LR Pardo & Associates

Technical Report

GEOTECHNICAL SITE INVESTIGATION

Jacksons Road

Portsea, Victoria

Prepared for:

Monash University

211964 NCCEC Project/2

29/04/2022

MELBOURNE
2 ALEX AVENUE
PO BOX 2050, MOORABBIN VIC 3189
T. 1300 922 964

GEELONG
7 FAIRLIE STREET
HAMLYN HEIGHTS VIC 3215
WWW.PARDOENGINEERING.COM.AU

Table of Contents

Project Details

Project

211964 NCCEC Project/1

Prepared for

Monash University

30 Research Way

Clayton Victoria 3800

Prepared by

Alex O'Neill - Undergraduate Engineer (StudIEAust)

Anushtiga Jeganathan - Geotechnical Engineer (BE [Civil, Hons], MIEAust)

LR Pardo & Associates Pty Ltd (LRP&A)

Date

29/04/2022

Commission

To carry out a geotechnical investigation in accordance with AS1289[1] and AS1726[2], and prepare a geotechnical site investigation report. This site investigation aimed to ascertain the subsurface soil conditions at the locations of the proposed development at NCCEC Project, Jacksons Road, Portsea, Victoria, as requested and authorised by our client's representative Mr Chris Webster, Project Manager for Monash University.

This report outlines the findings and recommendations of the geotechnical investigation undertaken between 29/06/2021 and 30/06/2021 as well as an additional investigation undertaken on 08/04/2022.

A geotechnical report has been provided to client based on the previous site investigation. Please refer to LRP&A 211964 NCCEC Project/1, dated 19/07/2021 for further information.

[1] AS1289-1997 *Methods of Testing soils for engineering purposes.*

[2] AS1726-2017 *Geotechnical Site Investigation*.

1 Introduction

A geotechnical site investigation was carried out by LRP&A between 29/06/2021 and 30/06/2021 at the property located at Jacksons Road, Portsea, Victoria. The site investigation consisted of six (6) boreholes excavated with a mechanical drill rig. An additional geotechnical site investigation was carried out by LRP&A on 08/04/2022 at the same subject site, consisting of an additional two (2) boreholes excavated with a mechanical drill rig at the client specified locations.

Information gained from the site investigation has been used to ascertain the subsurface soil conditions, in order to provide geotechnical recommendations for the proposed development.

To date, LRP&A has been provided with the following documents and drawings:

a) Black Geotechnical – Proposed pavement upgrade, subgrade geotechnical investigation, report no. v1262, dated 01/2010, received 05/02/2021.

b) Lane Piper Pty Ltd – Environmental Audit Report, Job no. 207118.1 Rev. 1, dated 10/08/2011, received 25/03/2021.

c) G-tek Australia Pty Ltd 2002 – Waste assessment, Project no. ADOD02019, dated 12/10/2002, received 24/06/2021.

d) Golder Associates – Quarantine Station and Norris Barracks, Point Napean, Project no. 06613677/016, dated 7/06/2021, received 25/03/2021.

e) Golder Associates – Final Assessment report, Report no. 06613677 Rev.3, dated 22/10/2010, received 25/03/2021.

f) Golder Associates – Final Validation report, Report no. 107613028 Rev.2, dated 12/2010, received 25/03/2021.

g) A&Y Associates laboratory testing reports for California Bearing Ratio and Min/Max Dry Density, report no. LRP2187-1, dated 19/04/2022, received 19/04/2022.

2 Site Investigation

The site investigations were conducted on 29/06/2021, 30/06/2021 and 8/04/2022 and consisted of a total of eight (8) boreholes augered to a maximum depth of 7.50m. Boreholes were excavated using a mechanical drill rig. All boreholes were spread across the site with the aim of identifying typical soil profiles at various points of interest. Appendix A presents the borehole logs, field, and a locality plan. All boreholes were logged by a geotechnical engineer.

2.1 Geology and Site Description

Geological Survey maps indicate that the site is in an area of Quaternary (Pleistocene) age Unnamed dune deposits described as: Aeolian: dune deposits: Sand, Clay, Calcareous Sand.[3]

The investigation uncovered the geological unit described above. Please see the engineering logs presented in Appendix A for further details.

The subject site is located next to the ocean and within the Point Nepean national park, in an area of cultural and historic significance. The ground has a moderate slope to the north between Jacksons Road and Badcoe Hall, and a significant slope from east to west between the quarantine residential buildings and Badcoe Hall. The area between the ocean and Badcoe Hall is generally flat and contains the old military parade grounds, which now serves as a croquet field. An aerial image of the subject site is shown below in Figure 1.

Please refer Appendix A for a site plan and Appendix C for photographs of the site.

[3] Geological Survey of Victoria, SJ55-5, MELBOURNE, 1:250,000

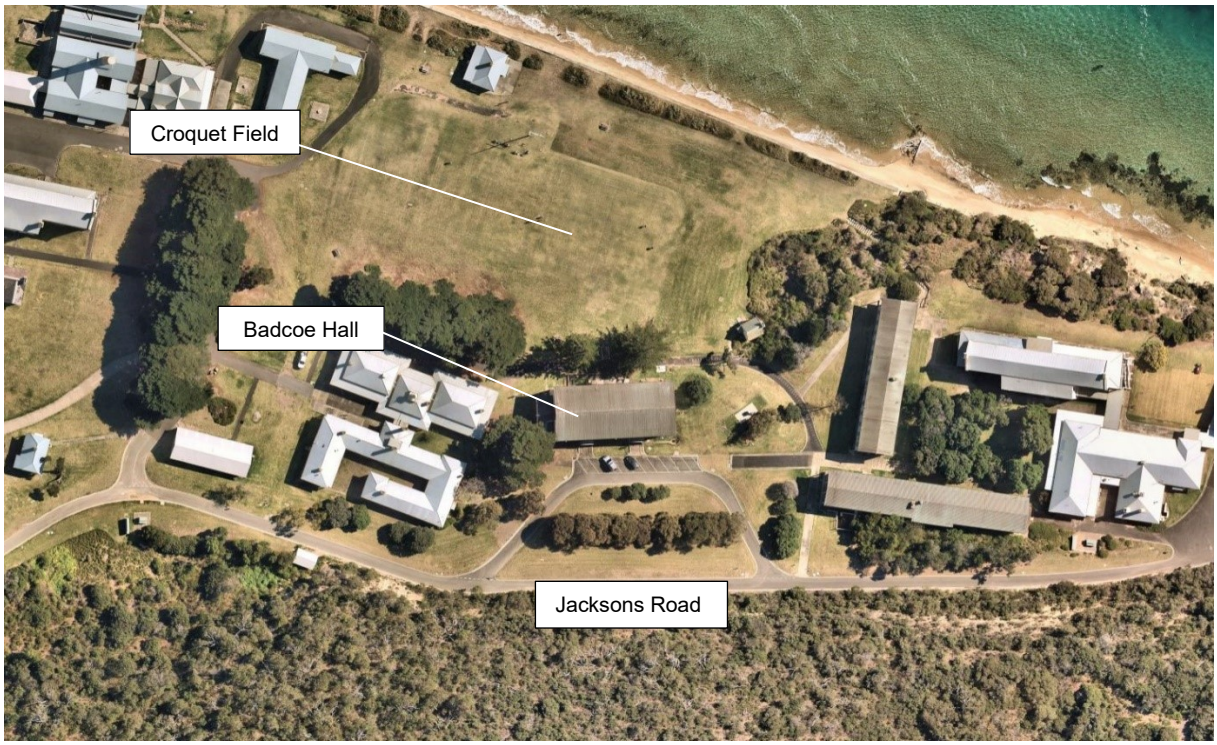


Figure 1: Aerial imagery of Jacksons Road, Portsea; Source: Nearmap.

2.2 Soil Profile

The below represents a typical soil profile encountered within the borehole excavated onsite. Please refer to the borehole logs attached in Appendix A for further details.

2.2.1 Profile 1: BH1 to BH6

Depth (m)	***Material***
0.00 – 0.80	Silty Sand FILL – Topsoil, fine grained, grey to black, loose, moist; overlying
0.80 – 3.00	Silty SAND – Fine to medium grained, grey to pale grey to light brown, loose to medium dense, moist to dry; overlying
3.00 – 6.00	Clayey SAND – Medium grained, brown to light yellow, medium density, moist.

Borehole 3 encountered XW Sandstone at the depth of 4.00m and Borehole 4 encountered Silty Sand FILL to a depth of 1.80m. Softer soil material was encountered at the depth between 3.00m and 5.0m at borehole 1. This may be due to the groundwater table.

2.2.2 Profile 2: BH7 to BH8

Depth (m)	***Material***
0.00 – 0.20	Silty Sand FILL – Topsoil, fine grained, grey to black, loose, moist; overlying
0.20 – 7.50	Silty SAND – Limestone Gravel, fine grained, white to light yellow, loose to medium dense, dry.

Please note that these soil profiles are typical ranges, and the depths to soil layers varied across the existing site. Please see Appendix A for detailed information regarding the borehole logs and locations.

2.3 Groundwater

Groundwater was identified during the geotechnical site investigation at the depth of 2.50m and 3.50m at Borehole 1 and 2, respectively. Information taken from the Visualising Victoria's Groundwater website indicates that the depth to groundwater at the site varies between 0m and 20m. This depth to groundwater is expected to have an influence on the proposed development. Groundwater levels are likely to fluctuate seasonally.

Groundwater may be an issue during construction due to the proximity of the ocean. Any water will need to be pumped out of excavations prior to concreting and discharged appropriately. Attention should be given to the impact of the water downstream with respect to erosion, sedimentation, salinity or possible contamination from drilling and construction equipment into the ocean.

2.4 Refusal Depth

None of the boreholes encountered refusal during the drilling process. Therefore, rock breaking equipment may not be required during the construction phase.

2.5 Site Classification

Based on the soil profile encountered, the presence of topsoil/FILL material, moisture conditions in the area and the local topography, the site has been classified as a Class P site, in accordance with AS2870[4]. This is primarily due to the presence of uncontrolled FILL material to depths greater than 0.80m at the proposed location.

[4] AS 2870-2011 – Residential Slabs and Footings

It should be noted that this classification assumes potential differential surface soil seasonal movement of up to 20mm.

2.6 Horizontal Earth Pressures

Horizontal earth pressure coefficients, friction angle and unit weight of the soils encountered during the investigation are summarised below in Table 1.

Table 1: Horizontal Earth Pressure Coefficients

Soil Type	Typical Depth Range (m)	Consistency	Design Parameter				
			K_a (active earth pressure)	K_p (passive earth pressure)	K_o* (at rest)	ϕ' Effective friction angle (degrees)	γ Unit Weight (kN/m^3)
Silty SAND	0.80 – 3.00[1]	Loose to Medium Dense	0.31	3.25	0.47	32	16
Silty SAND/ Clayey SAND	3.00 – 7.50	Medium Dense to Dense	0.25	4.02	0.40	37	19

*Overconsolidation Ratio (O.C.R)=1 (Normally consolidated)

[1]Material encountered in boreholes 7 & 8 were to termination of 7.5m.

These soil profiles are a typical soil profile and depths to soil layers varied across the site. Please see Appendix A for detailed information regarding the borehole logs and locations.

3 Field and Laboratory Testing

Field testing consisted of twenty-one (21) Standard Penetration tests (SPT) in accordance with AS1289.6.3.1-2004. These tests ascertained the consistency and relative compaction level of the subgrade soils. Field test results, borehole logs and location are presented in Appendix A. Soil properties based on SPT results are presented below in Table 2.

Table 2: SPT test results and soil properties

BH	Start Depth (m)	Soil Description	SPT N Value	Consistency/ Density	Undrained Friction Angle, Ø (Degrees)
1	1.00	Silty SAND	12	Medium Dense	32
	2.50	Silty SAND	28	Dense	40
	4.00	Silty SAND	1	Very Loose	28
2	1.00	Silty SAND	13	Medium Dense	35
	2.50	Silty SAND	17	Medium Dense	36
	4.00	Silty SAND	15+	Dense	42
3	1.00	Silty SAND	14	Medium Dense	36
	2.50	Silty SAND	19	Medium Dense	37
	4.00	Silty SAND	10+	Dense	42
4	1.00	Sandy Clay FILL	16	Medium Dense	38
	2.50	Silty SAND	7	Loose	29
	4.00	Clayey SAND	10+	Very Dense	50
	5.50	Clayey SAND	32	Dense	40
5	1.00	Silty	13	Medium Dense	35
	2.50	CLAY	35+	Very Dense	50
	4.00	CLAY	16+	Dense	42
6	1.00	Silty SAND	16+	Very Dense	50
	2.50	Silty SAND	8	Medium Dense	30
	4.00	Clayey SAND	30	Medium Dense	38
	5.50	Clayey SAND	22	Medium Dense	35

SPT testing was not able to conduct in BH7 and BH8 due to soil collapse in boreholes.

3.1 Laboratory Testing

Soil samples were collected from selected test sites and taken to a NATA accredited laboratory for testing in accordance with AS1289. Laboratory test results are presented in Appendix B and summarised below in Table 3.

Table 3: Laboratory testing summary

Borehole	Material	Depth (m)	MC (%)	LL (%)	PI (%)	Lab CBR (%)	Swell (%)	SA (See App. B)
BH 1	Silty SAND	1.00	6.8	-	-	-	-	-
	Silty SAND	1.50	1.8					
	Silty SAND	4.00	20.5	-	-	-	-	-
BH 2	Silty SAND	1.00-2.00	2.4	Slips in Cup	Non-plastic	-	-	*
BH 3	Silty SAND	0.60-2.40	4.3	Slips in Cup	Non-plastic	-	-	*
BH 4	Silty SAND	2.00-3.00	12.9	Slips in Cup	Non-plastic	-	-	*
BH 8	Silty SAND	3.5-7.5	-	-	-	13	0	-

*Please See Appendix B for Sieve Analysis Test Results

4 Foundation Solutions

Based on the information presented above, the foundations are required to be designed by a qualified engineer experienced in the design of footing systems for buildings. Recommendations below assume a maximum allowable differential settlement of 25mm.

Where any footings are to be constructed next to existing underground services (e.g. stormwater, sewers), then these footings should be founded at a depth above the invert of the service at an angle of repose of the subsurface soil.

The below sections present estimates of allowable bearing capacities, shaft resistance and end bearing capacities for different foundation options. Estimates of capacities originated from the Handbook of Geotechnical Investigations and Design Tables[5].

4.1 Design Subgrade CBR

Taking into account results from field DCP test, laboratory test results and knowledge of the area, a design subgrade CBR of 10% is recommended for the purpose of pavement design.

All pavements are to be founded on the natural Silty SAND/Clayey SAND layer. The depth of these materials may vary across the site. Once excavated, all subgrades should be compacted to 95% of STD MDD and soft spots removed and replaced with VicRoads Type A Capping material of CBR >15%.

4.2 Slab on Ground

Any slab on ground for the proposed buildings must be designed as a suspended slab. The allowable bearing capacity under the suspended slab must be 20 kPa. The suspended slab can lie within the FILL material and must be supported by driven/bored piles.

4.3 Shallow Footings

Shallow footings should be considered for light weight structures. These shallow footings must be founded on either a safe working platform or a controlled FILL pad. The allowable bearing capacity of the founding material must be 100kPa.

[5] *Look, B. (2014). Handbook of Geotechnical Investigation and Design Tables. Taylor & Francis Group, London, UK.*

LRP&A can provide the safe working platform design and controlled FILL thickness, if required. Controlled FILL should be placed in accordance with the Level 1 Supervision requirements as detailed in AS 3798 Guidelines on Earthworks for Commercial and Residential Developments. LRP&A can provide the necessary supervision, if required.

4.4 Shallow Soils Bearing Capacity and Lateral Resistance

Bearing capacities of the materials encountered onsite have been calculated with respect to gathered SPT test data. The bearing capacities presented are the typical value for each soil layer. Bearing capacities with are presented within Table 4 below.

Table 4: Material type bearing capacities.

Soil Description	Depth (m)	Allowable Bearing Capacity (kPa)	Allowable Lateral Resistance (kPa)
Silty Sand FILL (uncontrolled Fill)	0.00 - 0.80	50 kPa*	-
Silty SAND	0.80 - 1.50	100 kPa	50 kPa
	1.50 - 3.00	300 kPa	150 kPa
Silty SAND/Clayey SAND	3.00 - 6.00	500 kPa	250 kPa

*For design purposes, no bearing capacity should be assumed in Topsoil/uncontrolled FILL material.

The bearing capacities presented are the typical value for each soil layer. Due to the different moisture content and soft spots these values can vary with depth.

4.1 Bored Piles

Ultimate shaft capacities and end bearing capacities are given in Table 5 below for bored piles. Please note that no factor of safety has been applied to these values.

Please note that Sand soil material encountered onsite is very dry and prone to collapse. Therefore, casing might be needed to ensure the bores stay open.

Table 5: Ultimate shaft resistance and end bearing capacities for bored piles

Material	Consistency	Typical Depth Rage (m)	Un-factored Shaft Capacity (kPa)	Un-factored End Bearing Capacity (kPa)
Silty SAND	Medium Dense to Dense	1.50 - 3.00	4	1000
Silty SAND/Clayey SAND	Dense to Very Dense	3.00 – 6.00	10	2000

*Dependant on the type of equipment and procedures used in constructing the pile shaft/socket in the rock.

The above capacities for piles in sand assume the use of high displacement piles (concrete). If low displacement (e.g. steel 'H') piles are used then the values should be reduced by 50%.

4.2 Driven Piles

Ultimate shaft capacities and end bearing capacities are given in Table 6 below for driven piles. Please note that no factor of safety has been applied to these values.

Table 6: Ultimate shaft resistance and end bearing capacities for driven piles

Material	Consistency	Typical Depth Rage (m)	Un-factored Shaft Capacity (kPa)	Un-factored End Bearing Capacity (kPa)
Silty SAND	Medium Dense to Dense	1.00 - 3.00	15	2000
Silty SAND/Clayey SAND	Dense to Very Dense	3.00 – 6.00	40	4000

The displacements required to mobilise the load carrying capacity of the piles are as follows as given in *Handbook of Geotechnical Investigations and Design Tables*:

- Shaft load - 0.5-2% of the pile diameter (typically 5mm to 10mm),
- Base load – 5-10% of the pile diameter (typically 25mm to 50mm),
- Total load - Base displacement governs.

If the displacements required to mobilise the load are considered unacceptable then no base bearing capacity should be used.

4.3 Contiguous Piles

Earth retaining system can be considered during the proposed construction. Earth retention systems used during construction should be chosen based on proposed excavation depths as well as depth to water table and soils being retained. Earth retaining walls should be designed by a suitably qualified engineer.

Contiguous piles can be considered for the proposed development. Contiguous pile walls are constructed with small gaps between adjacent piles. The use of Contiguous Flight Auger (CFA) rigs to drill successive unconnected piles provide an economical wall. The diameter and spacing of the piles are decided based on soil type and ground water level. This type of piling generate low levels of vibration and noise and it creates minimal deformation to the adjacent ground or soil mass. Alternatively, Sheet Piles can also be considered for the proposed development.

Please note that above mentioned process must be designed, verified and executed by experienced personnel.

5 Construction Recommendations

5.1 Subgrade Preparation

The site should be first be stripped of all Topsoil/uncontrolled FILL material and organic material (roots, sticks, etc) prior to the placement of any overlying Fill material.

If the proposed construction works require the existing surface level to be raised, works should be carried out as detailed below. Following the stripping of Topsoil, trees and root balls of those trees, the site may be filled as follows;

1. The natural subgrade should be graded level and then compacted to obtain a firm base (i.e. able to withstand a 'proof roll'). Areas exhibiting excessive heave or movement (i.e. greater than 25mm), should be scarified and subjected to further compaction, or excavated to a depth of 0.5m and replaced with suitable drier soils. Excavated soil from these "soft spots" may be able to be reused as fill if allowed to dry and then mixed with other less reactive soils.
2. Following the compaction of the existing ground and having satisfied the 'proof roll' test, any subsequent fill can now be placed. The underlying layer should be scarified prior to the placement of a new lift to ensure good adhesion to the underlying layer.
3. It is understood that fill material imported to the site may vary in quality and consistency. These fills should be mixed on site in such a way as to provide a homogeneous fill. All fill materials imported to site should match the adjacent soil profiles so that the classification of the site does not change. Please refer to section 4.4 of AS3798 for suitable material for filling. All fill imported to the site must be accompanied by a 'Clean FILL Certificate', demonstrating that the soil has been tested and analysed in line with Victorian EPA regulations and guidelines.
4. Fill should be compacted in layers not thicker than 200mm. All fill must be compacted to a minimum density of 98% Standard MDD as per AS1289.5.1.1 by means of appropriate plant.

LRP&A can provide that may be of interest include the earthworks specification, providing Level 1 Supervision and coordinating necessary testing in accordance with Level 1 (AS 3798-2007) requirements and testing of footings and slab subbase prior the concreting.

5.2 Ease of Excavation

All boreholes were augered using a mechanical drill rig. The resistance of the soil to drilling as well as SPT results were used as a reference to how easy the soil would be to excavate. All boreholes encountered Silty SAND/Clayey SAND directly under the topsoil layer. Borehole 3 encountered XW Sandstone at the depth of 4.0m.

It is expected that foundations and excavations within the soils encountered at the site will not experience great difficulty in excavation. However, excavation in the Wet SAND materials site have the potential to collapse due to the groundwater table encountered unless adequately supported throughout their construction.

5.3 Open excavations

If the excavations are required to be open for a moderate term (2 to 3 days), or a person is required to enter an excavation greater than 1.0m, then alternative battering, benching or trench support will be required. The batters presented in **Error! Reference source not found.** can be adopted for all trenches. The Worksafe code of practice for trenching should be followed at all times.

Table 7: Safe Batters for Trench

Material	Recommended Safe Batter	
	Temporary*	Permanent
FILL	20° or 3:1 H:V	-
Silty SAND/Clayey SAND	30° or 2:1 H:V	20° 2.5:1 H:V

*Please note that recommended batters are only suitable for short term periods (i.e. less than 2 weeks)
**Maximum batter angle - supplied for preliminary design purposes. An experienced Geotechnical engineer must inspect the exposed soil face to confirm batter requirements.

Also, due to the very dry soil material encountered onsite, trench shields might be needed during the trenching works. The trench shield needs to be firmly wedged into the ground to prevent it from moving. When selecting the correct trench shield, the conditions of the environment in which the equipment is to be used need to be considered. All trench shields should be engineered to account for the pressures resulted by a trench collapse. Please refer to Worksafe code of practice for trenching for further details.

The top and the sides of the excavation should be monitored throughout the works for signs of collapse such as tension cracks, slumping, spring water etc. The effect of battering the excavations should also be allowed in the design of buried infrastructure.

With consideration to the soils encountered, open trenches exposed to excessive moisture could experience stability issues. No trenches should be exposed to excessive moisture. If water is identified during trench construction, due to a rain event, burst water pipe, water table, etc., the unsupported standing time for the soils should be reduced to one day. Drainage channels should be constructed to ensure surface water is diverted from the crest of all excavations.

Any water within the excavation should be pumped out immediately so that construction may continue. All surcharges should be eliminated from the edge of the excavation crests a minimum of the height of the slope away.

5.4 Earthquake Loading Site Factor

According to AS1170.4 - Earthquake Actions in Australia, the soil profile encountered onsite and historical borehole information for the area; the site sub-soil class would be Class Ce. This is defined as a shallow soil site with depths of soil that do not exceed those listed in Table 4.1 of AS1170.4. The Hazard Factor (Z) for this location, based on the map supplied in AS1170.4 Earthquake Actions in Australia, would be 0.10.

6 Geo-environmental Investigation

6.1 Investigation Works

6.1.1 Field Observations

During the excavation and sampling process Silty Clay FILL, Silty SAND, Clayey SAND, CLAY and XW Sandstone were all identified of varying consistencies. No staining or odour from any particular layer was observed.

6.1.2 Soil Sampling Methodology and Field Validation

During the investigation three (3) samples were obtained for IWRG621 testing and three (3) samples were obtained for asbestos testing. Sampling depths were determined on site based on the materials uncovered during the investigation. No composite testing was carried out by the laboratory.

Whilst sampling on site all precautions were taken to avoid cross contamination and contact with human skin. LRP&A's Work Instruction for Environmental Sampling LWI-004 was used for the purpose of all environmental sampling works. This document details the decontamination procedure expected. The sampling protocol followed at each sampling location is summarised below:

1. Scrape excess soil from sampling equipment using a spatula.
2. Wash clean sampling tools with tap water and mild detergent.
3. Rinse sampling tools with tap water.
4. Rinse sampling tools with deionised water.
5. Use a set of new sterilised gloves each time.
6. Dig down to prescribed depth.
7. Use clean sampling tool to collect the required soil.
8. Fill pre-sterilised sampling jars.
9. Fasten lid (air-tight) and store in Esky with iced cooler blocks.
10. Deliver to analytical laboratory.

Sample storage was provided by Eurofins MGT, which consisted of sterilised glass jars, Esky's and ice blocks. Deionised water was also provided. All soil samples were stored on ice while on site and during transit. Samples were tested within the specified holding times identified in AS 4482.1.

6.1.3 Laboratory Testing

Soil samples were collected and taken to a NATA accredited laboratory for testing. The Eurofins MGT suite for testing soils in accordance with IWRG 621 was used as well as determining if Asbestos was present in any of the collected samples. Laboratory test results are presented in Appendix B and summarised below in Table 8 and Table 9.

Table 9: Laboratory testing summary

Location	Material	Depth (m)	Soil Hazard Categorisation (Preliminary)
BH3-1	Silty SAND	1.00	Fill Material
BH4-1	Silty SAND	1.10	Fill Material
BH5-1	Silty SAND	0.35	Fill Material
BH6-1	Silty SAND	1.10	Fill Material

6.2 Results and Recommendations

6.2.1 Soil Hazard Categorisation and Management

Having carried out the site investigation and associated laboratory analysis, the results were reviewed with respect to contaminant levels waste categorisation.

According to the EPA publication *Soil Hazard Categorisation and Management*, the results of laboratory testing on soils collected during the investigation indicated there is soil categorised as "Category C contaminated Soil" due to elevated pH levels.

However, it is likely that these elevated levels of pH are naturally occurring due to the calcareous natural subgrade (Silty SAND), which is typically alkaline in nature[6]. Previous testing undertaken as part of an Environmental Audit (CARMS No. 37914-2) of the Former Quarantine Station & Norris Barracks, which encompasses the site, also indicated pH was typically within the range of 8.5 to 9.7. Therefore these test results will not affect future land use.

[6] D.T. Pruyne and M.J. Schlossberg, 2014. Penn State Univ. Center for Turfgrass Science

Soil Hazard Categorisation and Management recommends the following management options for **"Fill Material"**:

- On-site remediation
- Off-site remediation
- Disposal to licensed landfill
    - EPA transport certificates system must be used
    - Vehicles must hold EPA permit (unless exemption issues)

Note that this is only a preliminary classification. Additional testing will be required if disposal or off-site reuse of the excavated soils is anticipated.

6.2.2 National Environment Protection Measures

Laboratory results were also assessed with respect to Human Health-based Investigation Levels (HILs) within the National Environment Protection Measure, guidelines. These guidelines provide a range of "HIL"s for generic land use scenarios. The adopted criterion for this investigation is the exposure setting "C". Within the NEPM Guidelines Land described as HIL "C" is; "Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools, footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate."

According to the NEPM guidelines, the results of laboratory testing on soils collected indicated that the levels of contaminants are within that of HIL "C". The above HILs have been derived based on long-term exposures for the sections of the populous that would be most sensitive. Within the NEPM guidelines it is noted that HILs do no specifically address short-term exposures that can occur during construction. As the fill soils encountered during the construction would be classified as short-term exposure, the contaminants would not be expected to pose the same risk to human health as if they were exposed for a longer duration.

Excavation of the soils needs to be carried out with care so as not to spread the contaminated soil around the site where contact with the public could occur. All precautions should be taken to avoid human contact or exposure. This includes skin contact, ingestion, material in the eye and inhalation. Appropriate personal protective equipment should include full length clothing, gloves, eye protection and face mask when dusty.

7 Report Limitations

a) This technical report has been prepared in good faith based on the information provided by our Client's representative Mr Chris Webster for Monash University and in accordance with LRP&A quality system.

b) This report has been commissioned by and for the specific use of our Client the Monash University for the "NCCEC Project" project only, located at Jacksons Road Portsea,, Victoria. Therefore, no responsibility or liability to any third party is accepted for any damages, howsoever arising, from contents of this report or its use by any third party. Where such liability cannot be excluded it is reduced to the full extent lawful.

c) Please note that only limited laboratory testing was undertaken, and that all soil properties have been inferred to similar soils across the soil profile based on visual identification only. However, soil may vary greatly within a site, and therefore, further testing may be required to increase the degree of confidence in this assumption, if warranted by a risk assessment and/or project requirements. It should also be noted that whenever applicable, no responsibility or liability is accepted where the appropriate testing as detailed in this report is not undertaken by a qualified NATA Testing Authority. Please note that LRP&A can coordinate the appropriate geotechnical testing.

d) The use of this report **is not** appropriate where there have been any changes in the nature of the project or the conditions present during any field investigation or site inspection.

e) No responsibility or liability is accepted where any part of this report is used in isolation, out of context or without consideration of the total document.

f) If at a later time it is found that the information previously provided to LRP&A was incorrect, incomplete and/or if at the time of construction the soil conditions differ drastically from those initially reported, LRP&A **should be contacted immediately** and this report may need to be reviewed and amended if appropriate.

Should you require any further information regarding this report or any of our services, please do not hesitate to contact the undersigned on 1300 922 964.

Prepared by

Alex O'Neill
(StudIEAust)
Undergraduate Engineer
LR Pardo & Associates Pty Ltd

ENGINEERS AUSTRALIA
Professional Engineers
STUDENT MEMBER

Anushtiga Jeganathan
(BE [Civil, Hons], MIEAust)
Geotechnical Engineer
LR Pardo & Associates Pty Ltd

ENGINEERS AUSTRALIA
Professional Engineers
MEMBER NO. 4748980

Reviewed and authorised by

Lucas Pardo
(BE [Civil], MIEAust)
Director/Senior Principal
LR Pardo & Associates Pty Ltd

ENGINEERS AUSTRALIA
Professional Engineers
MEMBER No. 941556

Appendix A

Site Plan and Engineering Logs

Borehole Locations

This drawing shall be read in conjunction with LRP&A Report No. 211964 NCCEC Project /1

LRPardo & Associates
Consulting Civil & Geotechnical Engineers
Melbourne: 2 Alex Avenue, Moorabbin VIC 3189
Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215
Tel: (03) 9555 6995 Fax: (03) 9553 1394
www.pardoengineering.com.au

Source: Nearmap

NOT TO SCALE

Title Borehole Locations
Locality Monash university
Jacksons Road
Portsea, Victoria
Dwg. No 211964/1 BH
Prepared KG 5/07/2021
Checked RC 16/07/2021

Geotechnical Investigation
Investigation date: 30/06/2021 (BH1-6)
08/04/2022 (BH7-8)
Project: 211964 NCCEC Project /1

Sheet No Site plan

File 211964-1 Eng Logs.xlsm

LRPardo & Associates

BOREHOLE LOG

Client: Monash university — Borehole No: **BH 1**
Project: 211964 NCCEC Project /1 — Date: 30/06/2021
Borehole Location: See Site Plan — Logged by: LRP
Borehole Elevation: Surface Level — Checked by: LRP

Method	Depth (metres)	Graphic Log	Material Description (Type, Plasticity, Colour, Particle characteristics)	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
	0.5		Grass cover/ topsoil Silty Sand Fine grained Grey to black	FILL	L	M				Geology: Unnamed coastal dune deposits
	0.80									
	1.0		Silty SAND Medium grained Grey to pale grey	S	L	M		MC SPT 150 300 450	6.8% Blows 4 5 7 N=12	1.0m 1.0m
	1.5							MC	1.8%	1.5m
A	2.0					W				
	2.5		Becoming saturated at 2.5m	S	MD	Sat		SPT 150 300 450	Blows 5 10 18 N=28	2.5m ▼ Perched watertable =
	3.0		Becoming pale yellow to pale brown with some Sandstone gravel							
	3.5									
	4.0							MC SPT 150 300 450	20.5% Blows 0 - 1 N=1	4.0m 4.0m Sunk under over weight
	4.5									
	5.0									
	5.5									Unable to perform SPT after 4.00m in BH1. Very saturated
	6.0									
	6.5									Bore collapsed due to groundwater inflow.
			Borehole 1 terminated at 6.50m							

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash university | Borehole No: **BH 2**
Project: 211964 NCCEC Project /1 | Date: 30/06/2021
Borehole Location: See Site Plan | Logged by: LRP
Borehole Elevation: Surface Level | Checked by: LRP

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
	0.0		Grass cover/Topsoil Silty Sand FILL Black to grey	FILL	L	M				
	0.5									
	1.0	1.00								
A	1.0		Silty SAND Fine to medium grained Grey	SP	L-MD	M-D		SPT 150 300 450	Blows 4 5 8 N=13	1.0m
	1.5									
	1.60		Becoming very fine sand Grey to white at 1.60m					MC LL PL PI LS GR SA	2.4% Slips in cup Slips in cup Non-plastic N/A See App. B See App. B	1.0-2.0m 1.0-2.0m 1.0-2.0m 1.0-2.0m 1.0-2.0m 1.0-2.0m 1.0-2.0m
	2.0									
	2.5							SPT 150 300 450	Blows 1 6 11 N=17	2.5m
	3.0									
	3.5									Perched watertable
	4.0							SPT 150 300 450	Blows 15+ - - N= N/A	4.0m Double bouncing 0.30m remaining
	4.5									
	4.5		Borehole 2 terminated at 4.5m							
	5.0									
	5.5									
	6.0									
	6.5									

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash university | Borehole No: **BH 3**
Project: 211964 NCCEC Project /1 | Date: 30/06/2021
Borehole Location: See Site Plan | Logged by: LRP
Borehole Elevation: Surface Level | Checked by: LRP

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
A	0.5		Silty Sand/ Crushed Rock FILL Grey to black	FILL	L-MD	M				
		0.60								
	1.0		Silty SAND Fine to medium grained Brown	SP	L	M		IWRG SPT 150 300 450	FILL Blows 6 6 8 N=14	1.0m 1.0m
	1.5							MC LL PL PI LS	4.3% Slips In Cup Slips In Cup Non-plastic N/A	0.6-2.4m 0.6-2.4m 0.6-2.4m 0.6-2.4m 0.6-2.4m
	2.0	2.00						SA GR Emers. IWRG SPT 150 300 450	See app. B See app. B No. 1 FILL Blows 5 9 10 N= 19	0.6-2.4m 0.6-2.4m 0.6-2.4m 1.00m 4.0m 0.9m remaining
	2.5		Silty SAND Fine to medium grained Light brown	SP	MD	M				
	3.0									
	3.5									
	4.0	4.00								
	4.5		XW Sandstone Fine to medium grained Pale brown to light yellow	XW	H	D		SPT 150 300 450	Blows 10+ - - N=10+	4.0m 0.9m remaining
	5.0									
	5.5							SPT 150 300 450	Blows - - - N=N/A	5.5m Unable to perform test due to bore collapse.
	6.0	6.00								
	6.5		Borehole 3 terminated at 6.0m							

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash university | Borehole No: **BH 4**
Project: 211964 NCCEC Project /1 | Date: 30/06/2021
Borehole Location: See Site Plan | Logged by: LRP
Borehole Elevation: Surface Level | Checked by: LRP

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
	0.0		Silty Sand FILL Fine grained Grey to black	FILL	L	M				Sparse grass cover
	0.26									
H	0.5		Silty Sand FILL Fine to medium grained Brown	FILL	L-MD	M				
	1.0							IWRG SPT 150 300 450	FILL Blows 3 6 10 N=16	1.1m 1.0m
	1.5									
	1.80									
A	2.0		Silty SAND Medium grained Brown to dark brown	SM	L	M		LL PL PI LS GR SA Emers. MC SPT 150 300 450	Slips In Cup Slips In Cup Non-plastic N/A See app. B See app. B No. 3 12.9% Blows 2 2 5	2.0-3.0m 2.0-3.0m 2.0-3.0m 2.0-3.0m 2.0-3.0m 2.0-3.0m 2.0-3.0m 2.0-3.0m 2.5m
	2.5									
	3.00									
	3.0		Clayey SAND Medium grained Brown/ grey to light yellow	SC	MD	M			N=7	
	3.5									
	4.0		Lenses of Limestone and Cemented Sand	XW				SPT 150 300 450	Blows 10+ - - N=10+	4.0m 0.40 m remaining
	4.5									
	5.0									
	5.5							SPT 150 300 450	Blows 5 14 18 N=32	5.5m
	6.0									
	6.00		Borehole 4 terminated at 6.0m							
	6.5									

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash university | Borehole No: **BH 5**

Project: 211964 NCCEC Project /1 | Date: 30/06/2021

Borehole Location: See Site Plan | Logged by: LRP

Borehole Elevation: Surface Level | Checked by: LRP

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
H	0.5 1.0	1.00	Silty Sand FILL Fine grained Grey to black Lenses of brown sand at 0.80m	FILL	MD	M		IWRG	FILL	Grass cover 0.35m
A	1.5 2.0 2.5		Silty SAND Fine to medium grained Brown to dark brown	S	L-MD	M		SPT 150 300 450	Blows 5 6 7 N=13	1.00m
	3.0 3.5 4.0		Some Clay fines Brown/light brown to grey Medium plasticity	SC	Vst	M		SPT 150 300 450 SPT 150 300 450	Blows 6 14 21+ N=35+ Blows 14 16+ - N=16+	2.50m 4.00m Double bouncing 50mm remaining
	4.5	4.50	Borehole 5 terminated at 4.5m							
	5.0 5.5 6.0 6.5									

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method: A auger drilling; W washbore; NDD non destructive digging; R roller/tricone; H hand auger; E Excavator

moisture: D dry; W wet; M moist; Sat Saturated

Doc. No. LBH-001

Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash university | Borehole No: **BH 6**
Project: 211964 NCCEC Project /1 | Date: 30/06/2021
Borehole Location: See Site Plan | Logged by: LRP
Borehole Elevation: Surface Level | Checked by: LRP

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
			Silty Sand FILL Fine grained Grey to black	FILL	L	M				Grass cover
	0.35									
H	0.5		Silty SAND Fine to medium grained Brown	S	L	M				
	1.0									
	1.20		Becoming brown to pale brown at 1.20m	S	MD	M-D		IWRG SPT 150 300 450	FILL Blows 16 16+ - N=16+	1.10m 1.00m Double bouncing 50mm remaining on first 0.30m
A	1.5									
	2.0									
	2.5							SPT 150 300 450	Blows 3 5 3 N=8	2.50m
	3.0									
	3.5									
	4.0							SPT 150 300 450	Blows 7 10 20 N=30	4.00m
	4.20		Clayey Sand/ Sandy CLAY High plasticity Brown to red to pale brown to grey	S/CH	Vst	M				
	4.5									
	5.0									
	5.00		Clayey SAND Medium grained Pink to pale brown	S	MD	M				
	5.5							SPT 150 300 450	Blows 7 12 10 N=22	5.50m
	6.0									
	6.00		Borehole 6 terminated at 6.0m							
	6.5									

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash University
Project: 211964 NCCEC Project /2
Borehole Location: See Site Plan
Borehole Elevation: Surface Level

Borehole No: **BH 7**
Date: 8/04/2022
Logged by: LRP
Checked by: AJ

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
	0.10		Grasscover/Topsoil Silty Sand FILL	FILL	L	D				
A	0.6 1.2 1.8 2.4 3.0 3.6 4.2 4.8 5.4 6.0 6.6 7.2		Silty SAND with Limestone Gravel Fine grained White to light yellow	S	L-MD	D				Geology: Unnamed dune deposits Limestone bands throughout to full depth. NO SPTs possible due to soil collapse.
	7.50		Borehole 1 terminated at 7.50m							
	7.8									

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

LRPardo & Associates

BOREHOLE LOG

Client: Monash University | Borehole No: **BH 8**
Project: 211964 NCCEC Project /2 | Date: 8/04/2022
Borehole Location: See Site Plan | Logged by: LRP
Borehole Elevation: Surface Level | Checked by: AJ

Method	Depth (metres)	Graphic Log	Material Description Type, Plasticity, Colour, Particle characteristics	Soil Classification	Consistency / Density	Moisture	Other	Type	Test Results	Structure and additional observations
			Grasscover/Topsoil	FILL	L	D				
	0.20		Silty Sand FILL							
			Silty SAND with Limestone Gravel Fine grained White to light yellow	S	L-MD	D				Geology: Unnamed dune deposits Limestone bands throughout to full depth. NO SPTs possible due to soil collapse.
	0.6									
	1.2									
	1.8									
	2.4									
	3.0									
A	3.6							CBR Swell	13% 0%	3.50m - 7.50m 3.50m - 7.50m
	4.2									
	4.8									
	5.4									
	6.0									
	6.6									
	7.2									
	7.50		Borehole 2 terminated at 7.50m							
	7.8									

Consistency/density:

VS	very soft	Fb	friable
S	soft	VL	very loose
F	firm	L	loose
St	stiff	MD	medium dense
VSt	very stiff	D	dense
H	hard	VD	very dense

samples/tests:

V	pilcon shear vane kPa
U63	undisturbed sample 63mm
DS	disturbed sample
PP	pocket penetrometer kPa
CT	samples for contamination test
N	standard penetration test

Penetration

1	no resistance
2	ranging
3	to
4	Refusal

method:

A	auger drilling	R	roller/tricone
W	washbore	H	hand auger
NDD	non destructive digging	E	Excavator

moisture: D dry W wet M moist Sat Saturated

Doc. No. LBH-001
Issued Date: 20/11/08

Appendix B

Laboratory Test Results

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Moisture Content Test Results
AS1289.2.1.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	LR Pardo & Associates	**Job No:**	LRP1742
Project:	211964 NCCEC Project/1	**Report:**	1
Location:	BH1 - BH4	**Test Date:**	30/06/2021

Sample No	1	2	3	4	5	6
Test Location:	BH1	BH1	BH1	BH2	BH3	BH4
Depth:	1.0m	1.5m	4.0m	1.0m - 2.0m	0.6m - 2.4m	2.0m - 3.0m
Moisture Content, %	**6.8**	**1.8**	**20.5**	**2.4**	**4.3**	**12.9**
Material:	Silty SAND	Silty SAND	Silty SAND	Silty SAND	Silty SAND	Silty SAND

Sample No						
Test Location:						
Depth:						
Moisture Content, %						
Material:						

Notes:

Test Method AS 1289 2.1.1 **Sampling Method:** Sampled by Client

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory: David Burns

Date: 13/07/2021

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Atterberg Limits and Particle Size Distributions Report

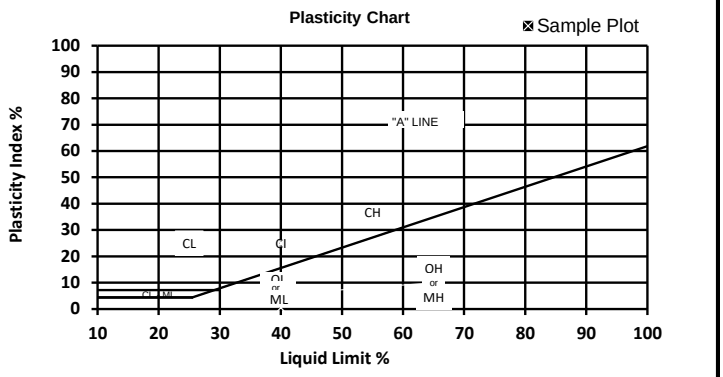
A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	LR Pardo & Associates	**Job No:**	LRP1742
Project:	211964 NCCEC Project/1	**Report:**	2
Location:	BH2 1.0 - 2.0m	**Test Date:**	30/06/2021
Sample No:	4 **Material:**	Silty SAND	
Sample Location:	BH2 1.0 - 2.0m		
Sample Source:			
Product Specification:			

Atterberg Limits

Sample History: Air Dried / Dry Sieved

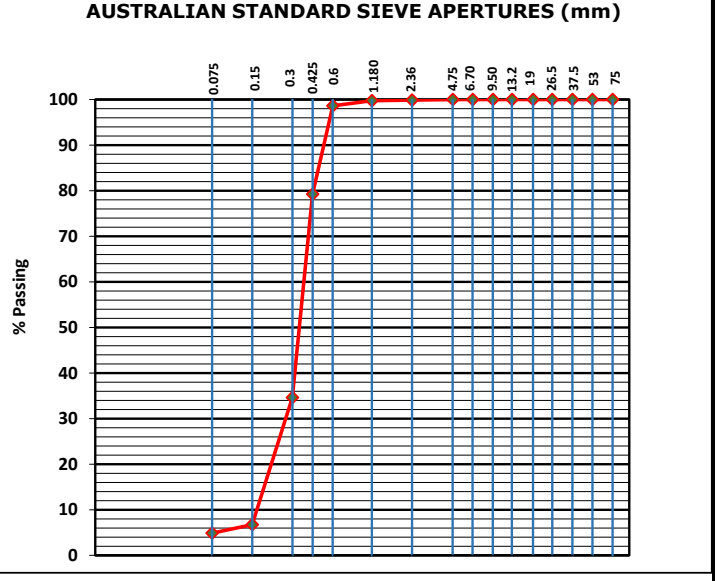
Plasticity Index Results	
Liquid Limit:	SLIPS IN CUP
Plastic Limit:	SLIPS IN CUP
Plastic Index:	NON-PLASTIC
Linear Shrinkage:	N/A
Linear Shrinkage Remarks:	N/A
0.075mm x 0.425mm Sieve	395
PI x 0.425mm Sieve	
LS x 0.425mm Sieve	



Particle Size Distribution

Sample History: Oven Dried (105-110 deg C), -19.0mm Washed

Sieve Size (mm)	% Passing	Limits
75.0	100	
53.0	100	
37.5	100	
26.5	100	
19.0	100	
13.2	100	
9.5	100	
6.7	100	
4.75	100	
2.36	100	
1.180	100	
0.600	99	
0.425	79	
0.300	35	
0.150	7	
0.075	5	



Soil Classification in accordance with Unified Soil Classification Laboratory Identification Procedure AS 1726:2017

USC	SP

Notes:

Test Methods: AS1289.3.6.1, AS1289.3.1.2, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1 **Sampling Method:** Sampled by Client

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory: David Burns

Date: 12/07/2021

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Atterberg Limits and Particle Size Distributions Report

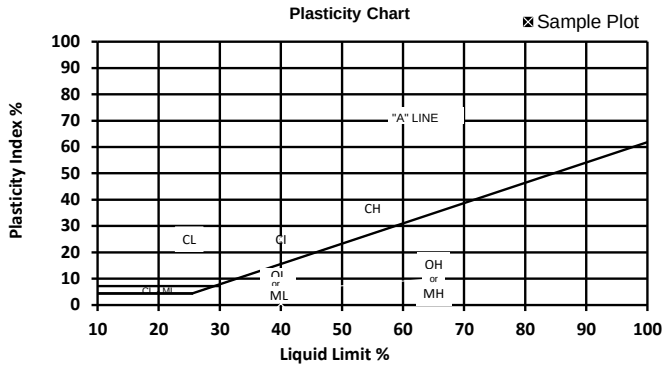
A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	LR Pardo & Associates	**Job No:**	LRP1742
Project:	211964 NCCEC Project/1	**Report:**	3
Location:	BH3 0.6 - 2.4m	**Test Date:**	30/06/2021
Sample No:	5 **Material:**	Silty SAND	
Sample Location:	BH3 0.6 - 2.4m		
Sample Source:			
Product Specification:			

Atterberg Limits

Sample History: Air Dried / Dry Sieved

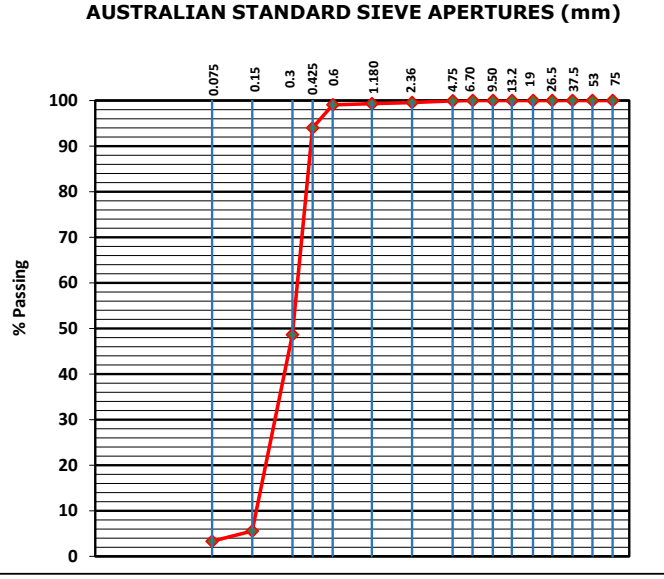
Plasticity Index Results	
Liquid Limit:	SLIPS IN CUP
Plastic Limit:	SLIPS IN CUP
Plastic Index:	NON-PLASTIC
Linear Shrinkage:	N/A
Linear Shrinkage Remarks:	N/A
0.075mm x 0.425mm Sieve	282
PI x 0.425mm Sieve	
LS x 0.425mm Sieve	



Particle Size Distribution

Sample History: Oven Dried (105-110 deg C), -19.0mm Washed

Sieve Size (mm)	% Passing	Limits
75.0	100	
53.0	100	
37.5	100	
26.5	100	
19.0	100	
13.2	100	
9.5	100	
6.7	100	
4.75	100	
2.36	100	
1.180	99	
0.600	99	
0.425	94	
0.300	49	
0.150	6	
0.075	3	



Soil Classification in accordance with Unified Soil Classification Laboratory Identification Procedure AS 1726:2017

USC	**SP**

Notes:

Test Methods: AS1289.3.6.1, AS1289.3.1.2, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1 **Sampling Method:** Sampled by Client

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory: David Burns

Date: 13/07/2021

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Emerson Class Test Results
AS1289.3.8.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	LR Pardo & Associates	**Job No:**	LRP1742
Project:	211964 NCCEC Project/1	**Report:**	4
Location:	BH3 0.6 - 2.4m	**Sample No:**	5
Date Sampled:	30/06/2021		
Date Tested:	13/07/2021		
Sampling Method:	Sampled by Client		

Sample Location: BH3 0.6 - 2.4m

Material Description: Silty SAND

Emerson Class Number

1

Water Used: Distilled Water

Water Temperature: 25 °C

Test Methods AS1289.3.8.1

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Issue Date: 13/07/2021

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Atterberg Limits and Particle Size Distributions Report

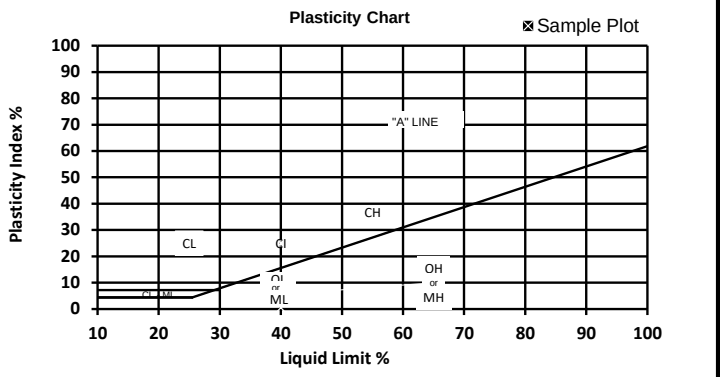
A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	LR Pardo & Associates	**Job No:**	LRP1742
Project:	211964 NCCEC Project/1	**Report:**	5
Location:	BH4 2.0 - 3.0m	**Test Date:**	30/06/2021
Sample No:	6 **Material:**	Silty SAND	
Sample Location:	BH4 2.0 - 3.0m		
Sample Source:			
Product Specification:			

Atterberg Limits

Sample History: Air Dried / Dry Sieved

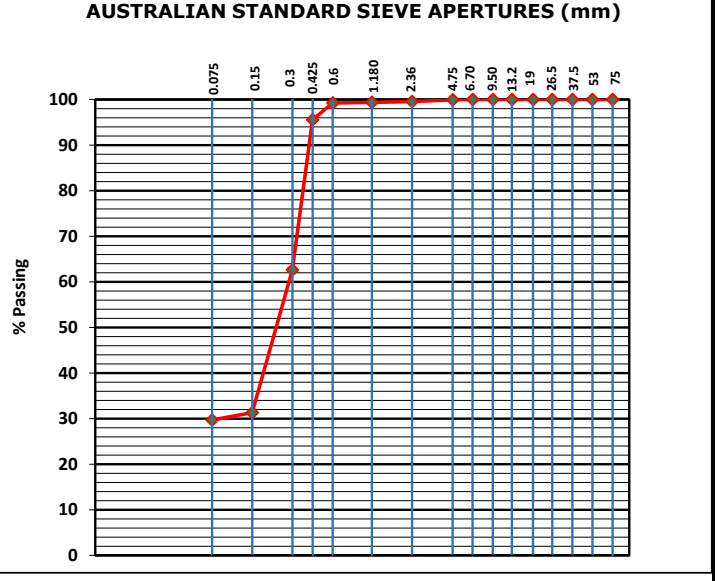
Plasticity Index Results	
Liquid Limit:	SLIPS IN CUP
Plastic Limit:	SLIPS IN CUP
Plastic Index:	NON-PLASTIC
Linear Shrinkage:	N/A
Linear Shrinkage Remarks:	N/A
0.075mm x 0.425mm Sieve	2880
PI x 0.425mm Sieve	
LS x 0.425mm Sieve	



Particle Size Distribution

Sample History: Oven Dried (105-110 deg C), -19.0mm Washed

Sieve Size (mm)	% Passing	Limits
75.0	100	
53.0	100	
37.5	100	
26.5	100	
19.0	100	
13.2	100	
9.5	100	
6.7	100	
4.75	100	
2.36	100	
1.180	99	
0.600	99	
0.425	96	
0.300	63	
0.150	31	
0.075	30	



Soil Classification in accordance with Unified Soil Classification Laboratory Identification Procedure AS 1726:2017

USC	**SM**

Notes:

Test Methods: AS1289.3.6.1, AS1289.3.1.2, AS1289.3.2.1, AS1289.3.4.1, AS1289.2.1.1 **Sampling Method:** Sampled by Client

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory: David Burns

Date: 13/07/2021

A&Y ASSOCIATES
GEOTECHNICAL ENGINEERING CONSULTANTS

Emerson Class Test Results
AS1289.3.8.1

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

Client:	LR Pardo & Associates	**Job No:**	LRP1742
Project:	211964 NCCEC Project/1	**Report:**	6
Location:	BH4 2.0 - 3.0m	**Sample No:**	6
Date Sampled:	30/06/2021		
Date Tested:	13/07/2021		
Sampling Method:	Sampled by Client		

Sample Location: BH4 2.0 - 3.0m

Material Description: Silty SAND

Emerson Class Number

3

Water Used: Distilled Water

Water Temperature: 25 °C

Test Methods AS1289.3.8.1

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No. 20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Issue Date: 13/07/2021

A & Y Associates Pty Ltd
5/16 Network Drive
Truganina VIC 3029
PH: 0400 413 531
info@ayassociates.com.au

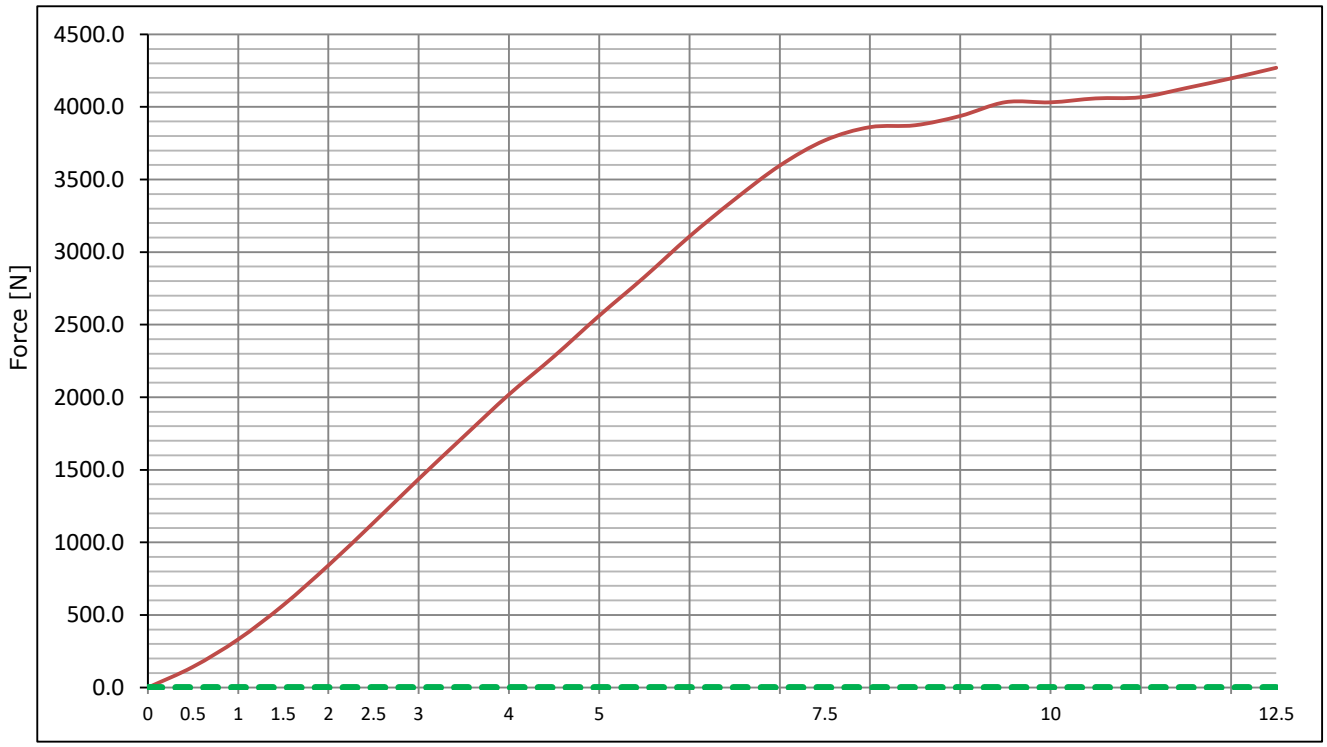
California Bearing Ratio
AS1289.6.1.1

Client:	**LR Pardo & Associates**	Job No:	**LRP2187**
Project:	**211964/2 NCCEC**	Report No:	**1**
Location:	**BH2 3500-7500mm**	Date Tested:	**16-Apr-22**

Sample No.	**1**
Material	Silty SAND
Location:	BH2 3500-7500mm

CBR 1 Point Graph

Force v Penetration



Compactive Effort	STD	Dry Density After Soak t/m3	1.441
Maximum Dry Density t/m3	1.513	Surcharge Mass kg	4.5
Optimum Moisture Content %	6.7	Moisture before soaking %	6.7
Initial Moisture Content %	6.8		
Oversize %	0.0	Moisture Content Top 30mm After Test %	25.8
Dry Density Before Soak t/m3	1.441	Moisture Content After Soak %	24.7
Density Ratio Before Soak %	95	Swell after soaking %	0.0
Moisture Ratio Before Soak %	100	Curve Correction mm	0.0
Soaked/Unsoaked	Soaked	**CBR Value**	**13**
Days Soaked	4		at 5.0mm

Notes: Liquid Limit Method: Estimation; Curing time 168 hrs.

Oversize Notes Oversize material retained over 19mm sieve excluded from this test

Test Methods: AS1289.2.1.1, 5.1.1, 6.1.1 **Sampling Method:** Sampled by Client

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory No.20172

Accreditation for compliance with ISO/IEC 17025 - Testing

The results of tests, calibrations and/or measurements included in this document, are traceable to Australian / National Standards

Approved Signatory:

David Burns

Date: 19/04/2022

L R Pardo & Associates
2 Alex Avenue
Moorabbin
VIC 3189

Attention: **Ryan Cerbus**

Report **806988-S**
Project name 211964 NCCEC PROJECT/1
Received Date Jun 30, 2021

Client Sample ID			**BH3-1**	**BH4-1**	**BH5-1**	**BH6-1**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**M21-Jn61675**	**M21-Jn61676**	**M21-Jn61677**	**M21-Jn61678**
Date Sampled			**Jun 30, 2021**	**Jun 30, 2021**	**Jun 30, 2021**	**Jun 30, 2021**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Volatile Organics						
Hexachlorobutadiene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Volatile Organics						
1.1-Dichloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2.4-Trichlorobenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.1-Dichloroethene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.1.1-Trichloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.1.1.2-Tetrachloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.1.2-Trichloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.1.2.2-Tetrachloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2-Dibromoethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2-Dichlorobenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2-Dichloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2-Dichloropropane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2.3-Trichloropropane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.2.4-Trimethylbenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.3-Dichlorobenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.3-Dichloropropane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.3.5-Trimethylbenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
1.4-Dichlorobenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Butanone (MEK)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Propanone (Acetone)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Chlorotoluene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			BH3-1	BH4-1	BH5-1	BH6-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-Jn61675	M21-Jn61676	M21-Jn61677	M21-Jn61678
Date Sampled			Jun 30, 2021	Jun 30, 2021	Jun 30, 2021	Jun 30, 2021
Test/Reference	LOR	Unit				
Volatile Organics						
4-Methyl-2-pentanone (MIBK)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Allyl chloride	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Bromobenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Bromochloromethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Bromodichloromethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Bromoform	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Bromomethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Carbon disulfide	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Carbon Tetrachloride	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chlorobenzene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chloroethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chloroform	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chloromethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
cis-1.2-Dichloroethene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
cis-1.3-Dichloropropene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibromochloromethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibromomethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dichlorodifluoromethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Iodomethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Isopropyl benzene (Cumene)	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methylene Chloride	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Styrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Tetrachloroethene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
trans-1.2-Dichloroethene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
trans-1.3-Dichloropropene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Trichloroethene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Trichlorofluoromethane	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vinyl chloride	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
Total MAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vic EPA IWRG 621 CHC (Total)*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Vic EPA IWRG 621 Other CHC (Total)*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Bromofluorobenzene (surr.)	1	%	63	70	56	55
Toluene-d8 (surr.)	1	%	56	57	51	56
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5

Client Sample ID			BH3-1	BH4-1	BH5-1	BH6-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-Jn61675	M21-Jn61676	M21-Jn61677	M21-Jn61678
Date Sampled			Jun 30, 2021	Jun 30, 2021	Jun 30, 2021	Jun 30, 2021
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	74	69	66	89
p-Terphenyl-d14 (surr.)	1	%	90	91	94	103
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	64	76	87	84
Tetrachloro-m-xylene (surr.)	1	%	111	128	125	121
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

Client Sample ID			BH3-1	BH4-1	BH5-1	BH6-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			M21-Jn61675	M21-Jn61676	M21-Jn61677	M21-Jn61678
Date Sampled			Jun 30, 2021	Jun 30, 2021	Jun 30, 2021	Jun 30, 2021
Test/Reference	LOR	Unit				
Polychlorinated Biphenyls						
Total PCB*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	64	76	87	84
Tetrachloro-m-xylene (surr.)	1	%	111	128	125	121
Phenols (Halogenated)						
2-Chlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4.5-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.4.6-Trichlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
2.6-Dichlorophenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Chloro-3-methylphenol	1	mg/kg	< 1	< 1	< 1	< 1
Pentachlorophenol	1	mg/kg	< 1	< 1	< 1	< 1
Tetrachlorophenols - Total	10	mg/kg	< 10	< 10	< 10	< 10
Total Halogenated Phenol*	1	mg/kg	< 1	< 1	< 1	< 1
Phenols (non-Halogenated)						
2-Cyclohexyl-4.6-dinitrophenol	20	mg/kg	< 20	< 20	< 20	< 20
2-Methyl-4.6-dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Nitrophenol	1.0	mg/kg	< 1	< 1	< 1	< 1
2.4-Dimethylphenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2.4-Dinitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
2-Methylphenol (o-Cresol)	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
3&4-Methylphenol (m&p-Cresol)	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Total cresols*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
4-Nitrophenol	5	mg/kg	< 5	< 5	< 5	< 5
Dinoseb	20	mg/kg	< 20	< 20	< 20	< 20
Phenol	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenol-d6 (surr.)	1	%	64	73	83	78
Total Non-Halogenated Phenol*	20	mg/kg	< 20	< 20	< 20	< 20
Chromium (hexavalent)	1	mg/kg	< 1	< 1	< 1	< 1
Cyanide (total)	5	mg/kg	< 5	< 5	< 5	< 5
Fluoride (Total)	100	mg/kg	< 100	< 100	< 100	< 100
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	9.5	9.5	9.0	9.3
% Moisture	1	%	3.7	6.7	1.8	6.3
Heavy Metals						
Arsenic	2	mg/kg	14	14	12	15
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	10	11	13	12
Copper	5	mg/kg	< 5	< 5	< 5	< 5
Lead	5	mg/kg	< 5	< 5	< 5	< 5
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum	5	mg/kg	< 5	< 5	< 5	< 5
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Selenium	2	mg/kg	< 2	< 2	< 2	< 2
Silver	2	mg/kg	< 2	< 2	< 2	< 2
Tin	10	mg/kg	< 10	< 10	< 10	< 10
Zinc	5	mg/kg	< 5	< 5	5.3	5.5

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Vic EPA IWRG 621 (Solids)			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Volatile Organics	Melbourne	Jul 02, 2021	7 Days
- Method: USEPA 8260 - MGT 350A Volatile Organics by GCMS			
Volatile Organics	Melbourne	Jul 02, 2021	7 Days
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices (USEPA 8260)			
Polycyclic Aromatic Hydrocarbons	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Organochlorine Pesticides	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8270)			
Polychlorinated Biphenyls	Melbourne	Jul 02, 2021	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water (USEPA 8082)			
Phenols (Halogenated)	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Phenols (non-Halogenated)	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Chromium (hexavalent)	Melbourne	Jul 02, 2021	28 Days
- Method: APHA 3500-Cr Hexavalent Chromium- (Extraction:- USEPA3060)			
Cyanide (total)	Melbourne	Jul 02, 2021	14 Days
- Method: LTM-INO-4020 Total Free WAD Cyanide by CFA			
Fluoride (Total)	Melbourne	Jul 03, 2021	28 Days
- Method: LTM-INO-4150 Determination of Total Fluoride PART B – ISE			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Jul 02, 2021	7 Days
- Method: LTM-GEN-7090 pH in soil by ISE			
Metals IWRG 621 : Metals M12	Melbourne	Jul 02, 2021	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Melbourne	Jun 30, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: L R Pardo & Associates
Address: 2 Alex Avenue
Moorabbin
VIC 3189

Project Name: 211964 NCCEC PROJECT/1

Order No.:
Report #: 806988
Phone: 03 9555 6995
Fax: 03 9553 1394

Received: Jun 30, 2021 2:20 PM
Due: Jul 7, 2021
Priority: 5 Day
Contact Name: Ryan Cerbus

Eurofins Analytical Services Manager : Callum McEwan

Sample Detail						Moisture Set	Vic EPA IWRG 621 (Solids)
Melbourne Laboratory - NATA Site # 1254						X	X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory - NATA Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	BH3-1	Jun 30, 2021		Soil	M21-Jn61675	X	X
2	BH4-1	Jun 30, 2021	10:15AM	Soil	M21-Jn61676	X	X
3	BH5-1	Jun 30, 2021	10:52AM	Soil	M21-Jn61677	X	X
4	BH6-1	Jun 30, 2021	11:50AM	Soil	M21-Jn61678	X	X
Test Counts						4	4

eurofins | Environment Testing

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

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

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Volatile Organics							
Hexachlorobutadiene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Volatile Organics							
1.1-Dichloroethane	mg/kg	< 0.5			0.5	Pass	
1.2.4-Trichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.1-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
1.1.1-Trichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.1.2-Tetrachloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.2-Trichloroethane	mg/kg	< 0.5			0.5	Pass	
1.1.2.2-Tetrachloroethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dibromoethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.2-Dichloroethane	mg/kg	< 0.5			0.5	Pass	
1.2-Dichloropropane	mg/kg	< 0.5			0.5	Pass	
1.2.3-Trichloropropane	mg/kg	< 0.5			0.5	Pass	
1.2.4-Trimethylbenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
1.3-Dichloropropane	mg/kg	< 0.5			0.5	Pass	
1.3.5-Trimethylbenzene	mg/kg	< 0.5			0.5	Pass	
1.4-Dichlorobenzene	mg/kg	< 0.5			0.5	Pass	
2-Butanone (MEK)	mg/kg	< 0.5			0.5	Pass	
2-Propanone (Acetone)	mg/kg	< 0.5			0.5	Pass	
4-Chlorotoluene	mg/kg	< 0.5			0.5	Pass	
4-Methyl-2-pentanone (MIBK)	mg/kg	< 0.5			0.5	Pass	
Allyl chloride	mg/kg	< 0.5			0.5	Pass	
Benzene	mg/kg	< 0.1			0.1	Pass	
Bromobenzene	mg/kg	< 0.5			0.5	Pass	
Bromochloromethane	mg/kg	< 0.5			0.5	Pass	
Bromodichloromethane	mg/kg	< 0.5			0.5	Pass	
Bromoform	mg/kg	< 0.5			0.5	Pass	
Bromomethane	mg/kg	< 0.5			0.5	Pass	
Carbon disulfide	mg/kg	< 0.5			0.5	Pass	
Carbon Tetrachloride	mg/kg	< 0.5			0.5	Pass	
Chlorobenzene	mg/kg	< 0.5			0.5	Pass	
Chloroethane	mg/kg	< 0.5			0.5	Pass	
Chloroform	mg/kg	< 0.5			0.5	Pass	
Chloromethane	mg/kg	< 0.5			0.5	Pass	
cis-1.2-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
cis-1.3-Dichloropropene	mg/kg	< 0.5			0.5	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dibromochloromethane	mg/kg	< 0.5			0.5	Pass	
Dibromomethane	mg/kg	< 0.5			0.5	Pass	
Dichlorodifluoromethane	mg/kg	< 0.5			0.5	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
Iodomethane	mg/kg	< 0.5			0.5	Pass	
Isopropyl benzene (Cumene)	mg/kg	< 0.5			0.5	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
Methylene Chloride	mg/kg	< 0.5			0.5	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Styrene	mg/kg	< 0.5			0.5	Pass	
Tetrachloroethene	mg/kg	< 0.5			0.5	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
trans-1.2-Dichloroethene	mg/kg	< 0.5			0.5	Pass	
trans-1.3-Dichloropropene	mg/kg	< 0.5			0.5	Pass	
Trichloroethene	mg/kg	< 0.5			0.5	Pass	
Trichlorofluoromethane	mg/kg	< 0.5			0.5	Pass	
Vinyl chloride	mg/kg	< 0.5			0.5	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Phenols (Halogenated)							
2-Chlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
2.4.5-Trichlorophenol	mg/kg	< 1			1	Pass	
2.4.6-Trichlorophenol	mg/kg	< 1			1	Pass	
2.6-Dichlorophenol	mg/kg	< 0.5			0.5	Pass	
4-Chloro-3-methylphenol	mg/kg	< 1			1	Pass	
Pentachlorophenol	mg/kg	< 1			1	Pass	
Tetrachlorophenols - Total	mg/kg	< 10			10	Pass	
Method Blank							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	mg/kg	< 20			20	Pass	
2-Methyl-4.6-dinitrophenol	mg/kg	< 5			5	Pass	
2-Nitrophenol	mg/kg	< 1			1.0	Pass	
2.4-Dimethylphenol	mg/kg	< 0.5			0.5	Pass	
2.4-Dinitrophenol	mg/kg	< 5			5	Pass	
2-Methylphenol (o-Cresol)	mg/kg	< 0.2			0.2	Pass	
3&4-Methylphenol (m&p-Cresol)	mg/kg	< 0.4			0.4	Pass	
4-Nitrophenol	mg/kg	< 5			5	Pass	
Dinoseb	mg/kg	< 20			20	Pass	
Phenol	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Chromium (hexavalent)	mg/kg	< 1			1	Pass	
Cyanide (total)	mg/kg	< 5			5	Pass	
Fluoride (Total)	mg/kg	< 100			100	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 2			2	Pass	
Tin	mg/kg	< 10			10	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons							
TRH C6-C9	%	85			70-130	Pass	
TRH C10-C14	%	78			70-130	Pass	
Naphthalene	%	103			70-130	Pass	
TRH C6-C10	%	91			70-130	Pass	
TRH >C10-C16	%	79			70-130	Pass	
LCS - % Recovery							
Volatile Organics							
1.1-Dichloroethene	%	108			70-130	Pass	
1.1.1-Trichloroethane	%	81			70-130	Pass	
1.2-Dichlorobenzene	%	85			70-130	Pass	
1.2-Dichloroethane	%	105			70-130	Pass	
Benzene	%	99			70-130	Pass	
Ethylbenzene	%	90			70-130	Pass	
m&p-Xylenes	%	83			70-130	Pass	
Toluene	%	91			70-130	Pass	
Trichloroethene	%	88			70-130	Pass	
Xylenes - Total*	%	86			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	82			70-130	Pass	
Acenaphthylene	%	89			70-130	Pass	
Anthracene	%	74			70-130	Pass	
Benz(a)anthracene	%	77			70-130	Pass	
Benzo(a)pyrene	%	71			70-130	Pass	
Benzo(b&j)fluoranthene	%	81			70-130	Pass	
Benzo(g.h.i)perylene	%	75			70-130	Pass	
Benzo(k)fluoranthene	%	76			70-130	Pass	
Chrysene	%	77			70-130	Pass	
Dibenz(a.h)anthracene	%	71			70-130	Pass	
Fluoranthene	%	72			70-130	Pass	
Fluorene	%	82			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	71			70-130	Pass	
Naphthalene	%	89			70-130	Pass	
Phenanthrene	%	73			70-130	Pass	
Pyrene	%	75			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
Chlordanes - Total	%	87			70-130	Pass	
4.4'-DDD	%	98			70-130	Pass	
4.4'-DDE	%	89			70-130	Pass	
4.4'-DDT	%	77			70-130	Pass	
a-BHC	%	104			70-130	Pass	
Aldrin	%	71			70-130	Pass	
b-BHC	%	91			70-130	Pass	
d-BHC	%	97			70-130	Pass	
Dieldrin	%	86			70-130	Pass	
Endosulfan I	%	91			70-130	Pass	
Endosulfan II	%	71			70-130	Pass	
Endosulfan sulphate	%	90			70-130	Pass	
Endrin	%	90			70-130	Pass	
Endrin aldehyde	%	99			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endrin ketone	%	92			70-130	Pass	
g-BHC (Lindane)	%	81			70-130	Pass	
Heptachlor	%	94			70-130	Pass	
Heptachlor epoxide	%	96			70-130	Pass	
Hexachlorobenzene	%	71			70-130	Pass	
Methoxychlor	%	75			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	77			70-130	Pass	
LCS - % Recovery							
Phenols (Halogenated)							
2-Chlorophenol	%	96			30-130	Pass	
2.4-Dichlorophenol	%	84			30-130	Pass	
2.4.5-Trichlorophenol	%	91			30-130	Pass	
2.4.6-Trichlorophenol	%	86			30-130	Pass	
2.6-Dichlorophenol	%	79			30-130	Pass	
4-Chloro-3-methylphenol	%	89			30-130	Pass	
Pentachlorophenol	%	85			30-130	Pass	
Tetrachlorophenols - Total	%	69			30-130	Pass	
LCS - % Recovery							
Phenols (non-Halogenated)							
2-Cyclohexyl-4.6-dinitrophenol	%	51			30-130	Pass	
2-Methyl-4.6-dinitrophenol	%	61			30-130	Pass	
2-Nitrophenol	%	82			30-130	Pass	
2.4-Dimethylphenol	%	60			30-130	Pass	
2.4-Dinitrophenol	%	55			30-130	Pass	
2-Methylphenol (o-Cresol)	%	81			30-130	Pass	
3&4-Methylphenol (m&p-Cresol)	%	102			30-130	Pass	
4-Nitrophenol	%	67			30-130	Pass	
Dinoseb	%	80			30-130	Pass	
Phenol	%	96			30-130	Pass	
LCS - % Recovery							
Cyanide (total)	%	101			70-130	Pass	
Fluoride (Total)	%	113			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	114			80-120	Pass	
Cadmium	%	108			80-120	Pass	
Chromium	%	117			80-120	Pass	
Copper	%	112			80-120	Pass	
Lead	%	112			80-120	Pass	
Mercury	%	119			80-120	Pass	
Molybdenum	%	117			80-120	Pass	
Nickel	%	108			80-120	Pass	
Selenium	%	107			80-120	Pass	
Silver	%	112			80-120	Pass	
Tin	%	115			80-120	Pass	
Zinc	%	108			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons				Result 1					
TRH C6-C9	M21-Jn61440	NCP	%	87			70-130	Pass	
TRH C10-C14	M21-Jn60883	NCP	%	84			70-130	Pass	
Naphthalene	M21-Jn61507	NCP	%	75			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C6-C10	M21-Jn61440	NCP	%	92			70-130	Pass	
TRH >C10-C16	M21-Jn60883	NCP	%	85			70-130	Pass	
Spike - % Recovery									
Volatile Organics				Result 1					
1.1-Dichloroethene	M21-Jn61507	NCP	%	94			70-130	Pass	
1.1.1-Trichloroethane	M21-Jn61507	NCP	%	72			70-130	Pass	
1.2-Dichlorobenzene	M21-Jn61507	NCP	%	80			70-130	Pass	
1.2-Dichloroethane	M21-Jn61507	NCP	%	84			70-130	Pass	
Benzene	M21-Jn61507	NCP	%	86			70-130	Pass	
Ethylbenzene	M21-Jn61507	NCP	%	79			70-130	Pass	
m&p-Xylenes	M21-Jn61507	NCP	%	79			70-130	Pass	
o-Xylene	M21-Jn61507	NCP	%	79			70-130	Pass	
Toluene	M21-Jn61507	NCP	%	76			70-130	Pass	
Trichloroethene	M21-Jn61507	NCP	%	80			70-130	Pass	
Xylenes - Total*	M21-Jn61507	NCP	%	79			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
Chlordanes - Total	P21-Jn59422	NCP	%	99			70-130	Pass	
4.4'-DDD	P21-Jn59422	NCP	%	116			70-130	Pass	
4.4'-DDE	P21-Jn59422	NCP	%	124			70-130	Pass	
4.4'-DDT	P21-Jn59422	NCP	%	87			70-130	Pass	
a-BHC	P21-Jn59422	NCP	%	86			70-130	Pass	
Aldrin	P21-Jn59422	NCP	%	102			70-130	Pass	
b-BHC	P21-Jn59422	NCP	%	122			70-130	Pass	
d-BHC	P21-Jn59422	NCP	%	96			70-130	Pass	
Dieldrin	P21-Jn59422	NCP	%	95			70-130	Pass	
Endosulfan I	P21-Jn59422	NCP	%	90			70-130	Pass	
Endosulfan II	P21-Jn59422	NCP	%	102			70-130	Pass	
Endosulfan sulphate	P21-Jn59422	NCP	%	104			70-130	Pass	
Endrin	P21-Jn59422	NCP	%	100			70-130	Pass	
Endrin aldehyde	P21-Jn59422	NCP	%	88			70-130	Pass	
Endrin ketone	P21-Jn59422	NCP	%	96			70-130	Pass	
g-BHC (Lindane)	P21-Jn59422	NCP	%	114			70-130	Pass	
Heptachlor	P21-Jn59422	NCP	%	108			70-130	Pass	
Heptachlor epoxide	P21-Jn59422	NCP	%	116			70-130	Pass	
Hexachlorobenzene	P21-Jn59422	NCP	%	91			70-130	Pass	
Methoxychlor	P21-Jn59422	NCP	%	88			70-130	Pass	
Spike - % Recovery									
				Result 1					
Fluoride (Total)	M21-Jn34703	NCP	%	73			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	M21-Jn61678	CP	%	115			75-125	Pass	
Cadmium	M21-Jn61678	CP	%	104			75-125	Pass	
Chromium	M21-Jn61678	CP	%	114			75-125	Pass	
Copper	M21-Jn61678	CP	%	108			75-125	Pass	
Lead	M21-Jn61678	CP	%	81			75-125	Pass	
Mercury	M21-Jn61678	CP	%	120			75-125	Pass	
Nickel	M21-Jn61678	CP	%	108			75-125	Pass	
Selenium	M21-Jn61678	CP	%	106			75-125	Pass	
Silver	M21-Jn61678	CP	%	109			75-125	Pass	
Tin	M21-Jn61678	CP	%	120			75-125	Pass	
Zinc	M21-Jn61678	CP	%	104			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD			
TRH C6-C9	M21-Jn61504	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M21-Jn60308	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M21-Jn60308	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	M21-Jn60308	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Naphthalene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	M21-Jn61504	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M21-Jn60308	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	M21-Jn60308	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	M21-Jn60308	NCP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
Hexachlorobutadiene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
1.1-Dichloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2.4-Trichlorobenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1-Dichloroethene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.1-Trichloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.1.2-Tetrachloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.2-Trichloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.1.2.2-Tetrachloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dibromoethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dichlorobenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dichloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2-Dichloropropane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2.3-Trichloropropane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.2.4-Trimethylbenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.3-Dichlorobenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.3-Dichloropropane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.3.5-Trimethylbenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
1.4-Dichlorobenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2-Butanone (MEK)	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2-Propanone (Acetone)	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chlorotoluene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Methyl-2-pentanone (MIBK)	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Allyl chloride	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzene	M21-Jn61504	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Bromobenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromochloromethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromodichloromethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromoform	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Bromomethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Carbon disulfide	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Carbon Tetrachloride	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chlorobenzene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chloroethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chloroform	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chloromethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
cis-1.2-Dichloroethene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
cis-1.3-Dichloropropene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibromochloromethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibromomethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Volatile Organics				Result 1	Result 2	RPD			
Dichlorodifluoromethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Ethylbenzene	M21-Jn61504	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Iodomethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Isopropyl benzene (Cumene)	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
m&p-Xylenes	M21-Jn61504	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methylene Chloride	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
o-Xylene	M21-Jn61504	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Styrene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Tetrachloroethene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Toluene	M21-Jn61504	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
trans-1.2-Dichloroethene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
trans-1.3-Dichloropropene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Trichloroethene	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Trichlorofluoromethane	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Vinyl chloride	M21-Jn61504	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Xylenes - Total*	M21-Jn61504	NCP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M21-Jn61596	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	

Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Hexachlorobenzene	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M21-Jn61596	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	P21-Jn59374	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	M21-Jn61565	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Phenols (Halogenated)				Result 1	Result 2	RPD			
2-Chlorophenol	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dichlorophenol	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4.5-Trichlorophenol	M21-Jn61596	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4.6-Trichlorophenol	M21-Jn61596	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.6-Dichlorophenol	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
4-Chloro-3-methylphenol	M21-Jn61596	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Pentachlorophenol	M21-Jn61596	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Tetrachlorophenols - Total	M21-Jn61596	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Phenols (non-Halogenated)				Result 1	Result 2	RPD			
2-Cyclohexyl-4.6-dinitrophenol	M21-Jn61596	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
2-Methyl-4.6-dinitrophenol	M21-Jn61596	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Nitrophenol	M21-Jn61596	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
2.4-Dimethylphenol	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
2.4-Dinitrophenol	M21-Jn61596	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
2-Methylphenol (o-Cresol)	M21-Jn61596	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
3&4-Methylphenol (m&p-Cresol)	M21-Jn61596	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
4-Nitrophenol	M21-Jn61596	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Dinoseb	M21-Jn61596	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
Phenol	M21-Jn61596	NCP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M21-Jn61675	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Cyanide (total)	M21-Jn60640	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
pH (1:5 Aqueous extract at 25°C as rec.)	M21-Jn61446	NCP	pH Units	9.6	9.7	pass	30%	Pass	
% Moisture	M21-Jn61666	NCP	%	2.9	3.1	4.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Fluoride (Total)	M21-Jn61676	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chromium (hexavalent)	M21-Jn61677	CP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M21-Jn61677	CP	mg/kg	12	12	7.0	30%	Pass	
Cadmium	M21-Jn61677	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M21-Jn61677	CP	mg/kg	13	13	7.0	30%	Pass	
Copper	M21-Jn61677	CP	mg/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Lead	M21-Jn61677	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	M21-Jn61677	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M21-Jn61677	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	M21-Jn61677	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	M21-Jn61677	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M21-Jn61677	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	M21-Jn61677	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M21-Jn61677	CP	mg/kg	5.3	5.6	5.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	M21-Jn61678	CP	mg/kg	15	15	2.0	30%	Pass	
Cadmium	M21-Jn61678	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	M21-Jn61678	CP	mg/kg	12	12	1.0	30%	Pass	
Copper	M21-Jn61678	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	M21-Jn61678	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	M21-Jn61678	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M21-Jn61678	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	M21-Jn61678	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Selenium	M21-Jn61678	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M21-Jn61678	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Tin	M21-Jn61678	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M21-Jn61678	CP	mg/kg	5.5	7.1	26	30%	Pass	

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised by:

Callum McEwan	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)
Vivian Wang	Senior Analyst-Volatile (VIC)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Appendix C

Photographs

Geotechnical Investigation - Jacksons Road

Photo 1: Overview to the east of Jacksons Road.

Photo 2: View to the north section of the site.

Photo 3: Location of borehole 1

Photo 4: Borehole 1 SPT sample at 1.0m Silty SAND.

Photo 5: Soil pofile of Borehole 1 at 2.5m.

Photo 6: Borehole 1 SPT sample at 2.50m Silty SAND.

LR Pardo & Associates
Consulting Civil & Geotechnical Engineers
Melbourne: 2 Alex Avenue, Moorabbin VIC 3189
Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215
Tel: (03) 9555 6995 Fax: (03) 9553 1394
www.pardoengineering.com.au

Title Photographs
Locality NCCEC Project
Jacksons Road
Portsea, Victoria
Dwg. No 211964/1 Photos
Prepared by KG 5/07/2021
Checked by LRP 19/07/2021

Geotechnical Investigation
Investigation date: 30/06/2021

Project: 211964 NCCEC Project/1

Sheet No Photo 1 **File** 211964-1 Photos.xlsm

Geotechnical Investigation - Jacksons Road

Photo 7: Borehole 1 SPT sample at 4.0m, very saturated Silty SAND.

Photo 8: Location of borehole 2.

Photo 9: Borehole 2 SPT sample at 1.0m, Silty Sand FILL.

Photo 10: Soil profile of borehole 2, Silty SAND.

Photo 11: Borehole 2 SPT sample at 2.5m, Silty SAND.

Photo 12: Borehole 2 SPT sample at 4.0m, very saturated Silty SAND.

LR Pardo & Associates

Consulting Civil & Geotechnical Engineers

Melbourne: 2 Alex Avenue, Moorabbin VIC 3189

Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215

Tel: (03) 9555 6995 Fax: (03) 9553 1394

www.pardoengineering.com.au

Title	Photographs
Locality	NCCEC Project Jacksons Road Portsea, Victoria
Dwg. No	211964/1 Photos
Prepared by	KG 5/07/2021
Checked by	LRP 19/07/2021

Geotechnical Investigation

Investigation date: 30/06/2021

Project: 211964 NCCEC Project/1

Sheet No	Photo 2	**File**	211964-1 Photos.xlsm

Geotechnical Investigation - Jacksons Road

Photo 13: Location of Borehole 3.

Photo 14: Borehole 3 SPT sample at 1.0m, Silty SAND.

Photo 15: Soil profile of borehole 3 at 2.5m

Photo 16: Borehole 3 SPT sample at 4.0m XW Sandstone.

Photo 17: Location of borehole 4.

Photo 18: Borehole 4 SPT sample at 1.0m, Silty Sand FILL.

LR Pardo & Associates
Consulting Civil & Geotechnical Engineers
Melbourne: 2 Alex Avenue, Moorabbin VIC 3189
Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215
Tel: (03) 9555 6995 Fax: (03) 9553 1394
www.pardoengineering.com.au

Title Photographs
Locality NCCEC Project
Jacksons Road
Portsea, Victoria
Dwg. No 211964/1 Photos
Prepared by KG 5/07/2021
Checked by LRP 19/07/2021

Geotechnical Investigation
Investigation date: 30/06/2021

Project: 211964 NCCEC Project/1

Sheet No Photo 3 **File** 211964-1 Photos.xlsm

Geotechnical Investigation - Jacksons Road

Photo 19: Borehole 4 SPT sample at 4.0m, Clayey SAND.

Photo 20: Soil profile of borehole 4.

Photo 21: Soil profile of borehole 5 at 1.0m

Photo 22: Borehole 5 SPT sample at 1.0m, Silty SAND.

Photo 23: Borehole 5 SPT sample at 2.5m.

Photo 24: Borehole 5 SPT sample at 4.0m, refusal at 0.5m.

LR Pardo & Associates
Consulting Civil & Geotechnical Engineers
Melbourne: 2 Alex Avenue, Moorabbin VIC 3189
Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215
Tel: (03) 9555 6995 Fax: (03) 9553 1394
www.pardoengineering.com.au

Title Photographs
Locality NCCEC Project
Jacksons Road
Portsea, Victoria
Dwg. No 211964/1 Photos
Prepared by KG 5/07/2021
Checked by LRP 19/07/2021

Geotechnical Investigation
Investigation date: 30/06/2021

Project: 211964 NCCEC Project/1

Sheet No Photo 4 **File** 211964-1 Photos.xlsm

Geotechnical Investigation - Jacksons Road

Photo 25: Location of borehole 6.

Photo 26: Borehole 6 SPT sample at 1.0m, Silty SAND.

Photo 27: Soil profile of borehole 6 at 2.5m

Photo 28: Borehole 6 SPT sample at 2.5m, Silty SAND.

Photo 29: Borehole 6 SPT sample at 4.0m, Clayey SAND/Sandy CLAY.

Photo 12: Borehole 6 SPT sample at 5.5m, Clayey SAND.

LR Pardo & Associates

Consulting Civil & Geotechnical Engineers

Melbourne: 2 Alex Avenue, Moorabbin VIC 3189

Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215

Tel: (03) 9555 6995 Fax: (03) 9553 1394

www.pardoengineering.com.au

Title	Photographs
Locality	NCCEC Project Jacksons Road Portsea, Victoria
Dwg. No	211964/1 Photos
Prepared by	KG 5/07/2021
Checked by	LRP 19/07/2021

Geotechnical Investigation

Investigation date: 30/06/2021

Project: 211964 NCCEC Project/1

Sheet No	Photo 5	**File**	211964-1 Photos.xlsm

Geotechnical Investigation - NCCEC Project

Photo 1: Overview viewing east down Jacksons Road.

Photo 2: Set-up over Borehole 7.

Photo 3: Auger spoil material from Borehole 7.

Photo 4: Borehole 7 spoil. Silty SAND.

Photo 5: Soil spoil of Borehole 7. Silty SAND.

Photo 6: Excavated soil material form Borehole 7.

LR Pardo & Associates
Consulting Civil & Geotechnical Engineers
Melbourne: 2 Alex Avenue, Moorabbin VIC 3189
Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215
Tel: (03) 9555 6995 Fax: (03) 9553 1394
www.pardoengineering.com.au

Title Photographs
Locality NCCEC Project
Jacksons Road
Portsea, Victoria
Dwg. No 211964/2 Photos

Prepared by	AO	12/04/2022
Checked by	AJ	27/04/2022

Geotechnical Investigation
Investigation date: 08/04/2022

Project: 211964 NCCEC Project/2

Sheet No Photo 1

File 211964-2 Photos.xlsm

Geotechnical Investigation - NCCEC Project

Photo 7: Overview of location of Borehole 8.

Photo 8: Borehole 8 location.

Photo 9: Reinstated Borehole 8.

Photo 10: Soil spoil from Borehole 8. Silty SAND.

Photo 11: Excavated soil material form Borehole 8.

Photo 12: Borehole 8 spoil. Silty SAND.

LR Pardo & Associates
Consulting Civil & Geotechnical Engineers
Melbourne: 2 Alex Avenue, Moorabbin VIC 3189
Geelong: 7 Fairlie Street, Hamlyn Heights VIC 3215
Tel: (03) 9555 6995 Fax: (03) 9553 1394
www.pardoengineering.com.au

Title Photographs
Locality NCCEC Project
Jacksons Road
Portsea, Victoria
Dwg. No 211964/2 Photos
Prepared by AO 12/04/2022
Checked by AJ 27/04/2022

Geotechnical Investigation
Investigation date: 08/04/2022

Project: 211964 NCCEC Project/2

Sheet No Photo 2 **File** 211964-2 Photos.xlsm