9 Railway Street
Chatswood NSW 2067
AUSTRALIA
Tel. (02) 9406 7000
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Email : brgroup@brgr.net

Date	SEPT 2020
Scale	1:200 @ A1
Drawn	SS
Amendment	1
Job No. : Drawing	2014 / DA03

B A R T O N S T R E E T

LEGEND

	BOUNDARY
	MASONRY WALL
	STUD WALL
	OUTLINE OF WALL ABOVE / BELOW
	ROOF OUTLINE
	NEW FENCE
+ ex.RL.00.00	EXISTING LEVELS
RL.00.00	PROPOSED LEVELS
	PROPOSED DOOR
	PROPOSED WINDOW
	ELEVATION TAG
	SECTION / ELEVATION TAG

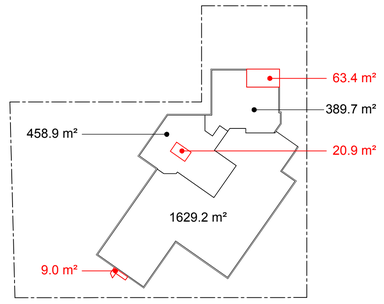
NCC 2019 - SECTION J REQUIREMENTS

Envelope Construction	Total System R-Value (m^2K/W)
J1.3 Roof and ceiling construction (Roof absorptance	≥ 3.20
J1.4 Roof lights	Compliant
J1.5a Total System external wall construction	≥ 2.00
J1.5b Total System internal wall construction (between conditioned & unconditioned areas)	≥ 1.40
J1.6a Floor construction (above an unconditioned zone)	≥ 2.00
J1.6b Floor construction (concrete slab on ground)	≥ 2.00

Glazing - Frame Construction (Uniform solution)	Orientation	Total System U-Value (m^2K/W)	Total System SHGC
Total window frame construction	All facades	≤ 2.10	≤ 0.18

ACOUSTIC REQUIREMENTS

Space / Activity Type	Recommended Design Sound Levels
Common Areas (e.g. foyer, lobby)	45 - 50 dB (A) Leq
Living Areas (e.g. common, lounges)	35 - 45 dB (A) Leq
Sleeping Areas (night time)	35 - 40 dB (A) Leq
Work areas (e.g. concierge, administration)	35 - 45 dB (A) Leq



SMOKE COMPARTMENTATION

PRELIMINARY

0m 2 5 10 15m
SCALE: 1:200

No.	Amendment	Date
7	MSB changed to Store	04.12.2020
6	Preliminary Issue For Review	27.11.2020
5	Services ducts added, stairs modified	23.10.2020
4	Minor changes. Laundry and storage changes	06.10.2020

Project
SUMMITCARE - MONTEREY
119 Barton Street, Monterey, N.S.W 2217

Drawing
BASEMENT FLOOR PLAN

CENTURION GROUP
YOUR TRUSTED ADVISOR

SUMMITCARE
WARMTH WORTH WELLBEING

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Email : brgroup@brgr.net

Date	AUG 2020	Job No. : Drawing
Scale	1:200 @ A1	2014 / DA04
Drawn	SS	
Amendment	7	

BARTON STREET

DEVELOPMENT STATISTICS

SITE AREA		7,218.7 m²
	BCA FLOOR AREA	SEPP 2004 GROSS FLOOR AREA
BASEMENT.FL.	2,644.5 m²	-
GROUND FL.	3,468.4 m²	3,468.4 m²
FIRST FL.	3,412.4 m²	3,412.4 m²
SECOND FL.	1,116.4 m²	1,116.4 m²
TOTAL	10,641.7 m²	7,997.2 m²
FSR		1.11 : 1
CARPARKING / AMBULANCE		42+1= 43 spaces
LANDSCAPE AREA		3,368.3 m²
LANDSCAPE AREA PER BED		22.0 m²

RESIDENT ACCOMMODATION

	1 BED	2 BED	TOTAL
GROUND FL.	52	8 x 2B	68
FIRST FL.	53	8 x 2B	69
SECOND FL.	16	0 x 2B	16
TOTAL No.of BEDS	121	32	153
TOTAL No.of ROOMS	121	16	137

PRIVATE ACTIVITIES	681.6 m²
COMMON ACTIVITIES	328.9 m²
STORAGE	272.6 m²

LEGEND

	BOUNDARY
	MASONRY WALL
	STUD WALL
	OUTLINE OF WALL ABOVE / BELOW
	ROOF OUTLINE
	NEW FENCE
+ ex.RL.00.00	EXISTING LEVELS
RL.00.00	PROPOSED LEVELS
	PROPOSED DOOR
	PROPOSED WINDOW
	ELEVATION TAG
	SECTION / ELEVATION TAG

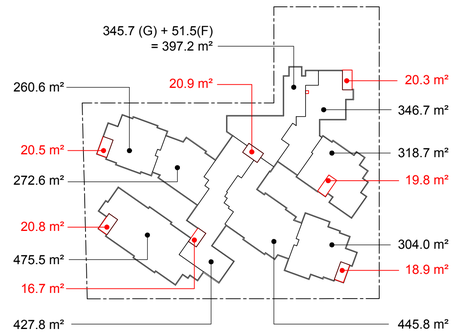
NCC 2019 - SECTION J REQUIREMENTS

Envelope Construction	Total System R-Value (m^2K/W)
J1.3 Roof and ceiling construction (Roof absorptance	≥ 3.20
J1.4 Roof lights	Compliant
J1.5a Total System external wall construction	≥ 2.00
J1.5b Total System internal wall construction (between conditioned & unconditioned areas)	≥ 1.40
J1.6a Floor construction (above an unconditioned zone)	≥ 2.00
J1.6b Floor construction (concrete slab on ground)	≥ 2.00

Glazing - Frame Construction (Uniform solution)	Orientation	Total System U-Value (m^2K/W)	Total System SHGC
Total window frame construction	All facades	≤ 2.10	≤ 0.18

ACOUSTIC REQUIREMENTS

Space / Activity Type	Recommended Design Sound Levels
Common Areas (e.g. foyer, lobby)	45 - 50 dB (A) Leq
Living Areas (e.g. common, lounges)	35 - 45 dB (A) Leq
Sleeping Areas (night time)	35 - 40 dB (A) Leq
Work areas (e.g. concierge, administration)	35 - 45 dB (A) Leq



SMOKE COMPARTMENTATION

PRELIMINARY

0m 2 5 10 15m
SCALE: 1:200

No.	Amendment	Date
7	Inground fire tank, Water meter, Gas regulator & Fire indicator panel shown Window amended to Quiet rooms	04.12.2020
6	Preliminary Issue For Review	27.11.2020

Project
SUMMITCARE - MONTEREY
119 Barton Street, Monterey, N.S.W 2217

Drawing
GROUND FLOOR PLAN

CENTURION GROUP
YOUR TRUSTED ADVISOR

SUMMITCARE
WARMTH WORTH WELLBEING

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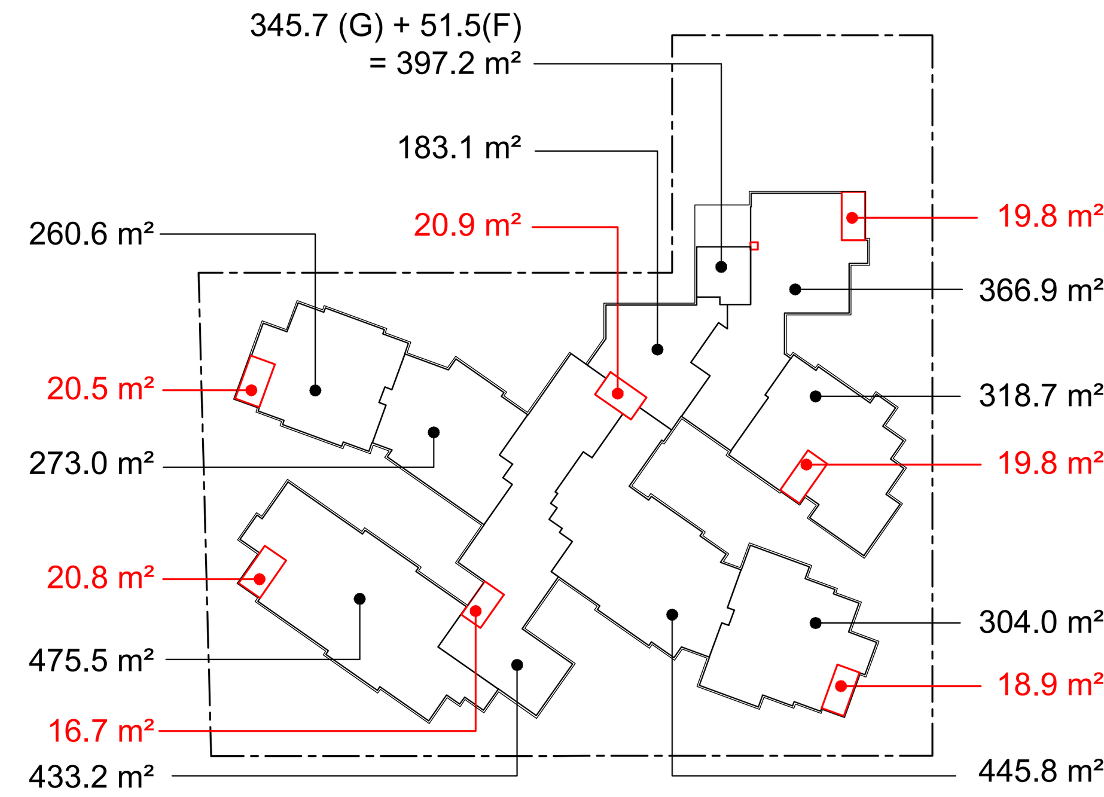
Date	AUG 2020	Job No. : Drawing
Scale	1:200 @ A1	2014 / DA05
Drawn	SS	
Amendment	7	



SMOKE COMPARTMENTATION

LEGEND

	BOUNDARY
	MASONRY WALL
	STUD WALL
	OUTLINE OF WALL ABOVE / BELOW
	ROOF OUTLINE
	NEW FENCE
+ ex.RL.00.00	EXISTING LEVELS
RL.00.00	PROPOSED LEVELS
	PROPOSED DOOR
	PROPOSED WINDOW
X CD-00	ELEVATION TAG
X CD-00	SECTION / ELEVATION TAG

NCC 2019 - SECTION J REQUIREMENTS

Envelope Construction	Total System R-Value (m²K/W)
J1.3 Roof and ceiling construction (Roof absorptance	≥ 3.20
J1.4 Roof lights	Compliant
J1.5a Total System external wall construction	≥ 2.00
J1.5b Total System internal wall construction (between conditioned & unconditioned areas)	≥ 1.40
J1.6a Floor construction (above an unconditioned zone)	≥ 2.00
J1.6b Floor construction (concrete slab on ground)	≥ 2.00

Glazing - Frame Construction (Uniform solution)	Orientation	Total System U-Value (m²K/W)	Total System SHGC
Total window frame construction	All facades	≤ 2.10	≤ 0.18

ACOUSTIC REQUIREMENTS

Space / Activity Type	Recommended Design Sound Levels
Common Areas (e.g. foyer, lobby)	45 - 50 dB (A) Leq
Living Areas (e.g. common, lounges)	35 - 45 dB (A) Leq
Sleeping Areas (night time)	35 - 40 dB (A) Leq
Work areas (e.g. concierge, administration)	35 - 45 dB (A) Leq

PRELIMINARY

0m 2 5 10 15m
SCALE: 1:200

No.	Amendment	Date
7	Inground fire tank, Water meter, Gas regulator & Fire indicator panel shown. Window amended to Quiet rooms and north Lounge. Front Pergola updated	04.12.2020

Project
SUMMITCARE - MONTEREY
119 Barton Street, Monterey, N.S.W 2217

Drawing
FIRST FLOOR PLAN

CENTURION GROUP
YOUR TRUSTED ADVISOR

SUMMITCARE
WARMTH WORTH WELLBEING

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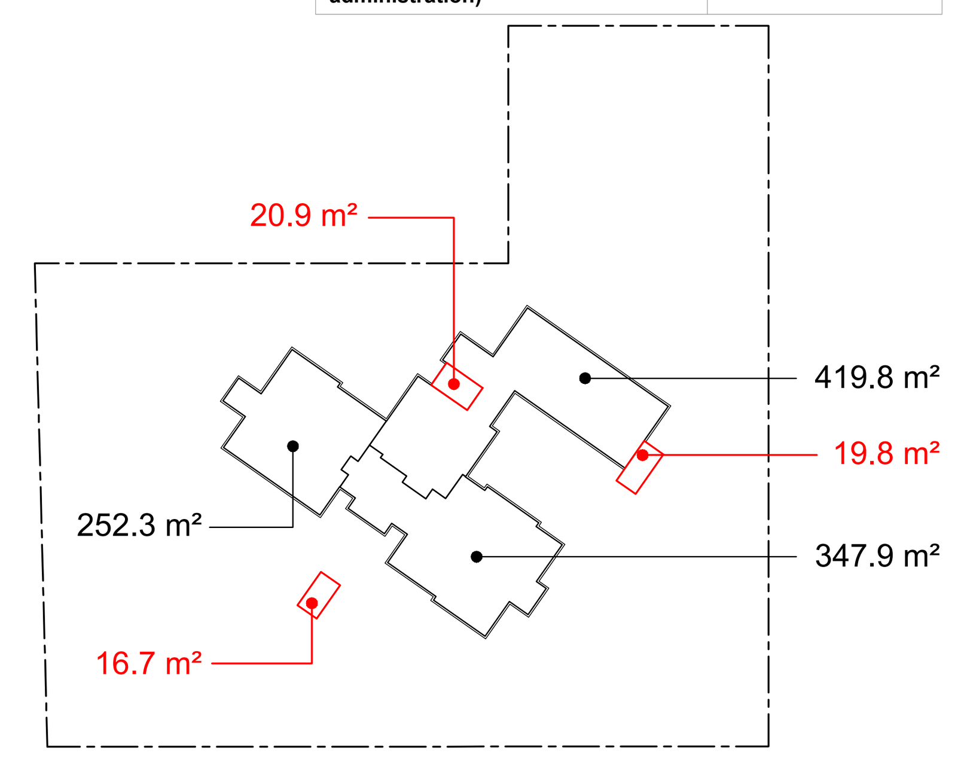
Date	AUG 2020	Job No. : Drawing
Scale	1:200 @ A1	2014 / DA06
Drawn	SS	
Amendment	7	



SMOKE COMPARTMENTATION

LEGEND

—·—·—	BOUNDARY
	MASONRY WALL
	STUD WALL
------	OUTLINE OF WALL ABOVE / BELOW
	ROOF OUTLINE
	NEW FENCE
+ ex.RL.00.00	EXISTING LEVELS
RL.00.00	PROPOSED LEVELS
	PROPOSED DOOR
	PROPOSED WINDOW
X CD-00	ELEVATION TAG
X CD-00	SECTION / ELEVATION TAG

NCC 2019 - SECTION J REQUIREMENTS

Envelope Construction	Total System R-Value (m²K/W)
J1.3 Roof and ceiling construction (Roof absorptance	≥ 3.20
J1.4 Roof lights	Compliant
J1.5a Total System external wall construction	≥ 2.00
J1.5b Total System internal wall construction (between conditioned & unconditioned areas)	≥ 1.40
J1.6a Floor construction (above an unconditioned zone)	≥ 2.00
J1.6b Floor construction (concrete slab on ground)	≥ 2.00

Glazing - Frame Construction (Uniform solution)	Orientation	Total System U-Value (m²K/W)	Total System SHGC
Total window frame construction	All facades	≤ 2.10	≤ 0.18

ACOUSTIC REQUIREMENTS

Space / Activity Type	Recommended Design Sound Levels
Common Areas (e.g. foyer, lobby)	45 - 50 dB (A) Leq
Living Areas (e.g. common, lounges)	35 - 45 dB (A) Leq
Sleeping Areas (night time)	35 - 40 dB (A) Leq
Work areas (e.g. concierge, administration)	35 - 45 dB (A) Leq

PRELIMINARY

0m 2 5 10 15m
SCALE: 1:200

No.	Amendment	Date
6	Fire Hydrant shown in Stair 5 Window amended to Quiet Room and Sitting Room	04.12.2020
5	Services ducts added, stairs modified	23.10.2020
4	Balconies and storage added	19.10.2020
3	Minor changes. Palliative Rooms Shown, Storage Changes	06.10.2020

Project
SUMMITCARE - MONTEREY
119 Barton Street, Monterey, N.S.W 2217

Drawing
SECOND FLOOR PLAN

CENTURION GROUP
YOUR TRUSTED ADVISOR

SUMMITCARE
WARMTH WORTH WELLBEING

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Email : brgroup@brgr.net

Date	AUG 2020	Job No. : Drawing
Scale	1:200 @ A1	2014 / DA07
Drawn	SS	
Amendment	6	

LEGEND

X°	PROPOSED ROOF PITCH AND FALL DIRECTION
	OUTLINE OF BUILDING BELOW
	NEW ROOF
RL.00.00	PROPOSED LEVELS
DP○	DOWNPIPE
	ROOF COWL

NOTE:

NCC 2019 - SECTION J REQUIREMENTS

Envelope Construction	Total System R-Value (m²K/W)
J1.3 Roof and ceiling construction (Roof absorptance	≥ 3.20
J1.4 Roof lights	Compliant
J1.5a Total System external wall construction	≥ 2.00
J1.5b Total System internal wall construction (between conditioned & unconditioned areas)	≥ 1.40
J1.6a Floor construction (above an unconditioned zone)	≥ 2.00
J1.6b Floor construction (concrete slab on ground)	≥ 2.00

Glazing - Frame Construction (Uniform solution)	Orientation	Total System U-Value (m²K/W)	Total System SHGC
Total window frame construction	All facades	≤ 2.10	≤ 0.18

ACOUSTIC REQUIREMENTS

Space / Activity Type	Recommended Design Sound Levels
Common Areas (e.g. foyer, lobby)	45 - 50 dB (A) Leq
Living Areas (e.g. common, lounges)	35 - 45 dB (A) Leq
Sleeping Areas (night time)	35 - 40 dB (A) Leq
Work areas (e.g. concierge, administration)	35 - 45 dB (A) Leq

PRELIMINARY

0m 1 2 5 7m
SCALE: 1:100

No.	Amendment	Date
2	Preliminary Issue For Review	27.11.2020
1	Services ducts added, stairs modified Roof modified	23.10.2020

Project
SUMMITCARE - MONTEREY
119 Barton Street, Monterey, N.S.W 2217

Drawing
ROOF PLAN

CENTURION GROUP
YOUR TRUSTED ADVISOR

SUMMITCARE
WARMTH WORTH WELLBEING

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Date	SEPT 2020	Job No. : Drawing	
Scale	1:200 @ A1	2014 /	DA08
Drawn			
Amendment	2		

10 Attachment D – ASS Summary Table

ASS Laboratory Test Results Interpretation

Method based on Acid Sulfate Soil Manual (ASSMAC, 1998)
Method ST-50 V05 Revised 30.04.2018

martens
Suite 201, 20 George Street, Hornsby, NSW 2077 Ph: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au, www.martens.com.au

PROJECT DETAILS

Client: Centurion Group
Project: Acid Sulfate Soils sPOCAS Assessment
Sampling Site: 119 Barton Street, Monterey, NSW
Sample Date: Jan-21

Assessment Date: 10/02/2021
Job Number: P1706332
Sampled By: WX

SAMPLE DETAILS / TEST RESULTS

Sample ID (mbgl)	Sample Depth (mAHD)	Infered Texture	pH KCL	Sulfur Trail			Acid Trail				ASS - Acid Base Accounting				Liming Rate without ANCE
				TSA		sPOS	TAA		TPA		Net Acidity (acidity units)	Net Acidity (sulfur units)	Net Acidity excluding ANC (acidity units)	Net Acidity excluding ANC (sulfur units)	
				mole H+/t	%S	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	mole H+/t	%S	kg/t
ASSMAC Criteria >1000 t disturbance			<4	18	0.03	0.03	18	0.03	18	0.03			18	0.03	
6332/BH201/2.5-2.7	1.64 to 1.84	Course	5.3	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH201/3.5-3.7	0.64 to 0.84	Course	5.5	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH201/4.5-4.7	-0.64 to -0.84	Course	8.7	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH202/1.5-1.7	2.2 to 2.4	Fine	4.3	<5	<0.01	<0.005	**18**	**0.03**	**19**	**0.03**	20	0.03	**20**	**0.03**	**1.5**
6332/BH202/3.5-3.7	0.2 to 0.4	Course	5.7	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH202/5.0-5.2	-1.3 to -1.5	Course	8.2	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH203/2.0-2.2	1.5 to 1.7	Course	5.8	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH203/3.0-3.2	0.5 to 0.7	Course	5.8	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH203/4.0-4.2	-0.5 to -0.7	Course	5.9	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH203/5.0-5.2	-1.5 to -1.7	Course	9	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH204/1.0-1.2	2.5 to 2.7	Course	6.1	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75
6332/BH205/1.5-1.7	2.3 to 2.5	Course	5.2	<5	<0.01	<0.005	<5	<0.01	<5	<0.01	<5	<0.01	<5	<0.01	<0.75

Notes:
1. Material type based on field texture assessment or laboratory report.
2. Total Actual Acidity. Highlighted values exceed ASSMAC (1998) action criteria.
3. Total Potential Acidity. Highlighted values exceed ASSMAC (1998) action criteria.
4. Percentage net acid soluble sulfur. Highlighted values exceed ASSMAC (1998) action criteria.
5. From laboratory test results (refer to laboratory test certificates). Calculated using a FOS of 1.5.

11 Attachment E – Laboratory Analytical Results

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12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 260394

Client Details

Client	Martens & Associates Pty Ltd
Attention	William Xu
Address	Suite 201, 20 George St, Hornsby, NSW, 2077

Sample Details

Your Reference	**P1706332: 119 Barton Road, Moneterey, NSW**
Number of Samples	12 Soil
Date samples received	28/01/2021
Date completed instructions received	28/01/2021

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	04/02/2021
Date of Issue	04/02/2021

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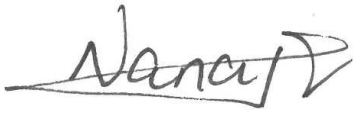
Results Approved By
Nick Sarlamis, Inorganics Supervisor

Authorised By



Nancy Zhang, Laboratory Manager

sPOCAS + %S w/w						
Our Reference		260394-1	260394-2	260394-3	260394-4	260394-5
Your Reference	UNITS	6332/BH201/2.5-3.7	6332/BH201/3.5-3.7	6332/BH201/4.5-4.7	6332/BH202/1.5-1.7	6332/BH202/3.5-3.7
Date Sampled		27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	02/02/2021	02/02/2021	02/02/2021	02/02/2021	02/02/2021
Date analysed	-	02/02/2021	02/02/2021	02/02/2021	02/02/2021	02/02/2021
pH $_{kcl}$	pH units	5.3	5.5	8.7	4.3	5.7
TAA pH 6.5	moles H^+ /t	<5	<5	<5	18	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.03	<0.01
pH $_{Ox}$	pH units	5.3	5.8	6.8	3.7	5.9
TPA pH 6.5	moles H^+ /t	<5	<5	<5	19	<5
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	0.03	<0.01
TSA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
ANC_E	% $CaCO_3$	NT	NT	0.12	NT	NT
a-ANC_E	moles H^+ /t	NT	NT	25	NT	NT
s-ANC_E	%w/w S	NT	NT	<0.05	NT	NT
S_{KCl}	%w/w S	<0.005	<0.005	<0.005	0.005	<0.005
S_P	%w/w	<0.005	<0.005	<0.005	0.005	<0.005
S_{POS}	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
a-S_{POS}	moles H^+ /t	<5	<5	<5	<5	<5
Ca_{KCl}	%w/w	<0.005	<0.005	0.04	0.03	<0.005
Ca_P	%w/w	<0.005	<0.005	0.06	0.02	<0.005
Ca_A	%w/w	<0.005	<0.005	0.023	<0.005	<0.005
Mg_{KCl}	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Mg_P	%w/w	<0.005	<0.005	<0.005	0.007	<0.005
Mg_A	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
S_{HCl}	%w/w S	NT	NT	NT	0.007	NT
S_{NAS}	%w/w S	NT	NT	NT	<0.005	NT
a-S_{NAS}	moles H^+ /t	NT	NT	NT	<5	NT
s-S_{NAS}	%w/w S	NT	NT	NT	<0.01	NT
Fineness Factor	-	1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H^+ /t	<5	<5	<5	20	<5
s-Net Acidity	%w/w S	<0.01	<0.01	<0.01	0.03	<0.01
Liming rate	kg $CaCO_3$ /t	<0.75	<0.75	<0.75	1.5	<0.75
s-Net Acidity without -ANCE	%w/w S	<0.01	<0.01	<0.01	0.03	<0.01
a-Net Acidity without ANCE	moles H^+ /t	<5	<5	<5	20	<5
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	<0.75	<0.75	1.5	<0.75

sPOCAS + %S w/w						
Our Reference		260394-6	260394-7	260394-8	260394-9	260394-10
Your Reference	UNITS	6332/BH202/5.0-5.2	6332/BH203/2.0-2.2	6332/BH203/3.0-3.2	6332/BH203/4.0-4.2	6332/BH203/5.0-5.2
Date Sampled		27/01/2021	27/01/2021	27/01/2021	27/01/2021	27/01/2021
Type of sample		Soil	Soil	Soil	Soil	Soil
Date prepared	-	02/02/2021	02/02/2021	02/02/2021	02/02/2021	02/02/2021
Date analysed	-	02/02/2021	02/02/2021	02/02/2021	02/02/2021	02/02/2021
pH $_{kcl}$	pH units	8.2	5.8	5.8	5.9	9.0
TAA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
pH $_{Ox}$	pH units	6.9	5.3	5.8	5.7	7.0
TPA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
s-TPA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TSA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
s-TSA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
ANC_E	% $CaCO_3$	0.12	NT	NT	NT	0.12
a-ANC_E	moles H^+ /t	25	NT	NT	NT	25
s-ANC_E	%w/w S	<0.05	NT	NT	NT	<0.05
S_{KCl}	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
S_P	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
S_{POS}	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
a-S_{POS}	moles H^+ /t	<5	<5	<5	<5	<5
Ca_{KCl}	%w/w	0.04	0.007	<0.005	<0.005	0.05
Ca_P	%w/w	0.12	0.007	<0.005	<0.005	0.13
Ca_A	%w/w	0.078	<0.005	<0.005	<0.005	0.081
Mg_{KCl}	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Mg_P	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
Mg_A	%w/w	<0.005	<0.005	<0.005	<0.005	<0.005
S_{HCl}	%w/w S	NT	NT	NT	NT	NT
S_{NAS}	%w/w S	NT	NT	NT	NT	NT
a-S_{NAS}	moles H^+ /t	NT	NT	NT	NT	NT
s-S_{NAS}	%w/w S	NT	NT	NT	NT	NT
Fineness Factor	-	1.5	1.5	1.5	1.5	1.5
a-Net Acidity	moles H^+ /t	<5	<5	<5	<5	<5
s-Net Acidity	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
Liming rate	kg $CaCO_3$ /t	<0.75	<0.75	<0.75	<0.75	<0.75
s-Net Acidity without -ANCE	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
a-Net Acidity without ANCE	moles H^+ /t	<5	<5	<5	<5	<5
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	<0.75	<0.75	<0.75	<0.75

sPOCAS + %S w/w			
Our Reference		260394-11	260394-12
Your Reference	UNITS	6332/BH204/1.0-1.2	6332/BH205/1.5-1.7
Date Sampled		27/01/2021	27/01/2021
Type of sample		Soil	Soil
Date prepared	-	02/02/2021	02/02/2021
Date analysed	-	02/02/2021	02/02/2021
pH $_{kcl}$	pH units	6.1	5.2
TAA pH 6.5	moles H^+ /t	<5	<5
s-TAA pH 6.5	%w/w S	<0.01	<0.01
pH $_{Ox}$	pH units	5.7	5.6
TPA pH 6.5	moles H^+ /t	<5	<5
s-TPA pH 6.5	%w/w S	<0.01	<0.01
TSA pH 6.5	moles H^+ /t	<5	<5
s-TSA pH 6.5	%w/w S	<0.01	<0.01
ANC_E	% $CaCO_3$	NT	NT
a-ANC_E	moles H^+ /t	NT	NT
s-ANC_E	%w/w S	NT	NT
S_{KCl}	%w/w S	<0.005	<0.005
S_P	%w/w	<0.005	<0.005
S_{POS}	%w/w	<0.005	<0.005
a-S_{POS}	moles H^+ /t	<5	<5
Ca_{KCl}	%w/w	0.009	0.005
Ca_P	%w/w	0.01	0.005
Ca_A	%w/w	<0.005	<0.005
Mg_{KCl}	%w/w	<0.005	<0.005
Mg_P	%w/w	<0.005	<0.005
Mg_A	%w/w	<0.005	<0.005
S_{HCl}	%w/w S	NT	NT
S_{NAS}	%w/w S	NT	NT
a-S_{NAS}	moles H^+ /t	NT	NT
s-S_{NAS}	%w/w S	NT	NT
Fineness Factor	-	1.5	1.5
a-Net Acidity	moles H^+ /t	<5	<5
s-Net Acidity	%w/w S	<0.01	<0.01
Liming rate	kg $CaCO_3$ /t	<0.75	<0.75
s-Net Acidity without -ANCE	%w/w S	<0.01	<0.01
a-Net Acidity without ANCE	moles H^+ /t	<5	<5
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	<0.75

Method ID	Methodology Summary
Inorg-064	sPOCAS determined using titrimetric and ICP-AES techniques. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			02/02/2021	1	02/02/2021	02/02/2021		02/02/2021	[NT]
Date analysed	-			02/02/2021	1	02/02/2021	02/02/2021		02/02/2021	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	1	5.3	5.4	2	98	[NT]
TAA pH 6.5	moles H^+/t	5	Inorg-064	<5	1	<5	<5	0	96	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	1	5.3	5.3	0	95	[NT]
TPA pH 6.5	moles H^+/t	5	Inorg-064	<5	1	<5	<5	0	94	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
TSA pH 6.5	moles H^+/t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	<0.05	1	NT	NT		[NT]	[NT]
a-ANC_E	moles H^+/t	5	Inorg-064	<5	1	NT	NT		[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	<0.05	1	NT	NT		[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
a-S_{POS}	moles H^+/t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	<0.005	1	NT	NT		[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	<0.005	1	NT	NT		[NT]	[NT]
a-S_{NAS}	moles H^+/t	5	Inorg-064	<5	1	NT	NT		[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	<0.01	1	NT	NT		[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	<1.5	1	1.5	1.5	0	[NT]	[NT]
a-Net Acidity	moles H^+/t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	<0.75	1	<0.75	<0.75	0	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	<0.01	1	<0.01	<0.01	0	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	<5	1	<5	<5	0	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-064	<0.75	1	<0.75	<0.75	0	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	11	02/02/2021	02/02/2021		[NT]	[NT]
Date analysed	-			[NT]	11	02/02/2021	02/02/2021		[NT]	[NT]
pH $_{kcl}$	pH units		Inorg-064	[NT]	11	6.1	6.1	0	[NT]	[NT]
TAA pH 6.5	moles H^+/t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
pH $_{Ox}$	pH units		Inorg-064	[NT]	11	5.7	6.0	5	[NT]	[NT]
TPA pH 6.5	moles H^+/t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-TPA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
TSA pH 6.5	moles H^+/t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-TSA pH 6.5	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
ANC_E	% $CaCO_3$	0.05	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
a-ANC_E	moles H^+/t	5	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
s-ANC_E	%w/w S	0.05	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
S_P	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
S_{POS}	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
a-S_{POS}	moles H^+/t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
Ca_{KCl}	%w/w	0.005	Inorg-064	[NT]	11	0.009	0.009	0	[NT]	[NT]
Ca_P	%w/w	0.005	Inorg-064	[NT]	11	0.01	0.009	11	[NT]	[NT]
Ca_A	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
Mg_{KCl}	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
Mg_P	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
Mg_A	%w/w	0.005	Inorg-064	[NT]	11	<0.005	<0.005	0	[NT]	[NT]
S_{HCl}	%w/w S	0.005	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
a-S_{NAS}	moles H^+/t	5	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
s-S_{NAS}	%w/w S	0.01	Inorg-064	[NT]	11	NT	NT		[NT]	[NT]
Fineness Factor	-	1.5	Inorg-064	[NT]	11	1.5	1.5	0	[NT]	[NT]
a-Net Acidity	moles H^+/t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
s-Net Acidity	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]
Liming rate	kg $CaCO_3$/t	0.75	Inorg-064	[NT]	11	<0.75	<0.75	0	[NT]	[NT]
s-Net Acidity without -ANCE	%w/w S	0.01	Inorg-064	[NT]	11	<0.01	<0.01	0	[NT]	[NT]

QUALITY CONTROL: sPOCAS + %S w/w					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-064	[NT]	11	<5	<5	0	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-064	[NT]	11	<0.75	<0.75	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.