

15 January 2021 Ref: E33691Plet

Anthony Brooks 13 Monash Crescent Clontarf NSW 2093

PRELIMINARY ACID SULFATE SOIL ASSESSMENT PROPOSED RESIDENTIAL DEVELOPMENT 13 MONASH CRESCENT, CLONTARF, NSW

1 INTRODUCTION

Anthony Brooks ('the client') commissioned JK Environments (JKE) to undertake a preliminary acid sulfate soil (ASS) assessment for the proposed residential development at 13 Monash Crescent, Clontarf, NSW. The site is identified as Lot 53 in DP9745. The site location is shown on Figure 1 and the assessment was confined to the site boundaries as shown on Figure 2.

The assessment was undertaken generally in accordance with a JKG proposal (Ref: P51577YJ) of 15 April 2020 and written acceptance from the client by email of 25 November 2020. A geotechnical investigation was undertaken in conjunction with the ASS assessment by JK Geotechnics and the results are presented in a separate report (Ref: 33691YJrpt).

The aims of the assessment were to establish whether ASS may be disturbed during the proposed development works, and to assess whether an ASS management plan (ASSMP) is required.

1.1 Assessment Guidelines and Background

The ASS assessment and preparation of this report were undertaken with reference to the National Acid Sulfate Soil Guidance (2018) documents and the Acid Sulfate Soil Management Advisory Committee (ASSMAC) Acid Sulfate Soil Manual (1998)¹.

ASS materials include potential acid sulfate soils (PASS or sulfidic soil materials) and actual acid sulfate soils (AASS or sulfuric soil materials). These are often found in the same profile, with AASS overlying PASS. AASS and PASS are defined further as follows:

PASS are soil materials which contain Reduced Inorganic Sulfur (RIS) such as pyrite. The field pH of these soils in their undisturbed state is usually more than pH 4 and is commonly neutral to alkaline (pH 7–9). These soil materials are invariably saturated with water in their natural state. Their texture may

¹ Acid Sulfate Soils Management Advisory Committee (ASSMAC), (1998). Acid Sulfate Soils Manual (ASS Manual 1998)





be peat, clay, loam, silt or sand and is often dark grey in colour and soft in consistence, but these materials may also exhibit colours that are dark brown, or medium to pale grey to white; and

AASS are soil materials which contained RIS such as pyrite that have undergone oxidation. This
oxidation results in low pH (that is pH less than 4) and often a yellow (jarosite) and/or orange to red
mottling (ferric iron oxides) in the soil profile. Actual ASS contains Actual Acidity, and commonly also
contains RIS (the source of Potential Sulfuric Acidity) as well as Retained Acidity.

Further background information on ASS and the assessment process is provided in the appendices.

1.2 Proposed Development Details

The proposed development includes demolition of the existing residential building and construction of a two storey house. No basement is proposed for this development, however, piling and shallow strip footings will require some minor excavation.

2 SITE INFORMATION

2.1 Site Information and Description

Site Address:	13 Monash Crescent, Clontarf, NSW
Lot & Deposited Plan:	Lot 53 DP9745
Current Land Use:	Residential
Site Area (m ²):	485
Site Elevation (metres Australian Height Datum – mAHD approx.)	2.3-2.5
Geographical Location	Latitude: -33.808831
approx.).	Longitude: 151.253084

Table 2-1: Site Identification

The site is located in a residential area of Clontarf, on the south-west side of Monash Crescent and northeast of Middle Harbour. The regional topography is characterised by gently undulating terrain and an alluvial plain which descends towards the south. The site is located at the bottom of the plain on Clontarf Beach and is relatively flat.

At the time of the fieldwork, the site was occupied by a two storey residential house in the southern section of the property, which was constructed from brick, tile, concrete and fibre cement (eaves). A one storey garage was located in the northern section of the property, which was constructed from concrete and tile.



An assortment of native and exotic grass, shrubs and trees were located on site which all appeared in good condition with no signs of stress or dieback.

An access easement was located immediately north-west of the site, with residential properties beyond. Similar residential properties were located to the north-east and south-east of the site. Clontarf Beach and Middle Harbour were located to the south-west of the site.

2.2 Regional Geology

The geological map of Sydney (1983)² indicates the site to be underlain by Quaternary aged deposits of coarse quartz sand, varying amounts of shell fragment.

2.3 Acid Sulfate Soil Risk Map

A review of the ASS risk maps prepared by Department of Land and Water Conservation (1997)³ indicates that the site is located in an area classed as having 'low risk' of occurrence of ASS between 1m and 3m below the ground surface.

2.4 Warringah Council Local Environmental Plan (LEP) 2000

A review of the Warringah council LEP indicates that the site is located on the boundary of ASS risk Classes 3 and 5 (refer to appendices for further details on each risk class).

3 INVESTIGATION REQUIREMENTS AND ASSESSMENT CRITERIA

3.1 Investigation Requirements

The National Acid Sulfate Soil Guidance (2018) requires sampling to a depth of 1m beyond the depth of disturbance (including the depth of any groundwater disturbance). A summary of the sampling densities and analysis requirements outlined in the *National Acid Sulfate Soil Guidance: National acid sulfate soils sampling and identification methods manual* (2018) is provided in the following tables:

Type of disturbance	Extent of site	Sample point frequency
Small volumes (≤ 1000 m ³) – prior to disturbance	Volume of disturbance (m ³)	Number of boreholes
	< 250	2
	251–500	3
	501–1000	4

Table 3-1: Minimum Soil Sampling Densities for ASS Investigations

² Department of Mineral Resources, (1983). 1:100,000 Geological Map of Sydney (Series 9130)

³ Department of Land and Water Conservation, (1997). 1:25,000 Acid Sulfate Soil Risk Map (Series 9130N2, Ed 2)



Type of disturbance	Extent of site	Sample point frequency
Large volumes (> 1000 m ³) – prior to disturbance	Project area (ha)	Number of boreholes
	<1	4
	1-2	6
	2-3	8
	3-4	10
	>4	10 plus 2 per additional hectare
Linear	Width and volume	Intervals (m)
	Minor ¹	100
	Major ²	50
Existing stockpiles & verification testing	Volume (m ³)	Number of samples
	<250	2
	251-500	3
	1,000	4
	>1,000	4 plus 1 per additional 500m ³

¹ Minor Linear Disturbance – for example underground services, narrow shallow drains (less than 1 m below ground level).

² Major Linear Disturbance – for example roads, railways, canals, deep sewer, wide drains, deep drains and dredging projects[#].

[#] Further guidance is provided in the Guidelines for the dredging of acid sulfate soil sediments and associated dredge spoil management (Simpson et al. 2017).

Table 3-2: Minimum Number	of Soil Samples to be Subi	mitted for Laboratory A	nalysis (small-scale disturbance)
			, , , ,

Volume of	Maximum disturbance depth								
disturbed soils	< 1 m	1–2 m	2-3 m	3-4 m					
≤ 250m ³	3	4	5	6					
251–500m ³	4	5	6	7					
500–1,000m ³	5	6	7	8					

Note: Small scale is considered less than or equal to 1,000 m³ and does not involve dewatering or groundwater pumping (excluding linear disturbances). Number of samples to be analysed per total volume of soil to be disturbed, not per borehole. Depth of disturbance to be measured from ground surface. Borehole depth must be at least 1 m below maximum proposed depth of disturbance.

The investigation component of this assessment was designed as a preliminary investigation and does not meet the minimum sampling density and analysis frequency. The low sampling density is considered reasonable given the site access limitations and localised extent of soil disturbance.

3.2 Action Criteria

The action criteria presented in the *National Acid Sulfate Soil Guidance: National acid sulfate soils sampling and identification methods manual* (2018) are summarised in the following table:



Type of material		Net Acidity					
Texture range* (NCST 2009)	Approximate clay content (%)	1–1000 t materials % S-equiv. (oven-dried basis)	s disturbed mol H⁺/t (oven- dried basis)	> 1000 t materials % S-equiv. (oven-dried basis)	disturbed mol H⁺/t (oven- dried basis)		
Fine - light medium to heavy clays	>40	≥0.10	≥62	≥0.03	≥18		
Medium - clayey sand to light clays	5–40	≥0.06	≥36	≥0.03	≥18		
Coarse and Peats - <5 sands to loamy sands		≥0.03	≥18	≥0.03	≥18		

Table 3-3: ASS Action Criteria Based on Soil Texture and Volume of Material Being Disturbed

* If bulk density values are not available for the conversion of cubic meters to tonnes of soil, then default bulk densities, based on the soil texture, may be used.

The action criteria for coarse were used for this assessment.

3.3 Field Tests

The soil field tests commonly used for investigations for ASS materials include field pH (pH_F) and field pH peroxide (pH_{FOX}) tests. The pH_F test can help identify Actual ASS. While a pH_F of less than or equal to pH 4 is indicative of the presence of Actual ASS, it is not conclusive of the presence of ASS on its own, as naturally occurring, non ASS soils such as many organic soils (for example peats) and heavily leached soils may also have pH_F less than or equal to pH 4. To identify an Actual ASS other evidence must be presented that indicates the low pH_F has been mainly caused by the oxidation of reduced inorganic sulfur. Such information includes the presence of jarosite in the soil layer/horizon, or the location of other Actual ASS or PASS materials within the sampling location or in the nearby vicinity.

The difference between the pH_F and the pH_{FOX} is helpful in the preliminary identification of PASS. Combined, the pH_F and pH_{FOX} results can be a useful aid with soil sample selection for laboratory analysis. Additional Information in relation to interpretation of the pH field tests is provided in the appendices.

4 INVESTIGATION PROCEDURE

4.1 Subsurface Investigation and Soil Sampling Methods

Field work was undertaken on 7 December 2020. Soil samples were collected from two locations in conjunction with the JK Geotechnics investigation, to a maximum borehole depth of 2.2m below ground level (BGL). The sampling locations are shown on the attached Figure 2. The sample locations were drilled using hand equipment due to access restrictions.

Soil samples were obtained at various depths, based on observations made during the field investigation. All samples were placed in plastic bags and sealed with plastic ties with minimal headspace. Each sample was labelled with a unique job number, the sampling location, sampling depth and date. All samples were recorded on the borehole logs attached in the appendices.



The samples were preserved by immediate storage in an insulated sample container with ice and frozen upon return to the JKE office. Samples were subsequently delivered in the insulated sample container (on ice or with ice packs) to a NATA registered laboratory for analysis under standard chain of custody (COC) procedures.

4.2 Laboratory Analysis

Samples for this assessment were analysed for ASS field tests (including pH_F and pH_{FOX}) and using the chromium reducible sulfur (S_{CR}) acid base accounting analytical methods. All tests/analysis were performed at the laboratory and JKE did not carry out the testing in the field due to time constraints. Samples were Analysed by Envirolab Services (NATA Accreditation Number – 2901). Reference should be made to the laboratory report (Ref: 257751 and 257751-B) attached in the appendices for further information regarding the laboratory methods used.

5 RESULTS OF THE INVESTIGATION

5.1 Subsurface Conditions

The subsurface conditions encountered generally consisted of fill material from the surface to a depth of approximately 0.8mBGL in BH2 and to the termination/refusal of BH4 at a depth of approximately 1.1mBGL. The fill was underlain by marine silty sand soil in BH2 to the termination depth of approximately 2.2m BGL. Groundwater seepage was encountered in BH2 at approximately 2.0mBGL, at which point shell fragments were encountered in the natural soil. The fill material typically consisted of silty sand with inclusions of igneous gravel and root fibres. Reference should be made to the borehole logs attached in the appendices for further details.

5.2 Laboratory Results

The soil laboratory results were assessed against the action criteria adopted for the assessment. The results are presented in the attached report tables and are summarised below.

Results	Comments
pH _F and pH _{FOX}	pH_F results ranged from 5.6 to 8.3. The pH_{FOX} results ranged from 3.7 to 6.6.
pH_{FOX} reaction rates	Samples typically recorded medium reactions and dropped by between 1 and 2 pH units after oxidation. There was one high reaction.
Net Acidity % S-equiv.	The net acidity results were less than the laboratory detection limits of 0.005%.
Net Acidity mol H⁺/t	The net acidity results were less than the laboratory detection limits of 5 mol H ⁺ /t.
Scr%	The S_{CR} % results were all less than the laboratory detection limit of 0.005%. These results indicated that the soils did not contain significant oxidisable sulfur concentrations (i.e. no appreciable RIS).

Table 5-1: Summary of Results



Results	Comments
Liming Rate	The liming rate required for neutralisation was less than the laboratory detection limit of 0.75kgCaCO ₃ /tonne.

6 CONCLUSION

Based on the weight of evidence collected and evaluated for this assessment, there is considered to be a low potential for ASS materials (AASS or PASS) to be disturbed to a depth of approximately 2.2m. If no excavation is required beyond this depth, an ASSMP is not considered necessary for the proposed development. If, however, excavation beyond this depth is required, then further assessment will be required to better assess potential ASS conditions beyond 2.2m.

7 LIMITATIONS

The report limitations are outlined below:

- JKE accepts no responsibility for any unidentified AASS or PASS issues at the site. Any unexpected problems/subsurface features that may be encountered during development works should be inspected by an environmental consultant as soon as possible;
- This report has been prepared based on site conditions which existed at the time of the investigation; scope of work and limitation outlined in the JKE proposal; and terms of contract between JKE and the client (as applicable);
- The conclusions presented in this report are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, visual observations of the site and immediate surrounds and documents reviewed as described in the report;
- Subsurface soil and rock conditions encountered between investigation locations may be found to be different from those expected. Groundwater conditions may also vary, especially after climatic changes;
- The investigation and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined in the report;
- Where information has been provided by third parties, JKE has not undertaken any verification process, except where specifically stated in the report;
- JKE accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site;
- JKE have not and will not make any determination regarding finances associated with the site;
- Additional investigation work may be required in the event of changes to the proposed development or landuse. JKE should be contacted immediately in such circumstances;
- This report has been prepared for the particular project described and no responsibility is accepted for the use of any part of this report in any other context or for any other purpose;
- Copyright in this report is the property of JKE. JKE has used a degree of care, skill and diligence normally exercised by consulting professionals in similar circumstances and locality. No other warranty



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- If the client, or any person, provides a copy of this report to any third party, such third party must not rely on this report except with the express written consent of JKE; and
- Any third party who seeks to rely on this report without the express written consent of JKE does so entirely at their own risk and to the fullest extent permitted by law, JKE accepts no liability whatsoever, in respect of any loss or damage suffered by any such third party.

If you have any questions concerning the contents of this letter please do not hesitate to contact us.

Kind Regards

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Todd Hore Senior Associate Environmental Engineer

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Brendan Page Principal Associate

Appendices:

Appendix A: Report Figures Appendix B: Laboratory Results Summary Table Appendix C: Information on Acid Sulfate Soils Appendix D: Borehole Logs Appendix E: Laboratory Reports & COC Documents



Appendix A: Report Figures





Project No:

E33691P

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Appendix B: Laboratory Results Summary Table

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ABBREVIATIONS AND EXPLANATIONS FOR ACID SULFATE SOIL TABLE

Abbreviations used in the Tables:

ANC _{BT}	Acid Neutralising Capacity - Back Titration
ANCE	Excess Acid Neutralising Capacity
CaCO ₃	Calcium Carbonate
kg	kilogram
mol H⁺/t	moles hydrogen per tonne
pHF	Field pH
pHFOX	Field peroxide pH
pΗ _{κci}	Pottasium chloride pH
S	Sulfur
SCr	The symbol given to the result from the Chromium Reducible Sulfur method
S _{NAS}	Net Acid Soluble Sulfur
% w/w	Percentage by mass

Results have been assessed against the criteria specified in Table 1.1 of National Acid sulfate Soil Guidance - National acid sulfate soil identification and laboratory method manual. Water Quality Australia. June 2018



					SUMM	IARY OF LABORAT	TABLE A	- ACID SULFATE SOI	L ANALYSIS						
Soil Texture: Coarse Analysis		pH _F and pH _{FOX}				Actual Acidity (Titratable Actual Acidity - TAA)	Potential Sulfidic Acidity		Retained Acidity	Acid Neutralising Capacity (ANC _{BT})	a-Net Acidity without ANCE	<pre>/ s-Net Acidity E without ANCE</pre>	Liming Rate - without ANCE		
			pH _F	pH _{FOX}	Reaction	pH _F - pH _{FOX}	pH _{KCL}	(mol H⁺/t)	(% SCr)	(mol H ⁺ /t)	(%S _{NAS})	(% CaCO ₃)	(mol H ⁺ /t)	(%w/w S)	(kg CaCO ₃ /tonne)
National Acio Guidano	d Sulfate Soils ce (2018)		-	-	-	-	-	-	-	-	-	-	18	0.03	-
Sample	Sample Depth														
Reference	(m)	Sample Description													
BH2	0.55-0.6	Fill: Silty Sand	5.6	4.1	Medium reaction	1.5	5.5	<5	< 0.005	<3	NT	NT	<5	< 0.005	<0.75
BH2	0.55-0.6	Lab Replicate	NA	NA	NA	NA	5.5	<5	< 0.005	<3	NT	NT	<5	< 0.005	<0.75
BH2	0.9-1.1	Silty Sand	6.1	4.3	Medium reaction	1.8	5.6	<5	< 0.005	<3	NT	NT	<5	< 0.005	<0.75
BH2	2.0-2.2	Silty Sand	7.6	6.6	High reaction	1	8.7	<5	< 0.005	<3	[NT]	1.9	<5	< 0.005	<0.75
BH4	0-0.2	Fill: Silty Sand	5.7	3.7	Medium reaction	2	NA	NA	NA	NA	NA	NA	NA	NA	NA
BH4	0.5-0.7	Fill: Silty Sand	8.3	6.4	Medium reaction	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Number	of Samples		5	5	-	5	4	4	4	4	4	4	4	4	4
Minimum Valu	Je		5.6	3.7	-	1	5.5	<pql< td=""><td><pql< td=""><td><pql< td=""><td><pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<></td></pql<></td></pql<></td></pql<>	<pql< td=""><td><pql< td=""><td><pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<></td></pql<></td></pql<>	<pql< td=""><td><pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<></td></pql<>	<pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<>	1.90	<pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<>	<pql< td=""><td><pql< td=""></pql<></td></pql<>	<pql< td=""></pql<>
Maximum Val	ue		8.3	6.6	-	2	8.7	<pql< td=""><td><pql< td=""><td><pql< td=""><td><pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<></td></pql<></td></pql<></td></pql<>	<pql< td=""><td><pql< td=""><td><pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<></td></pql<></td></pql<>	<pql< td=""><td><pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<></td></pql<>	<pql< td=""><td>1.90</td><td><pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<></td></pql<>	1.90	<pql< td=""><td><pql< td=""><td><pql< td=""></pql<></td></pql<></td></pql<>	<pql< td=""><td><pql< td=""></pql<></td></pql<>	<pql< td=""></pql<>
Values Excee	eding Action Crite	eria	0.5	0.0	1 1	-	5.7		-, QL	QL	ur	1.50	QL		



Appendix C: Information on Acid Sulfate Soils



A. <u>Background</u>

Acid Sulfate Soil (ASS) is formed from iron rich alluvial sediments and sulfate (found in seawater) in the presence of sulfate reducing bacteria and plentiful organic matter. These conditions are generally found in mangroves, salt marsh vegetation or tidal areas and at the bottom of coastal rivers and lakes. ASS materials are distinguished from other soil or sediment materials (referred to as 'soil materials' throughout the National Acid Sulfate Soils Guidance) by having properties and behaviour that have either:

- 1) Been affected considerably by the oxidation of Reduced Inorganic Sulfur (RIS), or
- 2) The capacity to be affected considerably by the oxidation of their RIS constituents.

Acid sulfate soil materials include potential acid sulfate soils (PASS or sulfidic soil materials) and actual acid sulfate soils (AASS or sulfuric soil materials). These are often found in the same profile, with AASS overlying PASS. PASS and AASS are defined further below:

- PASS are soil materials which contain RIS such as pyrite. The field pH of these soils in their undisturbed state is usually more than pH 4 and is commonly neutral to alkaline (pH 7–9). These soil materials are invariably saturated with water in their natural state. Their texture may be peat, clay, loam, silt or sand and is often dark grey in colour and soft in consistence, but these materials may also exhibit colours that are dark brown, or medium to pale grey to white; and
- AASS are soil materials which contained RIS such as pyrite that have undergone oxidation. This oxidation results in low pH (that is pH less than 4) and often a yellow (jarosite) and/or orange to red mottling (ferric iron oxides) in the soil profile. Actual ASS contains Actual Acidity, and commonly also contains RIS (the source of Potential Sulfuric Acidity) as well as Retained Acidity.

B. <u>The ASS Planning Maps</u>

The ASS planning maps provide an indication of the relative potential for disturbance of ASS to occur at locations within the council area. These maps do not provide an indication of the actual occurrence of ASS at a site or the likely severity of the conditions.

The maps are divided into five classes dependent upon the type of activities/works that if undertaken, may represent an environmental risk through the development of acidic conditions associated with ASS:

Risk Class	Description
Class 1	All works.
Class 2	All works below existing ground level and works by which the water table is likely to be lowered.
Class 3	Works at depths beyond 1m below existing ground level or works by which the water table is likely to be lowered beyond 1m below existing ground level.
Class 4	Works at depths beyond 2m below existing ground level or works by which the water table is likely to be lowered beyond 2m below existing ground level.
Class 5	Works within 500m of adjacent Class 1, 2, 3, 4 land which are likely to lower the water table below 1m AHD on the adjacent land.

Table 1: Risk Classes

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C. The ASS Risk Maps

The ASS risk maps provide an indication of the probability of occurrence of ASS materials at a particular location based on interpretation from geological and soil landscape maps. The maps provide classes based on high probability, low probability, no known occurrence and areas of disturbed terrain (site specific assessment necessary) and the likely depth at which ASS materials are likely to be encountered.

D. Interpretation of ASS Field Tests

Tables A1 and A2 below provide some guidance on the interpretation of pH_F and pH_{FOX} test results, as detailed in the *National Acid Sulfate Soil Guidance: National acid sulfate soils sampling and identification methods manual* (2018):

pH value	Result	Comments
pH _F ≤ 4, jarosite not observed in the soil layer/horizon	May indicate an AASS indicating previous oxidation of RIS or may indicate naturally occurring, non ASS soils.	Generally not conclusive as naturally occurring, non ASS soils, such as many organic soils (for example peats) and heavily leached soils, often also return $pH_F \le 4$.
pH _F ≤ 4, jarosite observed in the soil layer/horizon	The soil material is an AASS.	Jarosite and other iron precipitate minerals in ASS such as schwertmannite require a pH < 4 to form and indicate prior oxidation of RIS.
pH _F > 7	Expected in waterlogged, unoxidised, or poorly drained soils.	Marine muds commonly have a pH > 7 which reflects a seawater (pH 8.2) influence. Oxidation of samples with H_2O_2 can help indicate if the soil materials contain RIS.

Table A1: Interpretation of some pH_F test ranges

Source: Adapted from DER (2015a).

pH value and reaction	Result	Comments
Strong reaction of soil with H ₂ O ₂ (that is X or V)	Useful indicator of the presence of RIS but cannot be used alone	Organic rich substrates such as peat and coffee rock, and soil constituents like manganese oxides, can also cause a reaction. Care must be exercised in interpreting these results. Laboratory analyses are required to confirm if appreciable RIS is present.
pH _{FOX} value at least one unit below field pH _F and strong reaction with H ₂ O ₂ (that is X or V)	May indicate PASS	The difference between pH _F and pH _{FOX} is termed the Δ pH. Generally the larger the Δ pH the more indicative of PASS. The lower the final pH _{FOX} the better the likelihood of an appreciable RIS content. For example, a change from pH _F of 8 to pH _{FOX} of 7 (that is a Δ pH of 1) would not indicate PASS, however, a unit change from pH _F of 3.5 to pH _{FOX} of 2.5 would be indicative of PASS. Laboratory analyses are required to confirm if appreciable RIS is present.
pH _{FOX} < 3, large pH and a strong reaction with H ₂ O ₂ (that is X or V)	Strongly indicates PASS	The lower the pH_{FOX} below 3, the greater the likelihood that appreciable RIS is present. A combination of all three parameters – pH_{FOX} , ΔpH and reaction strength – gives the

Table A2: Interpretation of pH_{FOX} test results

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pH value and reaction	Result	Comments
		best indication of PASS. Laboratory analyses are required to confirm that appreciable RIS is present.
A pH _{FOX} 3–4 and Low, Medium or Strong reaction with H ₂ O ₂	Inconclusive	RIS may be present; however, organic matter may also be responsible for the decrease in pH. Laboratory analyses are required to confirm the presence of RIS.
pH _{FOX} 4–5	Inconclusive	RIS may be present in small quantities, or poorly reactive under rapid oxidation, or the sample may contain shell/ carbonate which neutralises some or all acid produced on oxidation. Equally, the pH _{FOX} value may be due to the production of organic acids with no RIS present. Laboratory analyses are required to confirm if appreciable RIS is present.
pH _{FOX} > 5, small or no pH, but Low, Medium or Strong reaction with H ₂ O ₂	Inconclusive	For neutral to alkaline pHF with shell or white concretions, the fizz test with 1 M HCl can be used to identify the presence of carbonates. Laboratory analyses are required to confirm if appreciable RIS is present and further testing is required to confirm that effective self- neutralising materials are present.

Source: Adapted from DER (2015a).



Appendix D: Borehole Logs





BOREHOLE LOG



	Clie	ent:	AN	THONY	′ BR	OOKS						
	Pro Loc	oject: catior	PR 1: 13	OPOSE MONAS	OSED RESIDENTIAL DEVELOPMENT NASH CRESCENT, CLONTARF, NSW							
	Job	No.:	33691	YJ	Method: HAND AUGER R.L. Surface: ~2.3 m							
	Dat	e: 7/*	12/20						D	atum:	AHD	
		ntiy	pe: -				LO	gged/Checked By: B.Z./J.M.				
Groundwater	Record ES 0		Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa	Remarks
			REFER DCP TES RESULT	ST 2-				FILL: Silty sand, fine to medium grained, brown, trace of roots.	D			MULCH COVER APPEARS POORLY
				1-	1-		SM	FILL: Silty sand, fine to medium grained, grey brown. Silty SAND: fine to medium grained, light brown and orange brown.	M	L - MD		- COMPACTED
	COMPLETION			-1 - -1 - -2 - -3 - -3 - -3 - -3 - -3 - -3 - -3	2- 3- 4- 5- 6- 7- 8- 9-			as above, but trace of sea shells. END OF BOREHOLE AT 2.20 m	W	MD		MARINE GROUNDWATER MEASURED ON COMPLETION AT A DEPTH OF 2.0m (~14:00PM) HIGH TIDE AT 14:12pm
			-			1						-



BOREHOLE LOG

IK 0 00



С	lien	t:	ANTH	ONY	BR(OOKS						
P	roje	ct:	PROP	OSE	OSED RESIDENTIAL DEVELOPMENT							
	ocat	tion	13 MC	NAS	NASH CRESCENT, CLONTARF, NSW							
J	ob N	lo.:	33691YJ				Me	thod: HAND AUGER	R.	L. Sur	face:	~2.5 m
	ate:	7/1. T	2/20						Da	atum:	AHD	
P		Тур)e: -	1	1		LO	ддеа/Спескеа Ву: В.2./J.М.	1			
Groundwater Record	NAS D20	PLES	Field Tests	RL (m AHD)	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/ Weathering	Strength/ Rel Density	Hand Penetrometer Readings (kPa	Remarks
DRY ON COMPLETION			REFER TO DCP TEST RESULTS	2-	- - - - 1-			FILL: Silty sand, fine to medium grained, dark brown, root fibres. as above, but light brown, trace of fine to coarse grained sub-angular igneous gravel.	D			GRASS COVER APPEARS POORLY COMPACTED
				- 1-				but trace of root fibres.				HAND AUGER REFUSAL
				- - 0-	2							
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Appendix E: Laboratory Reports & COC Documents



CERTIFICATE OF ANALYSIS 257751

Client Details	
Client	JK Environments
Attention	Alistair Mitchell
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details	
Your Reference	E33691P, Clontarf
Number of Samples	5 SOIL
Date samples received	08/12/2020
Date completed instructions received	08/12/2020

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	09/12/2020				
Date of Issue	09/12/2020				
NATA Accreditation Number 2901. This document shall not be reproduced except in full.					
Accredited for compliance with ISO/IEC 17	Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *				

<u>Results Approved By</u> Nick Sarlamis, Inorganics Supervisor Authorised By

Nancy Zhang, Laboratory Manager



sPOCAS field test						
Our Reference		257751-1	257751-2	257751-3	257751-4	257751-5
Your Reference	UNITS	BH2	BH2	BH2	BH4	BH4
Depth		0.55-0.6	0.9-1.1	2.0-2.2	0-0.2	0.5-0.7
Date Sampled		7/12/2020	7/12/2020	7/12/2020	7/12/2020	7/12/2020
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	07/12/2020	07/12/2020	07/12/2020	07/12/2020	07/12/2020
Date analysed	-	07/12/2020	07/12/2020	07/12/2020	07/12/2020	07/12/2020
pH⊧ (field pH test)*	pH Units	5.6	6.1	7.6	5.7	8.3
pHFox (field peroxide test)*	pH Units	4.1	4.3	6.6	3.7	6.4
Reaction Rate*	-	Medium reaction	Medium reaction	High reaction	Medium reaction	Medium reaction

Method ID	Methodology Summary
Inorg-063	pH- measured using pH meter and electrode. Soil is oxidised with Hydrogen Peroxide or extracted with water. Based on section H, Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004. To ensure accurate results these tests are recommended to be done in the field as pH may change with time thus these results may not be representative of true field conditions.

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	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.



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 customerservice@envirolab.com.au www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Alistair Mitchell

Sample Login Details	
Your reference	E33691P, Clontarf
Envirolab Reference	257751
Date Sample Received	08/12/2020
Date Instructions Received	08/12/2020
Date Results Expected to be Reported	09/12/2020

Sample Condition	
Samples received in appropriate condition for analysis	Yes
No. of Samples Provided	5 SOIL
Turnaround Time Requested	Standard
Temperature on Receipt (°C)	9.7
Cooling Method	Ice
Sampling Date Provided	YES

Comments Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst							
Phone: 02 9910 6200	Phone: 02 9910 6200							
Fax: 02 9910 6201	Fax: 02 9910 6201							
Email: ahie@envirolab.com.au	Email: jhurst@envirolab.com.au							

Analysis Underway, details on the following page:



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 customerservice@envirolab.com.au www.envirolab.com.au

Sample ID	sPOCAS field test	
BH2- 0.55-0.6	\checkmark	
BH2-0.9-1.1	\checkmark	
BH2-2.0-2.2	\checkmark	
BH4-0-0.2	\checkmark	
BH4-0.5-0.7	\checkmark	

The ' \checkmark ' indicates the testing you have requested. THIS IS NOT A REPORT OF THE RESULTS.

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

<u>FO:</u> ENVIROLAB S 12 ASHLEY ST CHATSWOOD P: (02) 991062 F: (02) 991062 Attention: Ail	ERVICE REET NSW 2 200 201	S PTY LTD 2067	:	JKE Job Number: E33691P Date Results STANDARD Required: MACQUARIE PARK, NSW 2113 Page: 1					nts									
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ocation:	Clonta	rf							Sam	nple Pr	eserv	ed in I	sky o	n ice				
Date Sampled	AM Lab Ref:	Sample Number	Depth (m)	Sample Container	Sample Description	ASS Field Test (pH F and pH FOX)					ests K	equire						1 A 91.,
7.12.20	1	BH2	0.55-0.6	Р	F: Silty Sand	x												-
.12.20	2	BH2	0.9-1.1	Þ	Silty Sand	X												
.12.20	3	BH2	2.0-2.2	Р	Silty Sand	X												~
7.12.20	4	BH4	0-0.2	Р	F: Silty Sand	x												,F -
7.12.20	9	BH4	0.5-0.7	Р	F: Silty Sand	x												17
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CERTIFICATE OF ANALYSIS 257751-B

Client Details	
Client	JK Environments
Attention	Alistair Mitchell
Address	PO Box 976, North Ryde BC, NSW, 1670

Sample Details	
Your Reference	E33691P, Clontarf
Number of Samples	5 SOIL
Date samples received	08/12/2020
Date completed instructions received	11/12/2020

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	18/12/2020				
Date of Issue	17/12/2020				
NATA Accreditation Number 2901. This document shall not be reproduced except in full.					
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *					

<u>Results Approved By</u> Priya Samarawickrama, Senior Chemist Authorised By

Nancy Zhang, Laboratory Manager



Chromium Suite				
Our Reference		257751-B-1	257751-B-2	257751-B-3
Your Reference	UNITS	BH2	BH2	BH2
Depth		0.55-0.6	0.9-1.1	2.0-2.2
Date Sampled		7/12/2020	7/12/2020	7/12/2020
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	15/12/2020	15/12/2020	15/12/2020
Date analysed	-	15/12/2020	15/12/2020	15/12/2020
pH _{kcl}	pH units	5.5	5.6	8.7
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01
TAA pH 6.5	moles H+ /t	<5	<5	<5
Chromium Reducible Sulfur	%w/w	<0.005	<0.005	<0.005
a-Chromium Reducible Sulfur	moles H+ /t	<3	<3	<3
S _{HCI}	%w/w S	NT	NT	NT
Sксі	%w/w S	<0.005	<0.005	0.005
Snas	%w/w S	NT	NT	[NT]
ANC _{BT}	% CaCO₃	NT	NT	1.9
s-ANC _{BT}	%w/w S	NT	NT	0.61
s-Net Acidity	%w/w S	<0.005	<0.005	<0.005
a-Net Acidity	moles H+ /t	<5	<5	<5
Liming rate	kg CaCO₃ /t	<0.75	<0.75	<0.75
a-Net Acidity without ANCE	moles H+ /t	<5	<5	<5
Liming rate without ANCE	kg CaCO₃ /t	<0.75	<0.75	<0.75
s-Net Acidity without ANCE	%w/w S	<0.005	<0.005	<0.005

Method ID	Methodology Summary
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity.
	Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY	CONTROL:	Chromiu	ım Suite			Du	plicate		Spike Re	covery %
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			15/12/2020	1	15/12/2020	15/12/2020		15/12/2020	
Date analysed	-			15/12/2020	1	15/12/2020	15/12/2020		15/12/2020	
pH _{kcl}	pH units		Inorg-068	[NT]	1	5.5	5.5	0	97	
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	1	<0.01	<0.01	0	[NT]	
TAA pH 6.5	moles H⁺ /t	5	Inorg-068	<5	1	<5	<5	0	93	
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	
a-Chromium Reducible Sulfur	moles H⁺ /t	3	Inorg-068	<3	1	<3	<3	0	109	
S _{HCI}	%w/w S	0.005	Inorg-068	<0.005	1	NT	NT		[NT]	
S _{KCI}	%w/w S	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	
S _{NAS}	%w/w S	0.005	Inorg-068	<0.005	1	NT	NT		[NT]	
ANC _{BT}	% CaCO₃	0.05	Inorg-068	<0.05	1	NT	NT		[NT]	
s-ANC _{BT}	%w/w S	0.05	Inorg-068	<0.05	1	NT	NT		[NT]	
s-Net Acidity	%w/w S	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	
a-Net Acidity	moles H⁺/t	5	Inorg-068	<5	1	<5	<5	0	[NT]	
Liming rate	kg CaCO₃/t	0.75	Inorg-068	<0.75	1	<0.75	<0.75	0	[NT]	
a-Net Acidity without ANCE	moles H* /t	5	Inorg-068	<5	1	<5	<5	0	[NT]	
Liming rate without ANCE	kg CaCO₃/t	0.75	Inorg-068	<0.75	1	<0.75	<0.75	0	[NT]	
s-Net Acidity without ANCE	%w/w S	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	[NT]

Result Definiti	ons
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	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.	
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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.

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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.



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 customerservice@envirolab.com.au www.envirolab.com.au

SAMPLE RECEIPT ADVICE

Client Details	
Client	JK Environments
Attention	Alistair Mitchell

Sample Login Details	
Your reference	E33691P, Clontarf
Envirolab Reference	257751-В
Date Sample Received	08/12/2020
Date Instructions Received	11/12/2020
Date Results Expected to be Reported	18/12/2020

ample Condition		
Samples received in appropriate condition for analysis	Yes	
No. of Samples Provided	5 SOIL	
Turnaround Time Requested	Standard	
Temperature on Receipt (°C)	9.7	
Cooling Method	Ice	
Sampling Date Provided	YES	

Comments Nil

Please direct any queries to:

Aileen Hie	Jacinta Hurst	
Phone: 02 9910 6200	Phone: 02 9910 6200	
Fax: 02 9910 6201	Fax: 02 9910 6201	
Email: ahie@envirolab.com.au	Email: jhurst@envirolab.com.au	

Analysis Underway, details on the following page:



Envirolab Services Pty Ltd ABN 37 112 535 645 12 Ashley St Chatswood NSW 2067 ph 02 9910 6200 fax 02 9910 6201 customerservice@envirolab.com.au www.envirolab.com.au

Sample ID	Chromium Suite	On Hold
BH2-0.55-0.6	\checkmark	
BH2-0.9-1.1	✓	
BH2-2.0-2.2	✓	
BH4-0-0.2		\checkmark
BH4-0.5-0.7		\checkmark

The ' \checkmark ' indicates the testing you have requested. THIS IS NOT A REPORT OF THE RESULTS.

Additional Info

Sample storage - Waters are routinely disposed of approximately 1 month and soils approximately 2 months from receipt.

Requests for longer term sample storage must be received in writing.

Please contact the laboratory immediately if observed settled sediment present in water samples is to be included in the extraction and/or analysis (exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS analysis where solids are included by default.

TAT for Micro is dependent on incubation. This varies from 3 to 6 days.

Ming To

From: Sent: To: Cc: Subject: Nick Sarlamis Friday, 11 December 2020 10:06 AM Alistair Mitchell Ming To; Lam Bui RE: Results for Registration 257751 E33691P, Clontarf

Morning Alistair

That should not be a problem.

Ref: 25775(-B. 7A7: Standard Due: 18/12/2020 M

Kind Regards,

Nick Sarlamis | Inorganics Supervisor | Envirolab Services

Celebrating 15 years of Great Science. Great Service.

12 Ashley Street Chatswood NSW 2067 T 612 9910 6200 E <u>NSarlamis@envirolab.com.au</u> | W <u>www.envirolab.com.au</u>

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Samples will be analysed per our T&C's. From: Alistair Mitchell <AMitchell@jkenvironments.com.au> Sent: Friday, 11 December 2020 8:57 AM To: Nick Sarlamis <NSarlamis@envirolab.com.au> Subject: RE: Results for Registration 257751 E33691P, Clontarf

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Hi Nick,

Can I get additional testing for Chromium Reducible Suite on standard turnaround for the following samples:

• BH2 (0.55-0.6);

(2) • BH2 (0.9-1.1); and

(³)• BH2 (2.0-2.2).

Thanks,

Regards Alistair Mitchell Environmental Scientist

We would like to take this opportunity to wish all our clients and suppliers Seasons Greetings. Thank you all for contributing to yet another great year for the JK Group. Our office will be closed from 5pm on Thursday 24th December 2020 and will reopen on Monday 4th January 2021.