Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC ref: 2006/2912

Mr Michael McErlean
Planning & Approvals Manager
North Harbour Holdings Pty Ltd
44 Brook Crescent, Burpengary East Qld 4505

Approval of Action Management Plan for North East Business Park Project, Caboolture River, Queensland

Dear Mr McErlean,

Thank you for your email dated 29 July 2024 to the Department of Climate Change, Energy, the Environment and Water (the department), seeking approval of an Action Management Plan for North East Business Park, in accordance with Condition 9 of approval 2006/2912 under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Officers of the department have advised me on the Action Management Plan and the requirements of the conditions of the approval for this project. On this basis, and as a delegate of the Minister for the Environment and Water (the Minister), I have decided to approve the *Land Based Environmental Management Plan - Sub-Plan 08 - North East Business Park - Mixed Industry and Business Area Bulk Earthworks,* Version RW2, dated 13 February 2025. This plan must now be implemented.

As you are aware, the department has an active monitoring program which includes monitoring inspections, desk top document reviews and audits. Please ensure that you maintain accurate records of all activities associated with, or relevant to, the conditions of approval so that they can be made available to the department on request.

Should you require any further information please contact Tony Dowd by email to PostApproval@dcceew.gov.au.

Yours sincerely



Brendan Linton-Smith
Director Post Approvals (QLD, NT and SA)
Environment Assessments (Vic and Tas) and Post Approvals Branch
Nature Positive Regulation Division
21 February 2024

JWA PTY LTD
Ecological Consultants
ABN 56 066 448 879

LAND BASED ENVIRONMENTAL MANAGEMENT PLAN - SUB-PLAN 08

Hardwood Drive, North Harbour
North East Business Park Mixed Industry and Business Area
Bulk Earthworks

Lot 2 SP320619
Burpengary East

A Report Prepared for
North Harbour Holdings Pty Ltd

FEBRUARY 2025

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DOCUMENT CONTROL

Document

Title	Land Based Environmental Management Plan – Sub-Plan 08 Hardwood Drive, North Harbour – North East Business Park Mixed Industry and Business Area Bulk Earthworks
Job Number	Q15003
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Version and Date	RW2 13/02/25
Client	North Harbour Holdings Pty Ltd

Revision History **(office use only)**

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Client Issue

Version	Date	Author		Approved by	
		Name	Initials	Name	Initials
RW1	19/12/24	Nicole Davies	ND	Adam McArthur	AM
RW2	13/02/25	Nicole Davies	ND	Adam McArthur	AM

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1 INTRODUCTION

1.1 Background

JWA Pty Ltd have been engaged by North Harbour Holdings Pty Ltd (formerly North East Business Park Pty Ltd) to complete a Land Based Environmental Management Plan (LBEMP) for the proposed bulk earthworks associated with the Mixed Industry and Business Area (MIBA). The site is located east of Hardwood Dr, Morayfield and is formally described as Lot 2 SP320619 (**FIGURE 1**). The site is approximately 26.5 ha. An aerial photograph of the site is shown in **FIGURE 2**.

The subject site has a preliminary approval for development allowing mixed industry, business area precincts, open space and related purposes (Court Order no. 911 of 2015, Council Ref. MCU-2002-1079). The proposed bulk earthworks are being undertaken under this current preliminary approval.

In accordance with Condition 9 of the EPBC Approval (Ref: EPBC 2006/2912) the NEBP development is to be undertaken in accordance with the provisions of a Land Based Environmental Management Plan (LBEMP), approved by the Commonwealth Minister for the Environment, so as to ensure potential impacts to Matters of National Environmental Significance (MNES) are appropriately managed.

The following LBEMPs have previously been prepared for the NEBP and approved by the Commonwealth Minister for the Environment:

- *North East Business Park – Land Based Environmental Management Plan for Matters of National Environmental Significance (Version 2)* prepared by Cardno and dated 31 January 2014 (LBEMP for MNES v2 (Cardno, 2014)), which comprises the overarching LBEMP for the NEBP development and provides specifications for the preparation of LBEMP Sub-Plans for specific programs of approved works that are to be undertaken as part of the orderly and staged establishment of the NEBP development – approved on 17th February 2014;
- *North East Business Park – LBEMP Sub-Plan 01 (Version 2)* prepared by Cardno and dated 31 January 2014 (LBEMP Sub-Plan 01), which comprises an LBEMP Sub-Plan prepared in accordance with the specifications of the LBEMP for MNES v2 (Cardno 2014) and addressing the works program associated with preliminary works within part of the Mixed Industry and Business Area (MIBA) – approved on 17th February 2014;
- *North East Business Park – LBEMP Sub-Plan* prepared by Future-Plus Environmental and dated 22 August 2014 (LBEMP Sub-Plan 02), which comprises an LBEMP Sub-Plan prepared in accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the works program associated with preliminary works within Phase 1 of the Residential West Area (RWA) – approved on 25th August 2014;
- *North East Business Park – LBEMP Sub-Plan* prepared by JWA Pty Ltd and dated 8 July 2015 (LBEMP Sub-Plan 03), which comprises an LBEMP Sub-Plan prepared in



LEGEND

- LBEMP Sub-plan 08 Site Boundary
- NEBP Site Boundary

N

Scale 1:40 000

0 400m 800m 1200m 1600m 2000m

SOURCE: Google Maps

SCALE: 1 : 40 000 @ A3

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NEBP Hardwood Drive Bulk Earthworks
Hardwood Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 1

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TITLE

LOCALITY PLAN



LEGEND

- LBEMP Sub-plan 08 Site Boundary
- NEBP Site Boundary

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Scale 1 : 6000

0 100m 200m 300m

SOURCE: Metro Maps Aerial dated 04/06/24

SCALE: 1 : 6000 @ A3

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FIGURE 2

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TITLE

AERIAL PHOTOGRAPH

accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the works program associated with preliminary works within Phase 2 of the Residential West Area (RWA) – approved on 28th July 2015; and

- *North East Business Park – LBEMP Sub-Plan 04* prepared by JWA Pty Ltd and dated 13th June 2016, prepared in accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the works program associated with works within Phases 3-7 of the RWA – approved on 17th June 2016. Sub-Plan 04 was subsequently updated to include heritage areas and an extension to the borrow pit area, with the updated plan approved in September 2017.
- *North East Business Park – LBEMP Sub-Plan 05* prepared by JWA Pty Ltd and dated 28th March 2018, prepared in accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the works program associated with works to install the sewer line to service the NEBP development.
- *North East Business Park – LBEMP Sub-Plan 06* prepared by JWA Pty Ltd and dated 17th December 2020, prepared in accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the works program associated with the Mixed Industry and Business Area (MIBA) and the Raff Creek Crossing bulk earthworks – approved by the Commonwealth Minister for the Environment on 4th January 2021.
- *North East Business Park – LBEMP Sub-Plan 07* prepared by JWA Pty Ltd and dated 17th December 2020, prepared in accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the works program associated with flood mitigation works – approved by the Commonwealth Minister for the Environment on 23rd August 2021.
- *North East Business Park – Revised LBEMP Sub-Plan 06* prepared by JWA Pty Ltd and dated 22nd January 2024, prepared in accordance with the specifications of the LBEMP v2 (Cardno 2014) and addressing the revised (based on updated flood modelling for the NEBP site) earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works – approved by the Commonwealth Minister for the Environment on 20th September 2024.

FIGURE 3 shows the extent of current and previous LBEMP areas on the subject site.

1.2 Site Description

The majority of the site is highly disturbed and has been the subject of previous land clearing, livestock grazing and plantation forestry activities.

The works area has been largely cleared of native vegetation (**FIGURE 4**). The area previously cleared currently consists of grassland, with vegetation dominated by a range of introduced pasture grasses. Retained vegetation to the south and west of the works area consist of *Melaleuca quinquenervia* open forest and *Eucalyptus racemosa subsp. racemosa* woodland, respectively. Weeds are being actively managed as part of the approved MIBA works.



N

LEGEND

- LBEMP Sub-plan 08 Site Boundary - Hardwood Drive Bulk Earthworks
- NEBP Site Boundary
- LBEMP Sub-plan 07 Extent - Flood Mitigation Works
- LBEMP Sub-plan 06 Revised Extent
  - MIBA (remaining areas) - Bulk Earthworks
  - Raff Creek Crossing & Connection
- LBEMP Sub-plan 05 Extent - Sewer Pump Station SPS-BGY017 (PS3) Reticulation Network
- LBEMP Sub-plan 04 Extent
  - Residential West Area - Balance (Phases 3-7)
  - Borrow Areas
  - Heritage Works
- LBEMP Sub-plan 03 Extent
  - Residential West Area - Phase 2
  - Compensatory Cut / Restoration Area
  - Constructed Wetland
- LBEMP Sub-plan 02 Extent - Residential West Area Phase 1
- LBEMP Sub-plan 01 Extent - MIBA (part of) Vegetation Clearing Works

Scale 1 : 15 000

0 200m 400m 600m

SOURCE: Metro Maps Aerial dated 18/06/23

SCALE: 1 : 15 000 @ A3

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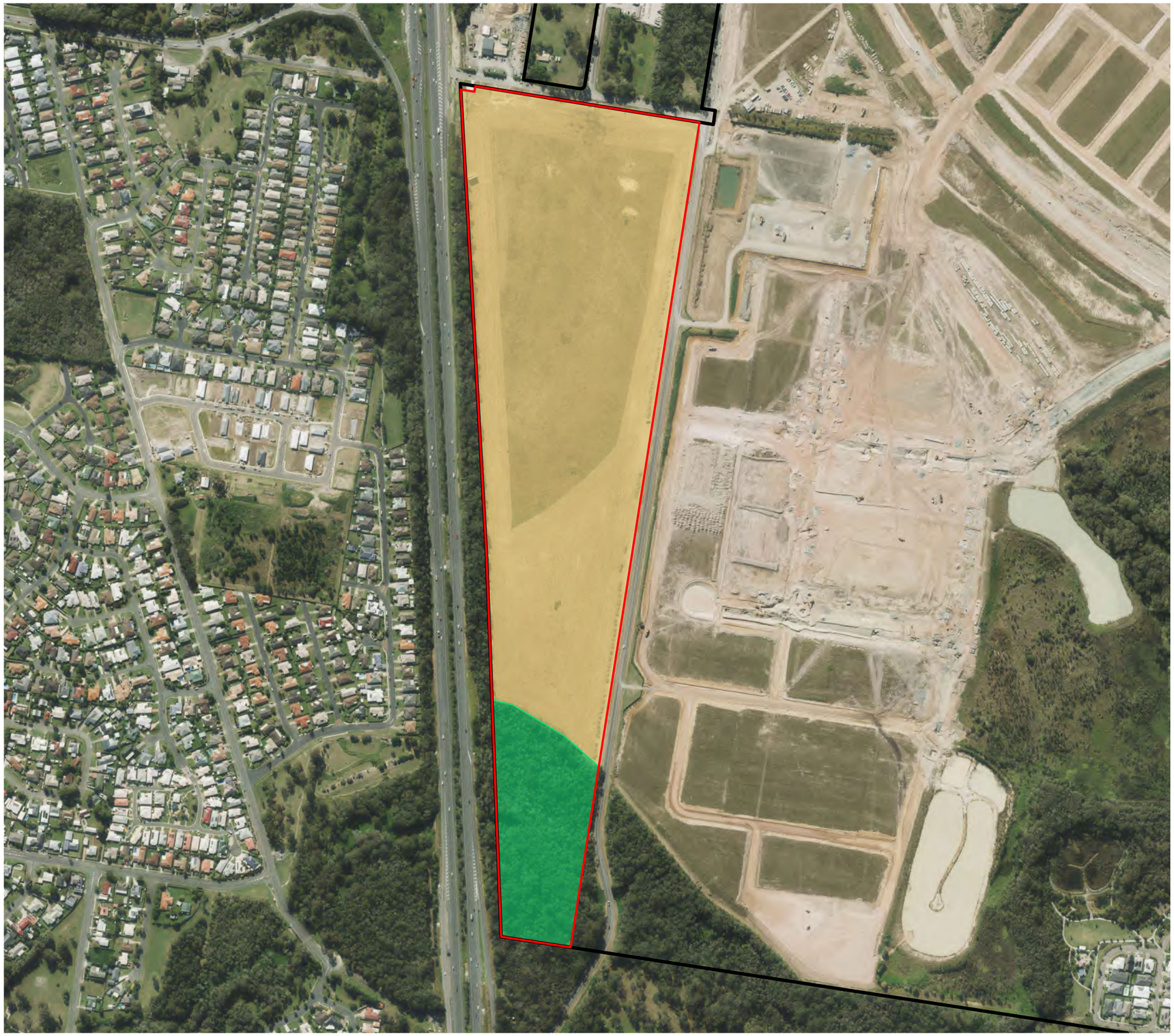
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FIGURE 3

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TITLE

EXTENT OF CURRENT & PREVIOUS LBEMP AREAS



LEGEND

- LBEMP Sub-plan 08 Site Boundary
- NEBP Site Boundary

Vegetation Communities

- Disturbed terrestrial grassland with scattered regrowth
- *Melaleuca quinquenervia* and *Eucalyptus racemosa* subsp. *racemosa* mixed woodland

Scale 1 : 6000

0 100m 200m 300m

SOURCE: JWA Site Investigations; Metro Maps Aerial dated 04/06/24

SCALE: 1 : 6000 @ A3

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FIGURE 4

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TITLE

VEGETATION COMMUNITIES

1.3 Scope and Objectives

This LBEMP provides a structured management plan with the objective of minimising the impacts of the approved works program on MNES.

Specifically, the LBEMP addresses the bulk earthworks associated with the MIBA site, and provides:

- An overview of the location and nature of the approved program of works that is the subject of this LBEMP;
- An assessment of the likelihood of occurrence of MNES within or adjacent to the works site;
- An assessment of the risk that the works program represents to relevant MNES; and
- Environmental management specifications for those aspects of the works program that are associated with a Medium to Extreme risk of harm to one or more MNES.

1.4 Roles and Responsibilities

It is the responsibility of North Harbour Holdings Pty Ltd (the Developer) to ensure that all tasks described in this LBEMP are completed within the specified timeframes.

The Developer is to ensure that all employees and contractors involved in the NEBP development works are aware of, and contractually required to comply with, the requirements of the overarching LBEMP for MNES v2 and this LBEMP Sub-Plan 08.

In the preparation of this LBEMP Sub-Plan 08, the services of an appropriately qualified and experienced ecologist have been engaged for the purposes of determining:

- The risk of negative impacts on MNES within the impact area; and
- Environmental management measures required to minimise, to the greatest extent practicable, any adverse impacts on MNES.

1.5 Compliance with EPBC Act Approval Condition 9

Condition 9	Compliance
The person taking the action must prepare and submit a Land-Based Environmental Management Plan (LBEMP) for the Minister's approval. The LBEMP must include, but not be limited to, the following:	
a. Measures to minimise impacts on EPBC Act listed threatened species, including measure to care for injured fauna and a vegetation clearing strategy	Management measures to minimise impacts on EPBC Act listed threatened species are included in **SECTION 4**. Management measures include tasks, actions and timing. This section also provides a rationale, objectives/targets and performance indicators to ensure the management measures are effective.

Condition 9	Compliance
	Element 2: Fauna (**SECTION 4.2**) and Element 3: Koalas (**SECTION 4.3**) detail measures to care for injured fauna and koalas, respectively, and provides a clearing strategy that includes: - Pre-clearance surveys; - Provisions of a licenced fauna spotter/catcher; - Ensuring vegetation clearance works comply with the procedures of Policy 6: Vegetation Clearing Practices of the Nature Conservation (Koala) Conservation Plan 2017; and - Vegetation clearance is conducted in a sequential manner in order to direct Koalas and other fauna away from threatening processes or hostile environments (e.g. roads) and towards any retained vegetation or habitat links.
b. Measures to limit the spread of pests and invasive species	Measures to limit the spread of pests and invasive species are included in Element 5: Weeds and Pests (**SECTION 4.5**). Management measures include tasks, actions and timing. This section also provides a rationale, objectives/targets and performance indicators to ensure the management measures are effective. Management measures include: - Identify specific areas of pest infestation; - Manage pest infestations within the works site; - Minimise the introduction and dispersal of pest species; - Record keeping; and - Corrective actions
c. Sediment and erosion controls	Sediment and erosion control measures are included in Element 6: Soil Erosion, Sediment Loss and Water Quality (**SECTION 4.6**). Management measures include tasks, actions and timing. This section also provides a rationale, objectives/targets and performance indicators to ensure the management measures are effective.
d. Measures to implement, monitor, or improve (should deficiencies be identified) the LBEMP	**SECTION 5** details the non-conformance and corrective action procedures should deficiencies be identified.

2 DESCRIPTION OF APPROVED WORKS PROGRAM

2.1 Description of Works Site

The proposed works covered by this LBEMP Sub-Plan 08 involves the following:

- Bulk earthworks associated with the MIBA area – within Lot 2 SP320619 (Hardwood Drive).

The works area covers a total area of approximately 26.5 ha. The extent of the Hardwood Drive bulk earthworks area is shown in **FIGURE 5**.

It should be noted that parts of the MIBA Bulk Earthworks area have been covered by previous LBEMP Sub-Plans.

The MIBA area has been included in a number of ecological assessments including:

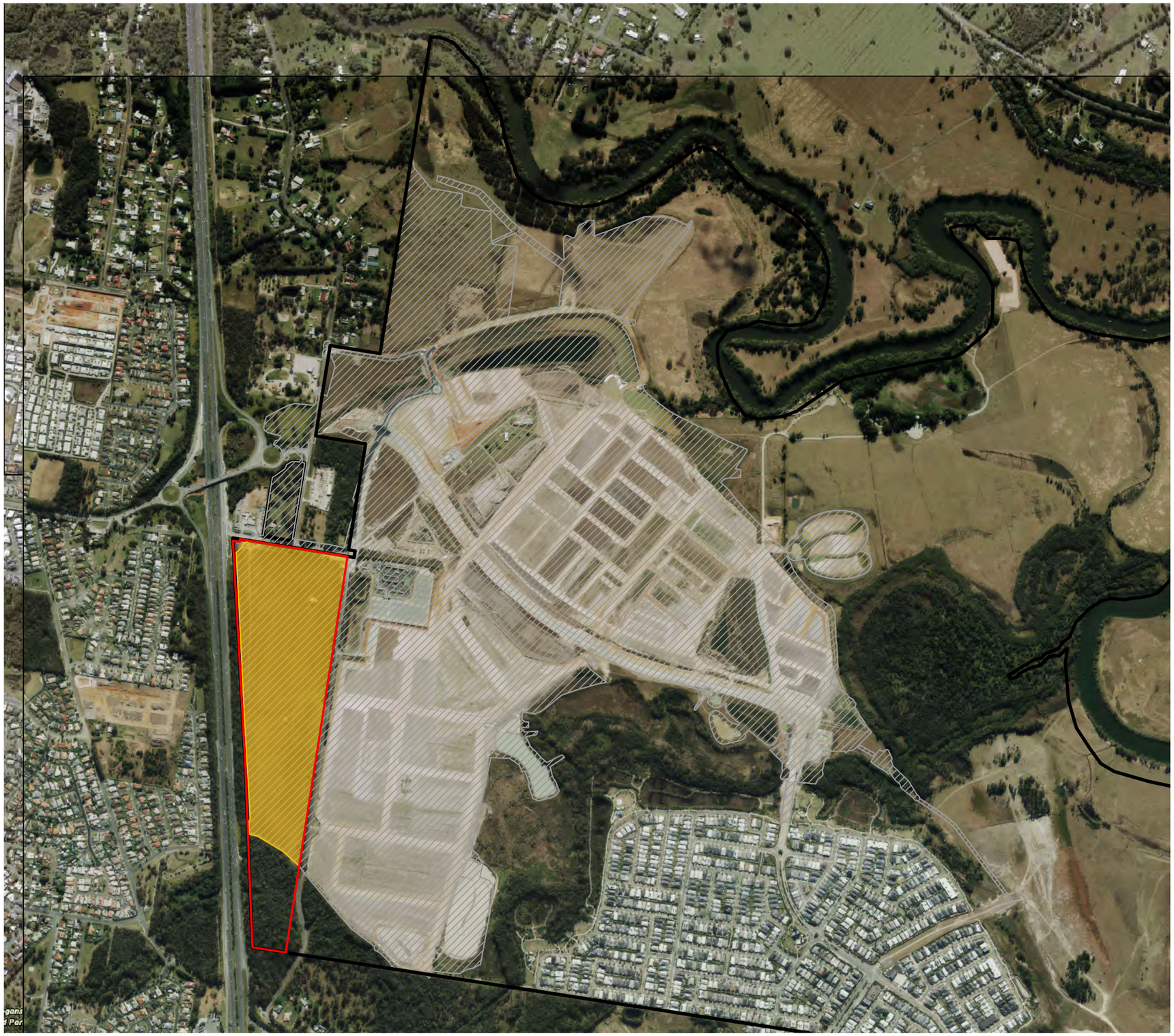
- Terrestrial Ecology Assessment Report – Northeast Business Park (Cardno 2007);
- Ecological Assessment Report: NEBP – Residential West RoL (Cardno 2014);
- Wetland Mapping Report: North East Business Park Residential West Area (JWA 2015);
- Significant Residual Impact Assessment – Marine Plants, North East Business Park Raff Creek Crossing (JWA 2019a);
- Significant Residual Impact Assessment – Marine Plants, North East Business Park MIBA Bulk Earthworks (JWA 2019b); and
- Revised Vegetation Management Plan – North Harbour MIBA Bulk Earthworks (JWA 2024d).

The majority of the works site has been subject to vegetation clearing as part of the approved MIBA works. The area previously cleared currently consists of grassland, with vegetation dominated by a range of introduced pasture grasses. Retained vegetation to the south and west of the works area consist of *Melaleuca quinquenervia* open forest and *Eucalyptus racemosa subsp. racemosa* woodland, respectively. Weeds are being actively managed as part of the approved MIBA works.

Overall, the works site has experienced substantial disturbance as a result of previous land uses, which has severely degraded the ecological values of the area.

2.2 Description of Works Program

FIGURE 5 shows the vegetation communities and habitat types proposed to be removed from within the works site.



LEGEND

- LBEMP Sub-plan 08 Site Boundary
- NEBP Site Boundary
- Hardwood Drive Bulk Earthworks - Extent of Works
- MIBA Bulk Earthworks - Extent of Works

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: KN Group (Ref: FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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FIGURE 5

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BULK EARTHWORKS EXTENT

2.3 Summary of Works Program

A summary of the works site and works program covered by this LBEMP Sub-Plan 08 is provided in **TABLE 1**.

TABLE 1
DESCRIPTION OF APPROVED WORKS PROGRAM ASPECT DESCRIPTION

Aspect	Description	Figure/Plan Reference
Works Site Description	MIBA (Hardwood Drive) – Lot 2 SP320619.	Refer to **FIGURES 4 - 5.**
Works Site Area	Approximately 26.5 ha	**FIGURE 5.**
Vegetation (Habitat) Types within Works Site	Currently vegetation communities present within the works site include: • Disturbed terrestrial grassland with scattered regrowth: 22.5 ha; • *Melaleuca quinquenervia* and *Eucalyptus racemosa subsp. racemosa* mixed woodland: 4.0 ha.	Refer to **FIGURE 4.**
Nature and Extent of Vegetation Clearance Works	The following vegetation types will be cleared as part of the works program: • Disturbed terrestrial grassland with scattered regrowth: 22.5 ha. The clearance of non-remnant vegetation will be subject to the same controls as outlined in the EPBC approval.	Refer to **FIGURE 6 -** Impacts**.**
Nature and Extent of Bulk Earthworks	Proposed works involves the following: • Bulk earthworks of cut and fill associated with the MIBA area.	Refer to **FIGURE 5.**
Nature and Extent of Road Works	N/A	N/A
Nature and Extent of Infrastructure and Building Works	The proposal is for bulk earthworks only.	N/A
Nature and Extent of Landscaping Works	NA	NA
Nature and Extent of Restoration Works	A "MIBA Bulk Earthworks - Site Stabilisation Plan / Ecological Restoration Plan" is required by relevant local government Approval conditions. Retained Vegetation to be managed in accordance with the approved Site Rehabilitation Plan - Open Space Areas A, B and C1 (JWA 2024a).	**APPENDIX 1** **APPENDIX 2**

Aspect	Description	Figure/Plan Reference
Relevant State and Local Government Approvals	The Bulk Earthworks has been approved by Moreton Bay Regional Council. As part of the approval process, the State's advice has been received and incorporated into the Council's conditions of approval.	N/A
Timing and Duration of Works Program	**Commencement: Early 2025** **Complete: Mid 2025**	N/A



LEGEND

- LBEMP Sub-plan 08 Site Boundary
- NEBP Site Boundary
- Hardwood Drive Bulk Earthworks - Extent of Works

Vegetation Communities

- Disturbed terrestrial grassland with scattered regrowth
- *Melaleuca quinquenervia* and *Eucalyptus racemosa* subsp. *racemosa* mixed woodland

N

Scale 1 : 6000

0 100m 200m 300m

SOURCE: JWA Site Investigations; KN Group (Ref: FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 04/06/24
SCALE: 1 : 6000 @ A3

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FIGURE 6

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TITLE

VEGETATION CLEARANCE PLAN

3 MNES RISK ASSESSMENT

3.1 Introduction

For each works program forming part of the NEBP development, the approved overarching LBEMP for MNES v2 (Cardno 2014) requires a risk assessment of potential adverse impacts of the works program on MNES (**TABLE 2**). Table 3-2 of Section 3.3 of the LBEMP for MNES v2 (Cardno 2014) specifies the MNES that are to be considered by the LBEMP.

In order to ensure that current environmental requirements are being suitably addressed, an updated search of the Commonwealth EPBC Act Protected Matters Search Tool (PMST) has been completed to provide an up-to-date list of protected matters that may occur within a 5 km radius of the site. The suitability of the habitats on the site for listed threatened flora and fauna species and migratory species identified in database search was also assessed to determine which of those species could potentially occur on the site.

This MNES Risk Assessment for the works program the subject of this LBEMP Sub-Plan 08 has been completed based on consideration of:

- The likelihood of occurrence of specific MNES within or adjacent to the approved works site; and
- The risk assessment framework contained within Section 4 of the LBEMP for MNES v2 (Cardno 2014).

3.2 Likelihood of Occurrence Assessment

The likelihood of occurrence of MNES was based on the results of site assessments, as well as a review of the Ecological Assessment Report – NEBP Residential West RoL dated 12th June 2014 (Cardno 2014).

TABLE 2
ASSESSMENT OF LIKELIHOOD OF OCCURRENCE

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
FLORA			
Acacia attenuata	Whipstick Wattle	This species occurs on flat coastal lowland plains, at altitudes of lower than 30 m above sea level. Across this range *A. attenuata* typically occurs in seasonally waterlogged areas of wet heathland or heathland margins, open forest and woodland communities, and specifically on sandy poorly drained soils or peat swamps which are infertile. *Acacia attenuata* has been recorded growing in shrublands with *Leptospermum whitei* and *Baeckea frutescens*; in wallum with *Banksia aemula* and *Eucalyptus robusta*; in woodlands with *Corymbia trachyphloia, E. umbra* and *Banksia oblongifolia*; and in open forests of *E. umbra, E. racemosa* and *Melaleuca quinquenervia*. *Acacia attenuata* has been found in disturbed environments, such as roadsides subject to vegetation control, indicating the potential for a wide distribution within its range (DoE 2016).	**Low**. This species has not previously been recorded on the NEBP site. *Melaleuca* tree swamps provide potentially suitable habitat but do not occur within the MIBA impact area.
Acronychia littoralis	Scented acronychia	Scented acronychia are generally found along the margins of littoral rainforest, including the transition zones between littoral rainforests and swamp sclerophyll or cypress pine communities.	**Low**. Suitable habitat for this species was not observed in the locality.
Arthraxon hispidus	Hairy Joint Grass	Hairy-joint Grass is found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps, as well as woodland. In south-east Queensland, Hairy-joint Grass has also been recorded growing around freshwater springs on coastal foreshore dunes, in shaded small gullies, on creek banks, and on sandy alluvium in creek beds in open forests, and also with bog mosses in mound springs (DoE 2016).	**Low / Moderate**. This species has not previously been recorded on the NEBP site. *Melaleuca* tree swamps provide potentially suitable habitat but do not occur within the MIBA area.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Bosistoa transvera	Three-leaved bosistoa	Occurs in lowland subtropical rainforest up to 300m above sea level. In the Gold Coast hinterland it grows on reddish loam over basalt rock on a very steep slope in complex notophyll vine forest with emergent Brush Box (*Lophostemon confertus*). Associated canopy species include White Booyong, Soft Corkwood (*Caldcluvia paniculosa*), Rosewood (*Dysoxylum fraserianum*), Yellow Carabeen (*Sloanea woollsii*) and Giant Water Gum (*Syzygium francisii*). At Buderim, Queensland, it has been found in remnant vine forest pockets within highly disturbed and weed infested habitats on a site with varying slope, from relatively flat to a steep scree slope. The species appears to occur only in areas that have experienced minimal disturbance (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Cryptocarya foetida	Stinking cryptocarya	Occurs in coastal sands, or close to the coast, occurring in littoral rainforest on old sand dunes and subtropical rainforests over slate and occasionally on basalt to an altitude of 150 m. Associated species include *Syzygium hemilamprum* (Broad-leaved Lilly Pilly), *Acronychia imperforata* (Beach Acronychia*), Cryptocarya triplinervis* (Three-veined Laurel), *Cupaniopsis anacardioides* (Tuckeroo), *Flindersia bennettiana* (Bennet's Ash*), Lophostemon confertus* (Brush Box) and *Syzygium luehmannii* (Small-leaved Lilly Pilly). Distribution, Iluka on the north coast of New South Wales, to Fraser Island in Queensland (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Cryptostylis hunteriana	Leafless tongue orchid	The Leafless Tongue-orchid has been reported to occur in a wide variety of habitats including heathlands, heathy woodlands, sedgelands, *Xanthorrheoa spp*. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests (grassy sub-formation). Soils are	**Low**. This species has not previously been recorded on the NEBP site. *Melaleuca* tree swamps provide potentially suitable habitat but do not occur within the MIBA impact area.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		generally considered to be moist and sandy, however, this species is also known to grow in dry or peaty soils (DoE 2016).	
Cupaniopsis shirleyana	Wedge-leaf tuckeroo	The Wedge-leaf tuckeroo occurs in various dry rainforest habitats, including riverbanks and hillside vine thickets (DoE, 2020).	**Low**. Suitable habitat for this species was not observed in the locality.
Macadamia integrifolia	Macadamia nut	Occurs in remnant rainforest, including complex mixed notophyll forest, and prefers partially open areas such as rainforest edges. This species can occur in areas with slopes ranging from level to steep and in a wide range of landforms including hill crests, hill slopes, scree slopes and foot slopes, gullies, benches and terrace plains. Occurs at altitudes ranging from 5–340m above sea level (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Macadamia ternifolia	Bopple nut	Occurs in lowland warm complex notophyll vine forest and *Araucarian* notophyll vine forest on basic and intermediate volcanic soils and alluvia in higher rainfall areas of south-east Queensland. This species generally occurs in south-facing gullies with fertile, basalt-derived krasnozem soils or the interface between sandstone and basalt krasnozems. Surface soils tend to be dark, of varying textures (sandy loams to light clays), slightly acid (pH 5.5–7.0) and well drained (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Macadamia tetraphylla	Rough-shelled bush nut	Occurs in subtropical rainforest and complex notophyll vineforest, at the margins of these forests and in mixed sclerophyll forest. It occurs in restricted habitat, growing on moderate to steep hillslopes on alluvial soils at well-drained sites. This species growing at altitudes ranging from 10 to 460m ASL (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Notelaea lloydii	Lloyd's Olive[#]	Lloyd's Olive is found in the ecotone between eucalypt open forests and vine thickets at 80-480 m above sea level. The species occurs on undulating to hilly terrain either in moist gullies or on gentle to steep dry slopes, but is rarely found on rocky outcrops.	**Low.** This species was not located during recent site surveys and suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Persicaria elatior	Tall knotweed	Knotweeds grow in damp environments including coastal swamps, watercourses, lakes, damp forests and disturbed areas (NSW DECCW, 2005).	**Low.** While low lying damp areas occur on site, these are heavily disturbed by previous approved clearing and invasion of exotic grasses.
Phaius australis	Lesser Swamp Orchid	The Lesser Swamp-Orchid is commonly associated with coastal wet heath/sedgeland wetlands, swampy grassland or swampy forest and often where Broad-leaved paperbark or Swamp mahogany are found. Typically, the Lesser swamp-orchid is restricted to the swamp-forest margins, where it occurs in swamp sclerophyll forest (Broad-leaved paperbark/Swamp mahogany/Swamp box (*Lophostemon suaveolens*)), swampy rainforest (often with sclerophyll emergents), or fringing open forest. It is often associated with rainforest elements such as Bangalow palm (*Archontophoenix cunninghamiana*) or Cabbage tree palm (*Livistona australis*) (DoE 2016).	**Low**. This species has not previously been recorded on the NEBP site. *Melaleuca* tree swamps provide potentially suitable habitat but are not present within the MBA impact area.
Phaius bernaysii	Yellow swamp-orchid	Occurs along the margins between open forest/woodland and closed sedgeland, along the perimeter of a swamp, often in a fairly shady environment in *Melaleuca quinquenervia–Eucalyptus robusta* open forest in sandy or peaty soil. This species is currently known to occur only in one area on Stradbroke Island, near Myora in Queensland (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Planchonella eerwah	Shiny-leaved Condoo[#]	The species grows in subtropical rainforest, dry rainforest and Hoop Pine (*Araucaria cunninghamii*) vine scrub.	**Low.** This species was not located during recent site surveys and suitable habitat for this species was not observed in the locality.
Rhodamnia rubescens	Scrub Turpentine[#]	This species commonly occurs in all rain forest subforms except cool temperate rainforest. The species occupies a range of volcanically derived and sedimentary soils and is a common pioneer species in	**Low.** This species was not located during recent site surveys and

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		eucalypt forests. Populations and individuals of this species are often found in wet sclerophyll associations in rainforest transition zones.	suitable habitat for this species was not observed in the locality.
Rhodomyrtus psidioides	Native Guava[#]	Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines (OEH 2021).	**Low.** This species was not located during recent site surveys and suitable habitat for this species was not observed in the locality.
Samadera bidwillii	Quassia	Occurs in lowland rainforest or on rainforest margins, but it can also be found in other forest types, such as open forest and woodland. This species is commonly found in areas adjacent to both temporary and permanent watercourses in locations up to 510m altitude. The species occurs on lithosols, skeletal soils, loam soils, sands, silts and sands with clay subsoils. Commonly associated tree species include Spotted Gum (*Corymbia citriodora*), Grey Gum (*Eucalyptus propinqua*), White Mahogany (*E. acmenoides*), Forest Red Gum (E. *tereticornis*), Pink Bloodwood (C. *intermedia*), an ironbark (*E. siderophloia*), Gum Topped Box (*E. moluccana*), Gympie Messmate (*E. cloeziana*), and Broad Leaved Ironbark (*E. fibrosa*) (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Sophora fraseri	Brush sophora	This species grows in moist habitats, often in hilly terrain at altitudes from 60–660m on shallow soils along rainforest margins in eucalypt forests or in large canopy gaps in closed forest communities (Dept. Environment 2012). Occurs in wet sclerophyll forest and a range of rainforest types on shallow stony to shaly soils, of loam to clay texture derived from sandstone or basalt rocks. Associated species include: *Corymbia citriodora, Eucalyptus carnea, E. microcorys, E. acmenoides, E. propinqua* and *Lophostemon confertus*. The shrub appears to prefer growing along rainforest margins, in eucalypt forests in the vicinity of rainforests or in large canopy gaps in closed forest communities (DEHP 2013).	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Thesium australe	Austral toadflax	Austral toadflax is semi-parasitic on roots of a range of grass species, notably Kangaroo Grass (*Themeda triandra*). It occurs in shrubland, grassland or woodland, often on damp sites, in subtropical, temperate and subalpine climates over a wide range of altitudes. It occurs on soils derived from sedimentary, igneous and metamorphic geology on a range of soils including black clay loams to yellow podzolics and peaty loams. Vegetation types include open grassy heath dominated by Swamp Myrtle (*Leptospermum myrtifolium*), Small-fruit Hakea (*Hakea microcarpa*), Alpine Bottlebrush (*Callistemon sieberi*), Woolly Grevillea (*Grevillea lanigera*), Coral Heath (*Epacris microphylla*) and *Poa* spp.; Kangaroo Grass grassland surrounded by Eucalyptus woodland; and grassland dominated by Barbed-wire Grass (*Cymbopogon refractus*) (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Triunia robusta	Glossy spice bush	A species usually found in subtropical rainforest.	**Low.** Suitable habitat for this species was not observed in the locality.
Zieria exsul	Banished Stink Bush[#]	Zieria exsul is restricted to lowland wallum woodland and open forest on sandy substrates that are often seasonally waterlogged.	**Low.** This species was not located during recent site surveys and suitable habitat for this species was not observed in the locality.
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Anseranas semipalmata	Magpie Goose	The Magpie goose occurs mainly in coastal and sub-coastal areas of northern Australia. The species is now a rare vagrant in NSW. It generally inhabits open lakes, swamps and permanent wetlands which are dominated by rush and sedge vegetation, with grasslands nearby.	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Anthochaera phrygia	Regent Honey-eater	Regent Honeyeaters mostly occur in dry Box-Ironbark eucalypt woodland and dry sclerophyll forest associations in areas of low to moderate relief, wherein they prefer moister, more fertile sites available, for example along creek flats, or in broad river valleys and foothills. At times of food shortage (e.g. when flowering fails in preferred habitats), Regent Honeyeaters also use other woodland types and wet lowland coastal forest dominated by Swamp Mahogany (*Eucalyptus robusta*) or Spotted Gum (*Corymbia maculata*) (DoE 2016). Regent Honeyeaters usually nest in the canopy of forests or woodlands, and in the crowns of tall trees, mostly eucalypts. Studies in the Bundarra-Barraba region indicate that birds actively select the tallest trees available to nest in. Nests in riparian sites are mostly built in rough-barked trees. Nests in woodland sites vary according to the availability of rough-barked trees: in woodlands dominated by rough-barked species (e.g. ironbarks), nests are placed in rough-barked trees; in woodlands where rough-barked trees are scarce (e.g. those dominated by White Box), nests are placed mostly in smooth-barked species (DoE 2016.)	**Low**. Suitable habitat for this species was not observed in the locality.
Apus pacificus	Fork-tailed Swift	This species occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (Higgins 1999). They forage aerially, up to hundreds of metres above ground, but also less then 1 m above open areas or over water. They probably roost aerially, but are occasionally observed to land. They are widespread but scattered in coastal areas from 20° S, south to	**Moderate**. This species may forage over the site.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		Brisbane and in much of the south south-eastern region (Dept. Environment 2012).	
Ardea alba	Great egret	This species inhabits a wide range of wetland habitats including swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs. This species usually frequents shallow waters (Dept. Environment 2012).	**Moderate**. A small amount of foraging habitat for this species may occur within the open paddocks when wet.
Ardea ibis	Cattle egret	This species inhabits tropical and temperate grasslands, wooded lands and terrestrial wetlands. It uses predominately shallow, open and fresh wetlands including meadows and swamps with low emergent vegetation and abundant aquatic flora. This species often forages away from water on low lying grasslands, improved pastures and croplands. It is commonly found in cattle fields and other farm areas that contain livestock. This species roosts in trees, or amongst ground vegetation in or near lakes and swamps (Dept. Environment 2012).	**Moderate**. Foraging habitat for this species may occur within the open paddocks.
Argyreus hyberbius inconstans	Australian fritillary*	The Australian fritillary butterfly is restricted to open, swampy, coastal areas (i.e. *Melaleuca* wetlands) where the larval food plant, *Viola betonicifolia,* grows as a small, insignificant ground herb in association with *Lomandra longifolia* (long leaved matrush) and grasses, especially the grass *Imperata cylindrica* (bladey grass) (DEHP 2016).	**Low.** The larval food plant has not been observed on site to date, and suitable habitat does not occur within or immediately adjacent to the MIBA area.
Botaurus poiciloptilus	Australian bittern	This species occurs in terrestrial freshwater wetlands and, rarely, estuarine habitats. It favours wetlands with tall, dense vegetation, where it forages in still, shallow water up to 0.3m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. The species favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes	**Low.** Potential habitat for this species may be found within vegetation associated with the creek south of works area, however dense aquatic vegetation (sedges, rushes) was

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		and/or reeds (e.g. *Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus*) or cutting grass (*Gahnia*) growing over muddy or peaty substrate (Dept. Environment 2012).	not present in the vicinity of the MIBA impact area.
Calidris acuminata	Sharp-tailed Sandpiper	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season.	**Low.** This species has not previously been recorded in the NEBP area. Paddock areas within the works site provide some potential habitat for this species when flooded. However, the level of slashing that occurs across this areas has substantially reduced the quality of this potential habitat.
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo[#]	This species is associated with woodland or open sclerophyll forests with populations of Allocasuarina, which comprise its exclusive diet. They require large old trees with hollows for nesting.	**Low**. Suitable habitat for this species was not observed in the locality.
Chalinolobus dwyeri	Large-eared pied bat	This species requires a combination of sandstone cliff/escarpment to provide roosting habitat that is adjacent to higher fertility sites, particularly box gum woodlands or river/rainforest corridors which are used for foraging. Almost all records have been found within several kilometres of cliff lines or rocky terrain. Roosting has also been observed in disused mine shafts, caves, overhangs and disused Fairy martin (*Hirundo ariel*) nests. It also possibly roosts in the hollows of trees. The structure of primary nursery roosts appears to be very specific, i.e. arch caves with dome roofs (that need to be deep enough to allow juvenile bats to learn to fly safely inside) and with indentations in the roof (presumably to allow the capture of heat). These physical	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		characteristics are not very common in the landscape and therefore a limiting factor (Dept. Environment 2012).	
Climacteris picumnus victoriae	Brown Treecreeper[#]	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	**Low**. Suitable habitat for this species was not observed in the locality.
Coeranoscincus reticulatus	Three-toed Snake-tooth Skink[#]	This species inhabits rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. This species feeds on earthworms and beetle grubs and is found in leaf litter, often immediately adjacent to fallen tree trunks.	**Low**. Suitable habitat for this species was not observed in the locality.
Cuculus optatus	Oriental cuckoo	This species occurs in mixed, deciduous and coniferous forests, woodlands, and open paddocks with trees (Flegg, 2002).	**Low.** No suitable foraging habitat for this species occurs within the MIBA impact area.
Cyclopsitta diophthalma coxenii	Coxen's fig-parrot	Coxen's fig-parrot occurs in rainforest habitats including subtropical rainforest, dry rainforest, littoral and developing littoral rainforest, and vine forest. Remaining populations are now concentrated into fragmented remnants of dry rainforest and cool subtropical rainforest that are drier and hillier than the habitats that were occupied in the past. Within these rainforest habitats, the fig-parrot is likely to favour alluvial areas that support figs and other trees with fleshy fruits, in particular, habitats that have a high diversity of fig species, and that	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		have a fruiting season that is staggered across moisture and altitudinal gradients (DoE 2016). Most recent records of the fig-parrot have been from small stands of remnant native vegetation, at forest edges, and in thin tracts of gallery forest (at edges of rivers or streams). Coxen's Fig-Parrot has also been recorded in other habitat types including sub-littoral mixed scrub; corridors of riparian vegetation in woodland, open woodland or other types of cleared or partially-cleared habitat; and isolated stands of fig or other trees on urban, agricultural or cleared land (DoE 2016).	
Dasyornis brachypterus	Eastern bristlebird	This species inhabit moist, mountain ranges within about 100km of the coast. In Queensland most sightings have been within localised pockets of relatively open eucalypt forest in close proximity to denser vegetation along creek lines and rainforest. Soils are relatively fertile, derived from basalts of the Main Range Volcanics and Mt Warning Shield. The ground stratum of the eucalypt forests favoured by the eastern bristlebird is a mosaic of dense clumped grasses interspersed with patches of shrubs, ferns, tangled vines and fallen logs. The more common grasses include Wild sorghum (*Sarga leiocladum*), Kangaroo grass (*Themeda triandra*) and Tussock grass (*Poa labillardieri*). The presence of mature Wild sorghum tussocks is thought to be a good indicator of high quality bristlebird habitat (DEHP 2013).	**Low**. Suitable habitat for this species was not observed in the locality.
Dasyurus hallucatus	Northern quoll	This species is found within most treed habitats and is most abundant in broken, rocky country and in open eucalypt forest within 150 km of the coast. Northern quoll habitat generally encompasses some form of rocky area for denning purposes. In Queensland Northern quolls are more likely to be present in high relief areas that have shallower soils, greater cover of boulders, less fire impact and were closer to permanent water (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Dasyurus maculatus maculatus	Spotted-tailed quoll	This species occurs in coastal areas and adjacent ranges of South-east Queensland from Bundaberg to the border and inland to Monto and Stanthorpe (Dept. Environment 2012). It generally occurs in densely vegetated areas ranging from rainforest and vine-forest through to dry and wet eucalypt forest, woodland and coastal heathland (DEHP 2013). Transient males are sometimes seen in more open areas, including land cleared for pasture (DEHP 2013). The Spotted-tailed quoll is predominantly nocturnal and rests during the day in dens. Habitat requirements include suitable den sites such as hollow logs, tree hollows, rock outcrops or caves (Dept. Environment 2012). Individuals also require an abundance of food, such as birds and small mammals, and large areas of relatively intact vegetation through which to forage (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Delma torquata	Collared delma	Due to specific habitat requirements, this species distribution is highly fragmented and restricted to only a few locations. The Collared delma is known from the western suburbs of Brisbane, QLD and the following sites: Bunya Mountains, Blackdown Tableland National Park (NP), Bullyard Conservation Park, D'Aguilar Range NP, Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran and the Toowoomba Range (Dept. Environment 2012). This species inhabits eucalypt dominated woodland and open forest where it is associated with suitable micro-habitats (exposed rocky outcrops). The ground cover is predominantly native grasses, such as Kangaroo Grass (*Themeda triandra*), Barbed-wire Grass (*Cymbopogon refractus*), Wiregrass (*Aristida* sp.) and Lomandra (*Lomandra* sp.) (Dept. Environment 2012). The presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100mm thick) appears to be an essential characteristic of the collared delma microhabitat and is always present where the species occurs (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		Whilst Collared delmas are often found associated with small rocks, the presence of small rocks is not an essential habitat characteristic (Dept. Environment 2012).	
Epinephelus daemelii	Black rockcod	This is a marine species, inhabiting reefs and estuaries.	**Low**. Suitable habitat for this species was not observed on site.
Erythrotriorchis radiatus	Red goshawk	The Red goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. Riverine forests are also used frequently. Such habitats typically support high bird numbers and biodiversity, especially medium to large species which the goshawk requires for prey. The Red goshawk nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water (DoE 2016). The Red goshawk occurs over wooded and forested lands of tropical and warm-temperate Australia, coastal and sub-coastal. This species prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins (DoE 2016).	**Moderate.** Forested areas adjoining the works site provide potential foraging habitat for this species. However, this species may also utilise scattered eucalypts within grazed areas to search for prey.
Falco hypoleucos	Grey Falcon[#]	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	**Low.** This species is extremely rare and suitable habitat for this species was not observed in the locality.
Furina dunmalli	Dunmall's snake	Suitable habitat for this species includes forests and woodlands dominated by *Acacia harpophylla* on black alluvial cracking clays and Eucalypt-Bulloak associations on sandstone derived soils (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level (Chapman 1969; Naarding 1981). They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies)	**Low**. Suitable habitat for this species was not observed within the works area.
Geophaps scripta scripta	Squatter pigeon	Preferred habitat for this species includes open-forest to sparse open-woodland, with a grassy ground layers and patches of bare ground (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Grantiella picta	Painted honeyeater	This species inhabits Acacia and Box-gum woodlands and Box-ironbark forests. A specialist feeder on mistletoes, particularly those of the genus *Amyema* (DOEH, 2016).	**Low**. Suitable habitat for this species was not observed in the locality.
Haliaeetus leucogaster	White-bellied sea-eagle	This species has a large distribution range throughout SE QLD and is found in association with coasts, large rivers and estuaries and prefers to nest in large trees adjacent watercourses (Dept. Environment 2012).	**Low.** This species may fly over the MIBA area, however is unlikely to nest in the immediate locality.
Hemiaspis damelii	Grey Snake[#]	In Queensland, grey snake habitat is Brigalow *Acacia harpophylla* and Belah *Casuarina cristata* woodlands on heavy, dark brown to black cracking clay soils, particularly in association with water bodies, areas with small gullies and ditches, and floodplain environments where the species shelters beneath logs, rocks and soil cracks. Habitat in Queensland also includes Queensland bluegrass *Dichanthium sericeum* and/or Mitchell grass *Astrebla spp*. grassland on alluvial plains with cracking clay soils. Key attributes of grey snake habitat are the floodplains and ephemeral wetlands which provide breeding habitat for the frog species that are its main prey, the presence of the frog species themselves, and the	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		heavy clay soils which provide and cracks and crevices that the species uses in its hunting strategy and for shelter.	
Hirundapus caudacutus	White-throated needletail	This species occurs flying over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. It is recorded in all coastal regions of Queensland and NSW and almost always forage aerially (Dept. Environment 2012).	**Moderate**. This species may forage over the MIBA impact area.
Lathamus discolor	Swift Parrot	The Swift parrot inhabits dry sclerophyll eucalypt forests and woodlands. It occasionally occurs in wet sclerophyll forests. The Swift Parrot migrates from its Tasmanian breeding grounds to overwinter in the box-ironbark forests and woodlands of Victoria, New South Wales and southern Queensland. The principal wintering grounds are the inland slopes of the Great Dividing Range and along the eastern coastal plains. In northern New South Wales and south-eastern Queensland, Narrow-leaved Red Ironbark (*E. crebra*), Forest Red Gum forests and Yellow Box forest are commonly utilised (DoE 2016).	**Low**. The fragmented nature of local habitat reduces the likelihood that this species will utilise the area, and suitable habitat does not occur within the MIBA impact area.
Litoria olongburensis	Wallum Sedge Frog[#]	The Wallum Sedge Frog is found in ephemeral, semi-permanent and permanent wetlands with emergent reeds, ferns and/or sedges, in undisturbed coastal wallum. Wallum is described as sandmass heathland and shrubland, and various forest, woodland, sedgeland and grassland communities (DoE 2016).	**Low.** Terrestrial grassland within the works site is highly disturbed and is unlikely to provide potential habitat for this species.
Macroderma gigas	Ghost Bat[#]	They currently occupy habitats ranging from the arid Pilbara to tropical savanna woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines.	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
Merops ornatus	Rainbow bee-eater	This species occurs in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. Usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. Also occurs in inland and coastal sand dune systems, and in mangroves (Dept. Environment 2012).	**High - Known.** This species has been observed during previous site assessments.
Mixophyes fleayi	Fleay's barred frog	This species is found in wet forests, including rainforests, Antarctic beech forests, and eucalypt forests.	**Low**. Suitable habitat for this species was not observed in the locality.
Mixophyes iteratus	Giant barred frog	This species occurs along shallow rocky streams in rainforest, wet sclerophyll forest and farmland from 100 to 1000m altitude or deep, slow moving streams with steep banks in the lowlands (DEHP 2013).	**Low**. Suitable habitat for this species was not observed in the locality.
Monarcha melanopsis	Black-faced monarch	This species occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. During winter or migration, this species also occurs in marginal habitats such as 20-30 years old regrowth rainforest, nearby open eucalypt forest (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey as well as dry sclerophyll forests and woodlands, often with a patchy understorey (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Monarcha trivirgatus	Spectacled monarch	This species occupies the understorey of mountain/lowland rainforests, thickly wooded gullies, and waterside vegetation; mostly well below the canopy, and occasionally mangroves (Pizzey and Knight 1997).	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
Myiagra cyanoleuca	Satin flycatcher	This species occurs in heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occurs in coastal forests, woodlands, mangroves and drier woodland and open forests (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Nannoperca oxleyana	Oxleyan pygmy perch	This species is found in slow flowing or still waters, usually those that are tannin stained and slightly acidic within lowland coastal wallum habitats (DEHP 2017).	**Low**. No suitable watercourse occurs within the vicinity of the MIBA area.
Neoceratodus forsteri	Australian lungfish	This species occurs in a number of aquatic habitats, from streams through to altered and artificial habitats such as dams and reservoirs (DoE, 2017)	**Low**. No suitable watercourse occurs within the vicinity of the MIBA area.
Pandion haliaetus	Osprey	This raptor is thinly distributed in coastal Australia. It nests in singularly overtopping, generally dead trees. The Eastern osprey hunts in coastal rivers, estuaries and streams and may gather nesting material from nearby forests.	**Moderate.** This species may fly over the MIBA area, however is unlikely to nest in the immediate locality.
Petauroides volans	Southern greater glider	This species is most abundant in tall, montane moist forests, and prefers habitat with a diversity of eucalypt species. It appears very sensitive to clearing (logging etc) and is reliant on tree hollows in old, mature trees for shelter and breeding. In southern Queensland, they have been found to require at least 2 – 4 dens trees per 2 hectares of suitable habitat (DoE, 2016).	**Low**. Suitable habitat for this species was not observed in the locality.
Petaurus australis australis	Yellow-bellied Glider[#]	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Phascolarctos cinereus	Koala[#]	Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species. Koala habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. The distribution of this habitat is largely influenced by land elevation, annual temperature and rainfall patterns, soil types and the resultant soil moisture availability and fertility. Preferred food and shelter trees are naturally abundant on fertile clay soils (DoE 2016).	**Moderate.** Evidence of koala activity has previously been recorded in the area. Only widely scattered eucalypts occur within the MIBA area, however areas of remnant vegetation that may provide Koala habitat are present directly adjacent to the site.
Phyllodes imperialis smithersi	Pink underwing moth	This species is found at heights below 600m in subtropical rainforest environments. It is associated with the larval food plant *Carronia multisepalea* (DoE, 2017).	**Low**. Suitable habitat for this species was not observed in the locality.
Pluvialis squatarola	Grey Plover	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (Marchant & Higgins 1993 and references therein).	**Low**. Suitable habitat for this species was not observed in the locality.
Potorous tridactylus tridactylus	Long-nosed potoroo	The long-nosed potoroo has scattered populations extending from south-eastern Queensland through to NSW. This species occurs across a range of vegetation types from subtropical and warm temperate rainforest through tall open forest with dense understory to dense coastal heaths (DEHP 2013). Its main habitat requirements are access to some form of dense vegetation for shelter and nesting materials, as well as the presence of an abundant supply of underground roots and fungi for food (DEHP 2013, Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
Pseudomugil mellis	Honey Blue Eye[#]	The Honey Blue-eye inhabits slightly acidic (pH 4.4–6.8), clear and tannin-stained lakes, streams and wetlands (Arthington & Marshall 1993) with sandy or muddy bottoms in coastal heath (wallum) ecosystems. The species usually occurs where there is little or no flow, and the fish can find shelter in dense, aquatic vegetation, such as emergent and submerged sedges, along the margins.	**Low**. Suitable habitat for this species was not observed in the locality.
Pteropus poliocephalus	Grey-headed Flying Fox	The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds on commercial fruit crops and on introduced tree species in urban areas. The primary food source is blossom from *Eucalyptus* and related genera but in some areas it also utilises a wide range of rainforest fruits. None of the vegetation communities used by the Grey-headed Flying-fox produce continuous foraging resources throughout the year. As a result, the species has adopted complex migration traits in response to ephemeral and patchy food resources (DoE 2016). The Grey-headed Flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation, but colonies also use highly modified vegetation in urban and suburban area (DoE 2016).	**Moderate.** This species has not previously been recorded and no roosting sites are known to occur in the vicinity of the MIBA. However, scattered eucalypts provide potential feeding resources for this highly mobile species.
Rhipidura rufifrons	Rufous fantail	In east and south-east Australia, the Rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain grey gum (*E. cypellocarpa*), Narrow-leaved peppermint (*E. radiata*), Mountain ash (*E. regnans*), Alpine ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red	**Low**. No suitable habitat for this species occurs within the MIBA area.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
		mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests; for example near Bega in south-east NSW, where they are recorded in temperate Lilly pilly (*Acmena smithi*) rainforest, with Grey myrtle (*Backhousia myrtifolia*), Sassafras (*Doryphora sassafras*) and Sweet pittosporum (*Pittosporum undulatum*) subdominants. They occasionally occur in secondary regrowth, following logging or disturbance in forests or rainforests. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including Spotted gum (*Eucalyptus maculata*), Yellow box (*E. melliodora*), ironbarks or stringybarks, often with a shrubby or heath understorey. They are also recorded from parks and gardens when on passage. In north and north-east Australia, they often occur in tropical rainforest and monsoon rainforests, including semi-evergreen mesophyll vine forests, semi-deciduous vine thickets or thickets of Paperbarks (*Melaleuca* spp.) (Dept. Environment 2012).	
Rostratula australis/bhengalensis	Australian painted snipe	The Australian painted snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*). The Australian painted snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (DoE 2016).	**Low.** This species has not previously been recorded in the NEBP area. Wet grassland areas within the works site provide some potential habitat for this species. However, the level of slashing that occurs across the area has substantially reduced the quality of this potential habitat.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Saiphos reticulatus	Three-toed snake-tooth skink	This species inhabits rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. This species feeds on earthworms and beetle grubs and is found in leaf litter, often immediately adjacent to fallen tree trunks (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Stagonopleura guttata	Diamond Firetail[#]	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).	**Moderate**. This species may forage over the MIBA impact area.
Thiornis rubricollis rubricollis	Hooded plover (eastern)	This species is mostly seen on ocean beaches, however may also occur on near-coastal lakes and lagoons and estuaries.	**Low**. Suitable habitat for this species was not observed in the locality.
Tringa nebularia	Common Greenshank, Greenshank	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms. The species uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands, including sewage farms and saltworks dams, inundated rice crops and bores. The edges of the wetlands used are generally of mud or clay, occasionally of sand, and may be bare or with emergent or fringing vegetation, including short sedges and saltmarsh, mangroves, thickets of rushes, and dead or live trees.	**Low**. Suitable habitat for this species was not observed in the locality.

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	**Common Name**		
Turnix melanogaster	Black-breasted button quail	This species is restricted to rainforests and forests, mostly in areas with 770-1200 mm rainfall per annum. They prefer drier low closed forests, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest. This species may also be found in low, dense acacia thickets and, in littoral area, in vegetation behind sand dunes. An extensive dense leaf-litter layer is required for foraging and possibly also roosting. Fallen logs and a dense, heterogeneously distributed shrub layers are also considered to be important habitat characteristics for shelter and breeding (Dept. Environment 2012).	**Low**. Suitable habitat for this species was not observed in the locality.
Xeromys myoides	Water Mouse[#]	In south-east Queensland, water mouse habitat includes mangrove communities and adjacent sedgelands, grasslands and freshwater wetlands. Mangrove communities in this region are typically comprised of A*vicenna marina var. australasica, Rhizophora stylosa,Bruguiera gymnorrhiza, Aegiceras corniculatum* and *Ceriops tagal var. australis* (DoE 2016).	**Low.** Areas of coastal and sub-coastal swamps near the site and downstream provide potential habitat for this species, although the quality of this habitat is substantially reduced by livestock disturbance. No potential habitat occurs within the MIBA area.
Various	Sea birds	Sea birds are those which spend a majority of time over coastal and oceanic environments, returning to land to nest.	**Low**. Suitable habitat for these species was not observed in the vicinity of the MIBA site.
Various	Wading birds	Wading birds are those which spend the majority of their time foraging in shallow marine or sometimes freshwater environments, such as beaches, mudflats, estuaries, or coastal wetlands.	**Low**. Suitable habitat for these species was not observed in the vicinity of the MIBA site.
Notes: # MNES species not listed in EPBC Approval but either known or considered likely to occur in or adjacent to the NEBP site or listed in current database search and therefore considered in this LBEMP Sub-Plan.			

MNES		Habitat Requirements	Likelihood of Occurrence
Scientific Name	Common Name		
* Species listed in the EPBC Approval but not currently listed as an MNES pursuant to the EPBC Act and therefore not subject to further consideration in this LBEMP Sub-Plan. Species that will clearly not occur on the site (i.e. whales, sharks, marine fish and turtles) have been omitted.			

3.3 MNES Risk Assessment

To manage the risk of adverse impacts on MNES and comply with the duty of care as defined by the *Environmental Protection Act 1994*, the following is required:

- Identification of the potential environmental hazards associated with the works program;
- Assessment environmental risks; and
- Development of controls to eliminate or minimise residual environmental risk.

In accordance with AS/NZS ISO 31000:2009 Risk management – Principles and Guidelines and Section 4 of the LBEMP for MNES v2 (Cardno 2014), a project hazard identification and risk assessment has been undertaken in order to identify and evaluate the risks posed to MNES by the various construction activities associated with the works program.

This risk assessment evaluates unmitigated project specific environmental hazards, including assigning likelihood and consequence levels, to determine a risk rating for each identified risk. The criteria for determining likelihood and consequence levels, and risk ratings for each identified risk are based on AS/NZS ISO 31000:2009 and are consistent with the criteria described in Tables 4-1 to 4-3 of Section 4 of the LBEMP for MNES v2 (Cardno 2014).

Likelihood and consequence criteria and the risk rating matrix adopted in this risk assessment are provided in **TABLES 3 to 5** of this LBEMP Sub-Plan 08. The results of the risk assessment are documented in **TABLE 6** of this LBEMP Sub-Plan 08. Note that in cases where the likelihood and consequence of risks relating to a particular hazard varied across the works site, the most conservative figure was adopted.

TABLE 3
LIKELIHOOD LEVELS

Level	Descriptor	Qualitative Description
A	Almost Certain	The event is expected to occur. The event will occur on an annual (or more frequent) basis.
B	Likely	It is probable the event will occur. The event has occurred several times before at similar developments.
C	Possible	The event may or may not occur. The event may occur once during the development.
D	Unlikely	The event may occur at some time but is unlikely. The event has been known to happen from time to time at similar developments.
E	Rare	The event may occur in exceptional circumstances. The event has not been heard of occurring at similar developments.

TABLE 4
CONSEQUENCE LEVELS

Level	Descriptor	Qualitative Description
1	Insignificant	**Environment:** No damaged detected. **People:** Event does not result in injury (i.e. no medical treatment required). **Property:** No damage to property. **Amenity:** No detectable impact on amenity.
2	Minor	**Environment:** Minor impact of short duration or short term damage. **People:** Reversible injury or illness. **Property:** Minor damage to property (<$5,000 to repair). **Amenity:** Minor, localised and short term amenity impacts, no complaints.
3	Moderate	**Environment:** Short term damage, localised impact. **People:** Irreversible disability or impairment (30%) to one or more persons. **Property:** Moderate damage to property (<$50,000 to repair). **Amenity:** One (1) or two (2) complaints, impacts extending to several properties and/or lasting for several days.
4	Major	**Environment:** Significant impact locally and potential for offsite impacts. **People:** Severe injuries or impairment (60%) to one or more persons, single fatality. **Property:** Major damage to property (<$500,000 to repair). **Amenity:** Many complaints, impacts extensive and/or lasting for many days, up to five (5) properties rendered uninhabitable for more than one day.
5	Catastrophic	**Environment:** Significant impacts to regional ecosystems and threatened species, potential for widespread off site impacts. **People:** Multiple fatalities, or irreversible injuries/impairment (>60%). **Property:** Significant loss to property (>$1,000,000 to repair). **Amenity:** Multiple dwellings rendered uninhabitable for >1 day.

TABLE 5
RISK MATRIX CRITERIA

		Consequence				
		1 (Insignificant)	2 (Minor)	3 (Moderate)	4 (Major)	5 (Catastrophic)
Likelihood	A (Almost Certain)	Medium	High	High	Extreme	Extreme
	B (Likely)	Medium	Medium	High	High	Extreme
	C (Possible)	Low	Medium	High	High	High
	D (Unlikely)	Low	Low	Medium	Medium	High
	E (Rare)	Low	Low	Medium	Medium	High

The risk ratings presented in **TABLE 5** are to be interpreted as follows:

- **Low:** Risk can be adequately managed by routine procedures and work practices.
- **Medium:** Corrective action other than administrative controls is needed.
- **High:** Significant risk control measures need to be implemented before works commence.
- **Extreme:** Operations are not to be undertaken without extensive risk control and mitigation measures in place prior to the commencement of works.

The emphasis of this LBEMP Sub-Plan 08 is on the management of activities assessed as having a risk rating of 'Extreme', 'High' or 'Medium' for MNES that are known or considered likely to occur within (Moderate or High likelihood of occurrence) or adjacent to the works site the subject of the approved works program.

As such, for each hazard associated with the approved works program that has been assessed as having a 'Extreme', 'High' or 'Medium' level of risk to one or more MNES, applicable environmental management elements are specified in **TABLE 6** and associated detailed specifications are provided in **SECTION 4** of this LBEMP Sub-Plan 08.

TABLE 6
ENVIRONMENTAL RISK ASSESSMENT REGISTER

Hazard	Risk	MNES Potentially Impacted	Likelihood	Consequence	Risk Rating	Management Element Reference Section
Vegetation clearing and grubbing	Loss of MNES flora within areas to be cleared / grubbed.	All MNES flora.	D	3	Medium	4
	Damage to potential habitat for MNES flora and fauna intended to be retained.	All MNES flora and fauna.	D	3	Medium	2, 3, 4
	Injury, death or displacement of MNES fauna, including the Koala	All terrestrial MNES fauna.	D	3	Medium	2, 3
	Removal of topsoil resulting in loss of seed bank / tubers of MNES flora.	All MNES flora.	D	3	Medium	4
	Increased soil instability causing erosion and sedimentation of downstream waterways providing potential habitat for MNES.	All MNES flora and fauna.	C	3	High	6
Movement of construction plant and machinery, increased road	Injury or death of MNES fauna, including Koalas, utilising the works site or surrounding road network.	All terrestrial MNES fauna.	D	3	Medium	2, 3

Hazard	Risk	MNES Potentially Impacted	Likelihood	Consequence	Risk Rating	Management Element Reference Section
traffic from construction vehicles.	Introduction and / or spread of weeds or pest animal / ant species causing degradation of potential habitat for MNES potential or increased competition / predation on MNES.	All MNES flora and fauna.	B	3	High	5
Construction personnel bringing dogs onto the works site.	Injury and harassment of MNES fauna, including Koalas.	All terrestrial MNES fauna.	D	2	Low	2, 3
Bulk earthworks, including filling and excavation, generally.	Erosion and discharge of sediment-laden runoff to downstream waterways impacting on water quality and habitat for MNES.	All aquatic MNES flora and fauna.	C	3	High	6
Bulk earthworks, including filling and excavation, below 5m AHD.	Disturbance of potential acid sulphate soils resulting in release of acidic discharge and other contaminants to soils and downstream waterways providing potential habitat for MNES.	All aquatic MNES flora and fauna.	B	4	High	7

Hazard	Risk	MNES Potentially Impacted	Likelihood	Consequence	Risk Rating	Management Element Reference Section
Construction of roads, stormwater, sewerage and water supply infrastructure, and landscaping works.	Runoff of sediment from disturbed work surfaces and stockpiles causing sedimentation of downstream waterways, impacting on water quality and habitat for MNES.	All aquatic MNES flora and fauna.	C	3	High	6
	Introduction or spread of weeds or pest animals / ants through importation of construction materials, plant and equipment.	All MNES flora and fauna.	C	3	High	5
Fire ignition caused by operation of construction plant or equipment, welding, personnel smoking or other construction activities.	Spread of uncontrolled fire resulting in loss or damage to retained vegetation providing potential habitat for MNES.	All terrestrial MNES flora and fauna.	D	3	Medium	N/A

4 ENVIRONMENTAL MANAGEMENT ELEMENTS

Based on consideration of the risk assessment presented in **TABLE 6**, the following environmental management elements have been identified as applicable to the approved works program the subject of this LBEMP Sub-Plan 08:

- Element 1: LBEMP Sub-Plan Risk Assessment (refer **SECTION 3**);
- Element 2: Fauna;
- Element 3: Koalas;
- Element 4: Flora;
- Element 5: Weeds and Pests;
- Element 6: Soil Erosion, Sediment Loss and Water Quality; and
- Element 7: Acid Sulphate Soils.

Each of these environmental management elements consists of the following key components:

- **Rationale:** the reason(s) why this management element is, or is not, relevant to the specific works program the subject of this LBEMP Sub-Plan 08.
- **Objectives:** the objectives and targets to be achieved by implementing this management element.
- **Performance Indicators:** measurable indicators and standards set to assess the efficacy of management measures taken.
- **Tasks:** specific management and monitoring tasks that need to be undertaken, including:
  - Actions: details of the actions, including monitoring, to be undertaken; and
  - Timing: details concerning the timing and frequency for undertaking specific actions.

4.1 Element 1: LBEMP Sub-plan MNES Risk Assessment

SECTION 3 of this LBEMP Sub-Plan 08 details the MNES Risk Assessment undertaken for the approved works program in accordance with Element 1: LBEMP Sub-Plan MNES Risk Assessment.

4.2 Element 2: Fauna

Rationale
Vegetation clearing works approved under LBEMP Sub-Plan 01 have completed over this site and work associated with the MIBA area have commenced over areas adjacent to the site. The following vegetation types will be cleared as part of the current works program: • Disturbed terrestrial grassland: 22.5 ha. These communities provide habitat of low quality for a number of fauna species listed as MNES under the EPBC Act. The removal of vegetation has the potential to result in the direct loss of suitable habitat for terrestrial MNES fauna, particularly through the clearing of mature trees, as well as causing disturbance and possible displacement to MNES fauna utilising adjacent habitat due to construction noise. The removal of vegetation, including mature trees and disturbed grassland areas, has the potential to increase sedimentation within downstream waterways indirectly impacting suitable habitat for aquatic MNES further downstream along nearby creek, the Caboolture River, and in Moreton Bay. Construction activities associated with the works program will involve increased movement of plant and equipment on site, which increases the risk of causing injury or harm to fauna utilising these areas. Construction activities have the potential to introduce pest species that could degrade the quality of fauna habitat adjacent to the site. Vegetation clearance works are to be undertaken in a manner that protects habitats adjacent to the site, and encourages fauna to move out of the vegetation clearance zone and into adjacent areas of retained habitat.
Objective / Target
• Development of the MIBA is undertaken in a manner that minimises impacts to fauna listed as MNES. • Areas of fauna habitat that are to be retained are appropriately protected during the construction phase. • Authorised fauna habitat disturbance is carried out in accordance with best practice environmental management measures, as well as the terms and conditions of relevant permits authorising such disturbance. • Any tampering with animal breeding places or handling of native wildlife is undertaken only by persons holding the appropriate permits under the *Nature Conservation Act 1992*. • Existing infestations of pest species are controlled and no new pest species are introduced to or spread within the works site.
Performance Indicators
• Construction activities do not result in avoidable harm to any fauna listed as MNES. • Compliance with project-specific conditions of approval relating to vegetation clearing or disturbance to native fauna. • Vegetation clearing is limited to the approved clearance zones. • Vegetation adjacent to the approved clearance zones is retained and protected at all times during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
Compliance with the Revised Fauna Management Plan (JWA 2024b) (**APPENDIX 3**)	All works on the subject site must be completed in strict compliance with the requirements of the Revised Fauna Management Plan (JWA 2024b) (**APPENDIX 3**).	At all times.
Identify and protect all vegetation and fauna habitats adjacent to the approved clearance zones.	Clearly define the limits of the approved clearance zones on all construction plans (refer to **FIGURE 6**). The approved clearance zone is restricted to within the extent of the works site shown in **FIGURE 6**. Physically demarcate areas of vegetation and fauna habitat to be retained using high visibility temporary or permanent fencing prior to the commencement of development activities. Advise all construction personnel, including sub-contractors, of the approved clearance zones as part of the site induction. Conduct regular inspections and maintenance of fencing protecting retained vegetation and habitat to maintain effectiveness.	Prior to the commencement of any vegetation clearance.
Conduct pre-clearance surveys of approved clearance zones.	Survey the defined approved clearance zone for the presence, or likely presence, of fauna listed as MNES by an appropriately qualified and experienced ecologist. Mark the location of any fauna MNES that were observed during the pre-clearance surveys with GPS and flagging tape.	Prior to the commencement of any vegetation clearance.
Engage an appropriately licensed DEHP licenced Fauna Spotter / Catcher.	An appropriately licenced Fauna Spotter/ Catcher is to be engaged to supervise and direct vegetation clearance works and is to be present on site for the duration of clearing works. The appointed Fauna Spotter/Catcher is to inspect the approved clearance zone.	Prior to and during any vegetation clearance works.
Conduct vegetation clearing in a manner that ensures any native fauna living within or adjacent to the vegetation to be removed has time to move out of the areas of disturbance without human intervention.	The appointed Fauna Spotter / Catcher is to be authorised to issue relevant instructions to the vegetation clearance contractor to ensure: • vegetation clearance works comply with the procedures of Policy 6: Vegetation Clearing Practices of the Nature Conservation (Koala) Conservation Plan 2017, including: – limiting the extent of clearance to not more than 3 hectares of open forest in any single day; and	During all vegetation clearance works.

Management Measures		
Tasks	**Actions**	**Timing**
	– ensuring that for a period of at least 12 hours, extending from 6:00pm until 6:00am on the following day, no further vegetation clearance occurs on the site; • any vegetation occupied by native fauna is not cleared until the fauna moves out of the vegetation, or (with the exception of Koala) is relocated to a secure area of similar habitat by a licensed Fauna Spotter/Catcher; and • vegetation clearance is conducted in a sequential manner in order to direct native fauna away from threatening processes or hostile environments (e.g. roads) and towards any retained vegetation or habitat links. Unless directed by the appointed Fauna Spotter/Catcher, vegetation clearance works are to be carried out in accordance with the specifications provided in the **FIGURE 6**.	
Domestic pets are excluded from the site during vegetation clearance works.	No domestic pets are to be brought into the site by contractors employed to undertake vegetation clearance works. Any contractors who ignore this management specification may, at the discretion of the Developer or its authorised representatives, be banned from the site.	During all vegetation clearance works.
Preparation of a post-clearance Fauna Management Report.	At the completion of vegetation clearance works, a brief post-clearance Fauna Management Report is to be completed and is to contain: • details on any incidents that occurred during the clearing; • details of any translocated fauna, such as species, location relocated; • an evaluation of the fauna management techniques; • a description of any additional future management measures; and • the name, licence reference number and contact details of the appointed Fauna Spotter / Catcher.	Following completion of vegetation clearance works.
Traffic management, and operation of construction vehicles,	Construction planning is to make appropriate provision for the safe movement of native fauna, including the MNES listed Koala, through the NEBP	Ongoing during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
plant and equipment on site.	site as is required by State Referral Agency Condition 7 of MCU-2004-1420. Vehicles attending and operating within the approved works site are to be operated in a manner that minimises the potential for harm to native fauna, including obeying all speed limits and utilising designated access roads as far as practicable.	
Trenches and excavations.	All open trenches and excavations are to be managed to minimise the potential for entrapment of native fauna by: • minimising as far as possible the period of time when trenches/excavations with steep sides (i.e. all slopes greater than 1V:1H) are open and accessible to native fauna; • inspection of open trenches/excavation each morning to identify the presence of any fauna that have become trapped; • provision of assistance to entrapped native fauna, including engagement of the services of a licensed Fauna Spotter / Catcher if required; and • establishment of exclusion fencing around any steep-sided trenches or excavations (i.e. all slopes greater than 1V:1H) that are to remain open for extended periods of time (i.e. > 48 hours).	Ongoing during the construction phase.
Care of injured fauna.	Any fauna recovered during vegetation clearance works or construction works generally, will, immediately upon capture by the licensed Fauna Spotter / Catcher, be inspected for any signs of physical injury. If the fauna appears to be injured, it will be immediately transported to a suitably qualified and licensed veterinary surgeon or wildlife carer for appropriate treatment. Uninjured fauna will be relocated to suitable, habitat in the surrounding area as described above. The details for nearby, suitable wildlife care facilities are: • Royal Society for the Prevention of Cruelty to Animals (RSPCA) – Ph: 1300 264 625	Ongoing during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
	• Queensland Department of Environment and Heritage Protection (DEHP) – Ph: 1300 130 372.	
Reporting of incidents involving threatened fauna	Any incidents involving Commonwealth listed species will be reported in writing to the Department of Environment (Monitoring & Audit Section of the Compliance & Enforcement Branch – EPBCMonitoring@environment.gov.au) within ten (10) business days of the incident. Any incidents involving State listed species will be reported in writing to the Queensland Department of Environment and Heritage Protection (DEHP) within ten (10) business days of the incident. The report will include the following details: • Time and date of the incident; • Details of the activity (i.e. vegetation clearance, earthworks etc.); • Details of the threatened species involved; • Impacts of the incident on the animal (i.e. deceased, injured, uninjured); • Immediate actions taken (i.e. transported for treatment, relocated etc.); • Corrective actions taken to prevent further incidents.	Ongoing
Record keeping	The following records and reports are to be retained in relation to this environmental management element and shall be made available to relevant administering authorities upon request: • photographic records of the establishment of required fencing; • the dates and locations of habitat clearance works are to be maintained; • the name, licence reference number and contact details of the licensed Fauna Spotter / Catcher that supervised the vegetation clearance works each day; • details concerning any native vertebrate fauna that were injured during the approved works program and the actions taken in respect thereof; and • post-clearance Fauna Management Report.	Ongoing

Management Measures		
Tasks	**Actions**	**Timing**
Corrective Actions	In the event of a non-compliance with the stated performance indicators, corrective action procedures should be implemented in accordance with **SECTION 5** of this LBEMP Sub-Plan 08. Appropriate corrective actions in relation to this environmental management element may include, but may not be limited to: • cessation of vegetation clearance activities; • restoration of fauna habitats subject to unauthorised disturbance; • establishment of fauna exclusion fencing around the works site; • reductions in vehicular speed limits within the works site; or • environmental awareness training of personnel.	Ongoing

4.3 Element 3: Koalas

Rationale
The works program will occur adjacent to areas of remnant eucalypt and melaleuca forest providing potential shelter habitat for Koalas. The works have the potential to cause disturbance and possible displacement of Koalas utilising adjacent habitat due to construction noise. Construction activities have the potential to introduce pest species that could pose a direct threat to Koalas or degrade the quality of Koala habitat adjacent to the site. Vegetation clearance works are to be undertaken in a manner that protects Koalas and habitats adjacent to the site.
Objective / Target
• Development is undertaken in a manner that minimises impacts to Koalas. • Areas of Koala habitat adjacent to the site are appropriately protected during the construction phase. • Authorised Koala habitat disturbance is carried out in accordance with best practice environmental management measures, as well as the terms and conditions of relevant permits authorising such disturbance. • Existing infestations of pest species are controlled and no new pest species are introduced to or spread within the works site.
Performance Indicators
• Construction activities do not result in avoidable harm to Koalas. • Compliance with project-specific conditions of approval relating to vegetation clearing or disturbance to Koalas. • Vegetation clearing is limited to the approved clearance zones. • Vegetation adjacent to the approved clearance zones is retained and protected at all times during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
Compliance with the Revised Fauna Management Plan (JWA 2024b) (**APPENDIX 3**)	All works on the subject site must be completed in strict compliance with the requirements of the Revised Fauna Management Plan (JWA 2024b) (**APPENDIX 3**)	At all times.
Identify and protect all vegetation and Koala habitat adjacent to the approved clearance zones.	Clearly define the limits of the approved clearance zones on all construction plans (refer **FIGURE 6**). The approved clearance zone is restricted to within the extent of the works site shown in **FIGURE 6**. Physically demarcate areas of vegetation and fauna habitat to be retained on or adjacent to the site using high visibility temporary or permanent fencing prior to the commencement of development activities.	Prior to the commencement of any vegetation clearance.

Management Measures		
Tasks	**Actions**	**Timing**
	Advise all construction personnel, including sub-contractors, of the approved clearance zones as part of the site induction. Conduct regular inspections and maintenance of fencing protecting retained vegetation and habitat to maintain effectiveness.	
Conduct pre-clearance surveys of approved clearance zones.	Survey the defined approved clearance zone immediately prior to commencement of clearing for the presence of Koalas. Survey to be completed by an appropriately qualified and experienced ecologist. Mark the location of any Koalas that were observed during the pre-clearance surveys with GPS and flagging tape.	Immediately prior to the commencement of any vegetation clearance.
Engage an appropriately licensed DEHP licenced Fauna Spotter/ Catcher.	An appropriately licenced Fauna Spotter/ Catcher is to be engaged to supervise and direct vegetation clearance works and is to be present on site for the duration of clearing works. The appointed Fauna Spotter/ Catcher is to inspect the approved clearance zone.	Prior to and during any vegetation clearance works.
Conduct vegetation clearing in a manner that ensures any Koala living within or adjacent to the vegetation to be removed has time to move out of the areas of disturbance without human intervention.	The appointed Fauna Spotter/ Catcher is to be authorised to issue relevant instructions to the vegetation clearance contractor to ensure: • vegetation clearance works comply with the procedures of Policy 6: Vegetation Clearing Practices of the Nature Conservation (Koala) Conservation Plan 2017, including: – limiting the extent of clearance to not more than 3 hectares of open forest in any single day; and – ensuring that for a period of at least 12 hours, extending from 6:00pm until 6:00am on the following day, no further vegetation clearance occurs on the site; • any tree occupied by a Koala is not cleared until the Koala moves out of the vegetation of its own accord; and • vegetation clearance is conducted in a sequential manner in order to direct Koalas away from threatening processes or hostile environments (e.g. roads) and towards any retained vegetation or habitat links.	During all vegetation clearance works.

Management Measures		
Tasks	**Actions**	**Timing**
	Unless directed by the appointed Fauna Spotter/ Catcher, vegetation clearance works are to be carried out in accordance with the specifications provided in **FIGURE 6**.	
Domestic pets are excluded from the site during vegetation clearance works.	No domestic pets are to be brought into the site by contractors employed to undertake vegetation clearance works. Any contractors who ignore this management specification may, at the discretion of the Developer or its authorised representatives, be banned from the site.	During all vegetation clearance works.
Preparation of a post-clearance Fauna Management Report.	Refer Element 2 – Fauna	Refer Element 2 – Fauna
Traffic management, and operation of construction vehicles, plant and equipment on site.	Construction planning is to make appropriate provision for the safe movement of Koalas through the NEBP site as is required by relevant State Referral Agency Conditions. Vehicles attending and operating within the approved works site are to be operated in a manner that minimises the potential for harm to Koalas, including obeying all speed limits and utilising designated access roads as far as practicable.	Ongoing during the construction phase.
Trenches and excavations.	All open trenches and excavations are to be managed to minimise the potential for entrapment of Koalas by: • minimising as far as possible the period of time when trenches/excavations with steep sides (i.e. all slopes greater than 1V:1H) are open and accessible to native fauna; • inspection of open trenches/excavation each morning to identify the presence of any Koalas that have become trapped; • provision of assistance to entrapped Koalas, including engagement of the services of a licensed Fauna Spotter / Catcher if required; and • establishment of exclusion fencing around any steep-sided trenches or excavations (i.e. all slopes greater than 1V:1H) that are to remain open for extended periods of time (i.e. > 48 hours).	Ongoing during the construction phase.
Care of injured Koalas.	Any Koalas recovered during vegetation clearance works or construction works generally, will, immediately upon capture by the licensed Fauna	Ongoing during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
	Spotter/ Catcher, be inspected for any signs of physical injury. If the Koala appears to be injured, it will be immediately transported to a suitably qualified and licensed veterinary surgeon or wildlife carer for appropriate treatment. The details for nearby, suitable wildlife care facilities are: • Royal Society for the Prevention of Cruelty to Animals (RSPCA) – Ph: 1300 264 625. • Queensland Department of Environment and Heritage Protection (DEHP) – Ph: 1300 130 372.	
Reporting of incidents involving Koalas	Any incidents involving Koalas will be reported in writing to the Department of Environment (Monitoring & Audit Section of the Compliance & Enforcement Branch – EPBCMonitoring@environment.gov.au) within ten (10) business days of the incident. Any incidents involving Koalas will be reported in writing to the Queensland Department of Environment and Heritage Protection (DEHP) within ten (10) business days of the incident. The report will include the following details: • Time and date of the incident; • Details of the activity (i.e. vegetation clearance, earthworks etc.); • Impacts of the incident on the animal (i.e. deceased, injured, uninjured); • Immediate actions taken (i.e. transported for treatment, relocated etc.); • Corrective actions taken to prevent further incidents.	Ongoing
Record keeping	The following records and reports are to be retained in relation to this environmental management element and shall be made available to relevant administering authorities upon request: • photographic records of the establishment of required fencing; • the dates and locations of habitat clearance works are to be maintained;	Ongoing

Management Measures		
Tasks	**Actions**	**Timing**
	• the name, licence reference number and contact details of the licensed Fauna Spotter/ Catcher that supervised the vegetation clearance works each day; • details concerning any Koalas present in the clearing area and the actions taken in respect thereof; and • post-clearance Fauna Management Report.	
Corrective Actions	In the event of a non-compliance with the stated performance indicators, corrective action procedures should be implemented in accordance with **SECTION 5** of this LBEMP Sub-Plan 08. Appropriate corrective actions in relation to this environmental management element may include, but may not be limited to: • cessation of vegetation clearance activities or activities adjacent to koala habitats; • restoration of Koala habitats subject to unauthorised disturbance; • establishment of fauna exclusion fencing around the works site; • reductions in vehicular speed limits within the works site; or • environmental awareness training of personnel.	Ongoing

4.4 Element 4: Flora

Rationale
Vegetation clearing works approved under LBEMP Sub-Plan 01 have completed over this site and work associated with the MIBA area have commenced over areas adjacent to the site. The following vegetation types will be cleared as part of the current works program: • Disturbed terrestrial grassland: 22.5 ha.
Objective / Target
• Areas of native vegetation located outside of the approved clearance zone are to be retained and appropriately protected; • Authorised vegetation disturbance is carried out in accordance with best practice environmental management measures, as well as the terms and conditions of relevant permits authorising such disturbance; and • Existing weed infestations are controlled and no new weed species are introduced to, or spread within, the site.
Performance Indicators
• All necessary permits are obtained prior to commencing vegetation clearance activities, and vegetation clearance complies with all terms and conditions of applicable permits. • Native vegetation adjacent to the approved clearance zones is retained and protected at all times throughout the construction phase. • No loss or damage to native vegetation occurs outside of the approved clearance zone.

Management Measures		
Tasks	**Actions**	**Timing**
Compliance with the Revised Vegetation Management Plan (JWA 2024d) (**APPENDIX 4**)	All works on the subject site must be completed in strict compliance with the requirements of the Revised Vegetation Management Plan (JWA 2024d) (**APPENDIX 4**)	At all times.
Identify and delineate areas of vegetation clearance and retention.	Clearly define the limits of approved clearance zones on all construction plans (refer **FIGURE 6**). The approved clearance zone is restricted to within the extent of the works site shown in **FIGURE 6**. Physically define areas of native vegetation to be retained, within or adjacent to the approved works site, using high visibility temporary or permanent fencing prior to the commencement of development activities. Advise all construction personnel, including sub-contractors, of the approved clearance zones as part of the site induction. Conduct regular inspections and maintenance of fencing protecting retained vegetation and habitat to maintain effectiveness.	Prior to the commencement of any vegetation clearance works.
Conduct clearance of vegetation in a manner that minimises the	Implement an appropriate program of controls based on Element 2 – Fauna of this LBEMP Sub-Plan 08.	Ongoing during vegetation clearance works.

Management Measures		
Tasks	**Actions**	**Timing**
potential for harm to native fauna.		
Conduct pre-clearance surveys of all vegetation to be removed.	A pre-clearance survey of the approved clearance zone is to be undertaken by an appropriately qualified and experienced ecologist to identify the presence of any flora listed as MNES. Clearly demarcate in the field and record the location with GPS of any flora MNES observed during the pre- clearance survey.	Prior to the commencement of any vegetation clearance works.
Implement appropriate mitigation strategies for any MNES listed flora identified during the pre-clearance surveys.	Determine whether it is practicable to retain and sustain the ecological functionality of the identified MNES flora in-situ, taking into account the nature of the approved development (Note: the retention of small numbers of plants in an ecologically isolated patch of land surrounded by urban/industrial development is unlikely to maintain ecological functionality). If it is possible to achieve the above, incorporate the identified MNES flora into a vegetation protection zone and manage accordingly. For MNES flora that are able to be successfully translocated, obtain necessary permits under the *Nature Conservation Act 1992* (NC Act) from the Queensland Department of Environment and Heritage Protection (DEHP). Undertake MNES listed flora translocation works in accordance with the terms and condition of relevant permits under the NC Act.	Prior to commencement of vegetation clearance works in areas supporting MNES flora.
Monitor the condition of retained and transplanted vegetation.	Visually monitor the condition of retained/transplanted vegetation on a weekly basis for signs of stress or damage throughout the construction period. Undertake issue specific corrective actions in respect of any observed damage/stress to retained/transplanted vegetation. Monitor all MNES flora translocation works in accordance with the terms of the relevant permits issued by DEHP under the NC Act.	Ongoing during the construction phase and in accordance with permit conditions.
Appropriate management, reuse and disposal of cleared vegetation.	Locate any temporary stockpiles of cleared vegetation on-site in a manner that assists with the management of erosion and sediment loss processes (refer LBEMP Element 6).	Ongoing during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
	Manage cleared non-native vegetation in accordance with LBEMP Element 5. Reuse or dispose of cleared vegetation in accordance with local government requirements.	
Protect MNES flora during ecological restoration works.	Undertake restoration site preparation and revegetation in a manner that avoids removal or damage to MNES flora. Where ecological restoration works are to be undertaken in areas supporting MNES flora: • mark all MNES listed flora in the restoration area with flagging tape or conspicuous marker stakes; • carefully undertake weed management, soil preparation, and planting works so as to avoid physical or chemical disturbance to MNES flora; and • monitor and record the responses of MNES flora to the ecological restoration works.	Ongoing during the construction phase.
Reporting of incidents involving threatened flora	Any incidents involving Commonwealth listed species will be reported in writing to the Department of Environment (Monitoring & Audit Section of the Compliance & Enforcement Branch - EPBCMonitoring@environment.gov.au) within ten (10) business days of the incident. Any incidents involving State listed species will be reported in writing to the Queensland Department of Environment and Heritage Protection (DEHP) within ten (10) business days of the incident. The report will include the following details: • Time and date of the incident; • Details of the activity (i.e. vegetation clearance, earthworks etc.); • Details of the threatened species involved; • Impacts of the incident on the plant; • Immediate actions taken; and • Corrective actions taken to prevent further incidents.	Ongoing
Record keeping	The following records and reports are to be retained in relation to this environmental management element and shall be made available to relevant administering authorities upon request:	Ongoing

Management Measures		
Tasks	**Actions**	**Timing**
	• photographic records of the establishment of required temporary protection fencing and other exclusionary fencing or marking; • records of pre-clearance survey including location of any MNES flora identified; • records of all permits and approvals obtained for vegetation clearance works, including any translocation works; • the dates and locations of vegetation clearance works; and • results of monitoring condition of retained and translocated vegetation, and restoration works.	
Corrective actions	In the event of a non-compliance with the stated performance indicators, corrective action procedures should be implemented in accordance with **SECTION 5** of this LBEMP Sub-Plan 08. Appropriate corrective actions in relation to this environmental management element may include, but may not be limited to: • cessation of vegetation clearance activities; • maintenance or reinstatement of exclusion fencing or marking; • restoration of vegetation subject to unauthorised clearing; or • environmental awareness training of personnel.	Ongoing

4.5 Element 5: Weeds and Pests

Rationale

Construction activities, including vegetation clearance works, associated with the approved works program have the potential to:

- introduce weeds or pest animal species to the works site through the importation of construction materials or the use of vehicles, plant and equipment contaminated with pest material (e.g. weed seed, eggs, pest ants);
- further disperse invasive species within and external to the works site through the movement of construction vehicles, plant and equipment between areas infested and not currently infested with invasive species; and
- further disperse invasive species through the reuse of cleared vegetation containing weed material across the works site.

Surveys of the NEBP site undertaken for the NEBP EIS (refer Cardno 2008) and monitoring completed as part of works completed to date recorded the presence of a number of restricted invasive plants species under the QLD *Biosecurity Act 2014*, as listed below:

Common Name	Scientific Name	Location on Site	Biosecurity Act Status
Asparagus fern	*Asparagus aethiopicus*	Scattered across site	Category 3
Broad-leaved Pepper Tree	*Schinus terebinthifolia*	Scattered across site and in disturbed riparian areas	Category 3
Camphor Laurel	*Cinnamomum camphor*	Within the retained habitat to the south of the works area	Category 3
Groundsel Bush	*Baccharis halimifolia*	Scattered across site	Category 3
Lantana	*Lantana camara*	Scattered across site	Category 3
Singapore Daisy	*Sphagneticola trilobata*	Within the retained habitat to the south of the works area	Category 3
Yellow bells	*Tecoma stans*	Scattered across site, particularly along Caboolture River in the north	Category 3

The works site is not currently located within a Fire Ant Biosecurity Zone.

Objective / Target

- Existing pest infestations are controlled prior to commencing the approved program of works.
- No new pest species are introduced to or spread within the works site as a result of the approved program of works.
- No pest species are dispersed from the works site to the surrounding environment as a result of the approved program of works.

Performance Indicators

- No invasion / dispersal of weeds or pest animal species.
- Weeds are treated in accordance with industry best practice and any relevant statutory requirements.

Management Measures		
Tasks	**Actions**	**Timing**
Identify specific areas of pest infestation.	Prior to commencing the approved program of works (i.e. vegetation clearing) conduct a survey of the works site and adjacent areas (where accessible) in accordance with the Revised Pest and Invasive Species Plan (JWA 2024c) (**APPENDIX 5**) to identify and map the presence and location of pest infestations.	Prior to commencement of the construction phase.
Manage pest infestations within the works site.	In areas where vegetation clearance and earthworks are to occur: • clear and stockpile weed infested areas separately from weed free areas; and • dispose of, rather than reuse, weed infested material in accordance with local government requirements. Following vegetation clearance works, monitor the area for new weed infestations or reinfestation in accordance with the Revised Pest and Invasive Species Plan (JWA 2024c) (**APPENDIX 5**), and treat in accordance with: • Department of Agriculture, Forestry and Fisheries (DAFF) requirements and industry best practice as detailed in http://www.daff.qld.gov.au/plants/weeds-pest-animals-ants • LBEMP Element 2 - Fauna; and • LBEMP Element 3 - Flora. Preference should be given to the use of manual control measures near waterways adjacent to works site and any herbicides used in the control of weeds on site are to be suitable for use near waterways.	Prior to and during the construction phase.
Minimise the introduction and dispersal of pest species.	Ensure that all vehicles, plant and equipment brought onto the works site is weed and red imported fire ant free through the use of appropriate pest hygiene declarations and / or inspections in accordance with the Revised Pest and Invasive Species Plan (JWA 2024c) (**APPENDIX 5**). Ensure that all equipment (e.g. machinery, vehicles and clothing) used in weed-infested areas on the works site are cleaned of weed material, including soil potentially containing weed seed, before moving into weed-free areas of the works site or off-site. (Note that the LP Act requires that written notice must be provided before supplying (including disposal to a licensed waste facility) any 'thing' (including gravel, machinery, mulch, packing material, sand, soil, vehicles etc.) that is, or could be, contaminated with certain declared Class 2 plants).	Ongoing during the construction phase.

Management Measures		
Tasks	**Actions**	**Timing**
	Avoid any unnecessary movement of vehicles, plant and equipment, or personnel in areas of known weed infestation and in areas of retained vegetation. Ensure that all mulch and fill material imported to the site is certified as being weed and red imported fire ant free.	
Record keeping	The following records and reports are to be retained in relation to this environmental management element and shall be made available to relevant administering authorities upon request: • copies of pest hygiene declarations or other evidence that materials and equipment used on site are pest free (e.g. inspection records); • copies of any 'written notice' required to be provided under the LP Act; and • records of pest monitoring and treatment conducted throughout the construction phase.	Ongoing
Corrective actions	In the event of a non-compliance with the stated performance indicators, corrective action procedures should be implemented in accordance with **SECTION 5** of this LBEMP Sub-Plan 08. Appropriate corrective actions in relation to this environmental management element may include, but may not be limited to: • treatment of any new infestations or reinfestation in accordance with the Revised Pest and Invasive Species Plan (JWA 2024c) (**APPENDIX 5**); • review work practices to avoid unnecessary movement of people, plant or equipment into areas of known weed infestation or retained vegetation; • consider establishing a weed washdown bay on site (refer to Revised Pest and Invasive Species Plan (JWA 2024c) – **APPENDIX 5**) to clean down equipment prior to entry / exit from the site; and • environmental awareness training of personnel.	Ongoing

4.6 Element 6: Soil Erosion, Sediment Loss and Water Quality

Rationale
The approved works program, including vegetation clearance works and bulk earthworks, has the potential to impact on water quality and potential habitat for MNES within downstream waterways and wetlands. Appropriate erosion and sedimentation controls must be implemented to minimise the release of sediment and other contaminants generated by construction activities into downstream waterways.
Objective / Target
• To minimise changes to water quality within receiving waters as a result of the approved works program. • To minimise sedimentation resulting in the loss or degradation of potential habitat for MNES within receiving waters as a result of the approved works program.
Performance Indicators
• No physical evidence of on-site erosion leading to the off-site transport and deposition of sediment. • Progressive establishment of stable soils as soon as practicable following completion of vegetation clearance and grubbing works within the works site.

Management Measures		
Tasks	**Actions**	**Timing**
Appropriately manage development activities to maintain acceptable water quality levels within receiving waterways and wetlands.	Adhere to all water quality assurance measures in accordance with the approved Erosion and Sediment Control Strategy (Design Flow 2024) (**APPENDIX 6**).	Prior to and ongoing during the construction phase.
Record keeping	The following records and reports are to be retained in relation to this environmental management element and shall be made available to relevant administering authorities upon request: • all records necessary to satisfy council and relevant environmental management plans.	Ongoing
Corrective Actions	In the event of a non-compliance with the stated performance indicators, corrective action procedures should be implemented in accordance with **SECTION 5** of this LBEMP Sub-Plan 08 and the approved Erosion and Sediment Control Strategy (Design Flow 2024) (**APPENDIX 6**). Appropriate corrective actions in relation to this environmental management element are provided in the approved Erosion and Sediment Control Strategy (Design Flow 2024) (**APPENDIX 6**). and include, but are be limited to:	Ongoing

Management Measures		
Tasks	**Actions**	**Timing**
	• removal of sediment, reinstatement of sediment fences or other maintenance of erosion and sediment control measures; and • revaluation of the size, location and type of erosion and sediment control measures to improve effectiveness in response to monitoring results.	

4.7 Element 7: Acid Sulphate Soils

Rationale
The works program involves filling and excavation of material greater than 5m AHD in areas that are unlikely to contain actual and potential acid sulphate soils (ASS). Portions of the MIBA development area (offsite) are located below 5m AHD and are likely to contain actual and potential acid sulphate soils (ASS). Disturbance of ASS has the potential to result in release acidic discharge and other contaminants to soil and waters impacting on potential habitat for MNES flora and fauna. Appropriate soil management practices must be employed in order to avoid detrimental impacts to land and water within and adjacent to the works site associated with disturbance to ASS. A detailed ASS management plan has been developed.
Objective / Target
• To minimise and where possible, avoid the exposure of ASS, and prevent acid leachate from leaving the site and potentially impacting on adjacent waters.
Performance Indicators
• Compliance with the requirements of relevant local and state government approvals that deal with the management of Acid Sulphate Soils.

Management Measures		
Tasks	**Actions**	**Timing**
Appropriately manage development activities involving disturbance to acid sulphate soils.	An Acid Sulphate Soils Investigation and Management Plan (Tectonic 2019) (**APPENDIX 7**) and Addendum to Acid Sulfate Soil Management Plan (Tectonic 2023) (**APPENDIX 8**) has been prepared for the site.	Complete
	Implement the Acid Sulphate Soils Investigation and Management Plan (Tectonic 2019) (**APPENDIX 7**) and Addendum to Acid Sulfate Soil Management Plan (Tectonic 2023) (**APPENDIX 8**) to ensure that no environmental harm as defined under the *Environment Protection Act 1994* is caused.	Ongoing during the construction phase.
Record keeping	The following records and reports are to be retained in relation to this environmental management element and shall be made available to relevant administering authorities upon request: • all records required under the approved Acid Sulphate Soils Management Plan.	Ongoing
Corrective actions	In the event of a non-compliance with the stated performance indicators, corrective action procedures should be implemented in accordance with **SECTION 5** of this LBEMP Sub-Plan 08.	Ongoing

5 NON-CONFORMANCE AND CORRECTIVE ACTION PROCEDURES

In the event of a non-compliance with the stated performance indicators of this LBEMP Sub-Plan 08 or any other incidents that cause actual or potential harm to any MNES, relevant investigations should be undertaken as detailed in the Implementation, Monitoring and Improvement Plan (**TABLE 7**) to identify the cause of the non-compliance; and a corrective action report (CAR) should be prepared including the following details:

- description of the non-compliance;
- date of non-compliance;
- identified cause of non-compliance;
- description of proposed corrective actions;
- persons / entities consulted in developing corrective actions;
- timeframe for implementation of corrective actions;
- nominated person responsible for implementation; and
- validation monitoring requirements.

An example CAR form is provided in **APPENDIX 9.**

Appropriate corrective actions should be determined by the Developer in consultation with relevant experts and the administering authority (where required) and shall be implemented by the Developer within the agreed timeframe noted on the CAR.

Validation monitoring should be undertaken to confirm that the nominated corrective actions have been effective.

The Developer shall maintain a register of CARs, which shall be made available to any relevant local, state or commonwealth government department, any statutory authority or any other person, consensually or as lawfully required.

The Developer shall notify the Commonwealth Department of the Environment of any non-conformances with this LBEMP Sub-Plan 08 or any environmental incidents involving MNES as soon as practicably possible.

TABLE 7
IMPLEMENTATION, MONITORING AND IMPROVEMENT PLAN

Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
Fauna (**SECTION 4.2**)	Fauna fencing	Pre, during and post construction	Principal Contractor	Contractor/Fauna Spotter/Ecologist to investigate circumstances and cause of incident	Fencing to be reviewed, adjusted, and replaced as deemed necessary following an incident assessment. Adjustments to the maintenance schedule may be required and plans modified accordingly.
	Health of retained habitat	Pre, during and post construction	Principal Contractor/Ecologist	Contractor/Ecologist to investigate removal or poor health of vegetation earmarked for retention	Fencing/barriers demarcating/protecting retained vegetation to be reviewed, adjusted, and replaced as deemed necessary following an incident assessment. Similarly, sediment and water flow regimes should be reviewed. Amendments to clearing operating procedures should be considered where applicable. Adjustments to the fencing/barrier maintenance schedule may be required and plans modified accordingly. Rehabilitation works will be necessary where significant degradation or loss of vegetation has occurred.
	Fauna safety	Pre and during construction	Principal Contractor/Fauna Spotter	Contractor/Fauna Spotter to investigate circumstances and cause of incident	The following aspects of fauna safety are to be reviewed and adjusted as appropriate: • pre-clearing fauna surveys and relocations; • tree-hollow inspections; • vehicle speed limits; • employee fauna awareness training; and/or • clearing procedure.

Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
					The Revised Fauna Management Plan (JWA 2024b) (**APPENDIX 3**) will be reviewed and adapted to reflect any changes deemed necessary.
Koalas (**SECTION 4.3**)	Koala safety	Pre and during construction	Principal Contractor/Fauna Spotter/MBRC/DES	Contractor/Fauna Spotter to investigate circumstances and cause of incident	The following aspects of Koala safety are to be reviewed and adjusted as appropriate: • pre-clearing koala surveys and relocations; • vehicle speed limits; • compliance with no dog policies; • employee fauna awareness training; • fencing; and/or • clearing procedure. The Revised Fauna Management Plan (JWA 2024b) (**APPENDIX 3**) will be reviewed and adapted to reflect any changes deemed necessary.
Flora (**SECTION 4.4**)	Health of retained vegetation	Pre, during and post construction	Principal Contractor/Ecologist	Contractor/Ecologist	Fencing/barriers demarcating/protecting retained vegetation to be reviewed, adjusted, and replaced as deemed necessary following and incident assessment. Similarly, sediment and water flow regimes should be reviewed. Amendments to clearing operating procedures may be considered where appropriate. Adjustments to fencing/barrier maintenance schedule may be required and plans modified accordingly. Rehabilitation works will be necessary where significant vegetation degradation or loss has occurred.

Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
					The Revised Vegetation Management Plan (JWA 2024d) (**APPENDIX 4**) will be reviewed and adapted to reflect any changes deemed necessary.
	Protection of threatened plants	Pre, during and post construction	Principal Contractor/Ecologist	Contractor/Ecologist	No threatened plants are currently known from the site. If threatened plants are identified on or adjacent to the clearing area, the management strategy for such plants must be reviewed and adapted to the species and location. Clearing, maintenance, and rehabilitation procedures must be adapted to ensure an appropriate ecological outcome. The Revised Vegetation Management Plan (JWA 2024d) (**APPENDIX 4**) will be reviewed and adapted to reflect any changes deemed necessary.
Weeds and Pests (**SECTION 4.5**)	Minimisation of weed introduction and spread	Pre, during and post construction	Principal Contractor/Landscaper/ Bush rehabilitator	Contractor/Ecologist/ Landscaper/Bush Rehabilitator	Weed infestations are to be prevented and managed as outlined in the Revised Pest and Invasive Species Plan (JWA 2024c) (**APPENDIX 5**). If infestations occur, measures contained in the Plan should be reviewed and adapted based on the weed species and extent of infestation.
	Control of pest animals	During and post construction	Principal Contractor/Ecologist	Contractor/Ecologist	Pest populations are to be managed as outlined in the Revised Pest and Invasive Species Plan (JWA 2024c) (**APPENDIX 5**). If pests are recorded, measures contained in the Plan should be reviewed and adapted based on the pest species and extent of presence.

Element	Monitoring Activity			Incident Response	Corrective Action
	What	When	Who		
Soil Erosion, Sediment Loss and Water Quality (**SECTION 4.6**)	Control of erosion and sedimentation	Pre, during and post construction	Principal Contractor/Engineer	Contractor/Engineer	Erosion and sedimentation control devices are to be maintained as per the approved Erosion and Sediment Control Strategy (Design Flow 2024) (**APPENDIX 6**). If the measures contained within this plan do not result in acceptable outcomes, the plan should be reviewed and modified accordingly. Ongoing monitoring must be implemented to ensure that management measures are successful.
	Maintenance of appropriate water quality and surface flow regimes	Pre, during and post construction	Principal Contractor/Engineer	Contractor/Engineer	Water quality and flow regimes are to be maintained as per the approved Erosion and Sediment Control Strategy (Design Flow 2024) (**APPENDIX 6**). If the measures contained within this plan do not result in acceptable outcomes, the plan should be reviewed and modified. Ongoing monitoring must be implemented to ensure that management measures are successful.
Acid Sulphate Soils (**SECTION 4.7**)	Acid sulphate soils are appropriately managed	Pre, during and post construction	Principal Contractor/Engineer	Contractor/Engineer	Acid sulphate soils are to be maintained as per the Addendum to Acid Sulphate Soils Investigation and Management Plan (**APPENDIX 7**) and Addendum to Acid Sulfate Soil Management Plan (Tectonic 2019 and 2023) (**APPENDIX 8**). If the measures contained within this plan do not result in acceptable outcomes, the plan should be reviewed and modified. Ongoing monitoring must be implemented to ensure that management measures are successful.

6 RECORD KEEPING

The Developer is to maintain appropriate records concerning all tasks and actions undertaken in accordance with this LBEMP Sub-Plan 08 including:

- copies of all relevant permits or approvals relevant to the works the subject of this LBEMP Sub-Plan 08;
- the name, qualifications and contact details of the suitably qualified ecologist engaged to the assist in the preparation of this LBEMP Sub-Plan 08;
- the dates and findings of the pre-clearance flora and fauna surveys and the name, qualifications and contact details of the suitably qualified ecologist who completed the surveys;
- the name, qualifications and contact details of the licensed Fauna Spotter / Catcher engaged to supervise vegetation clearance works;
- the dates and locations of all vegetation clearance works;
- the post-clearance Fauna Management Report as required by **SECTIONS 4.2 and 4.3** of this LBEMP Sub-Plan 08;
- any records required to be kept in for specific environmental management elements as identified in **SECTION 4** of this LBEMP Sub-Plan 08; and
- all incident reports and corrective action requests generated during the works program.

All records shall be kept for a minimum of 5 years following completion of the works program and shall be made available to any relevant local, state or commonwealth government department, statutory authority or any other person, consensually or as lawfully required.

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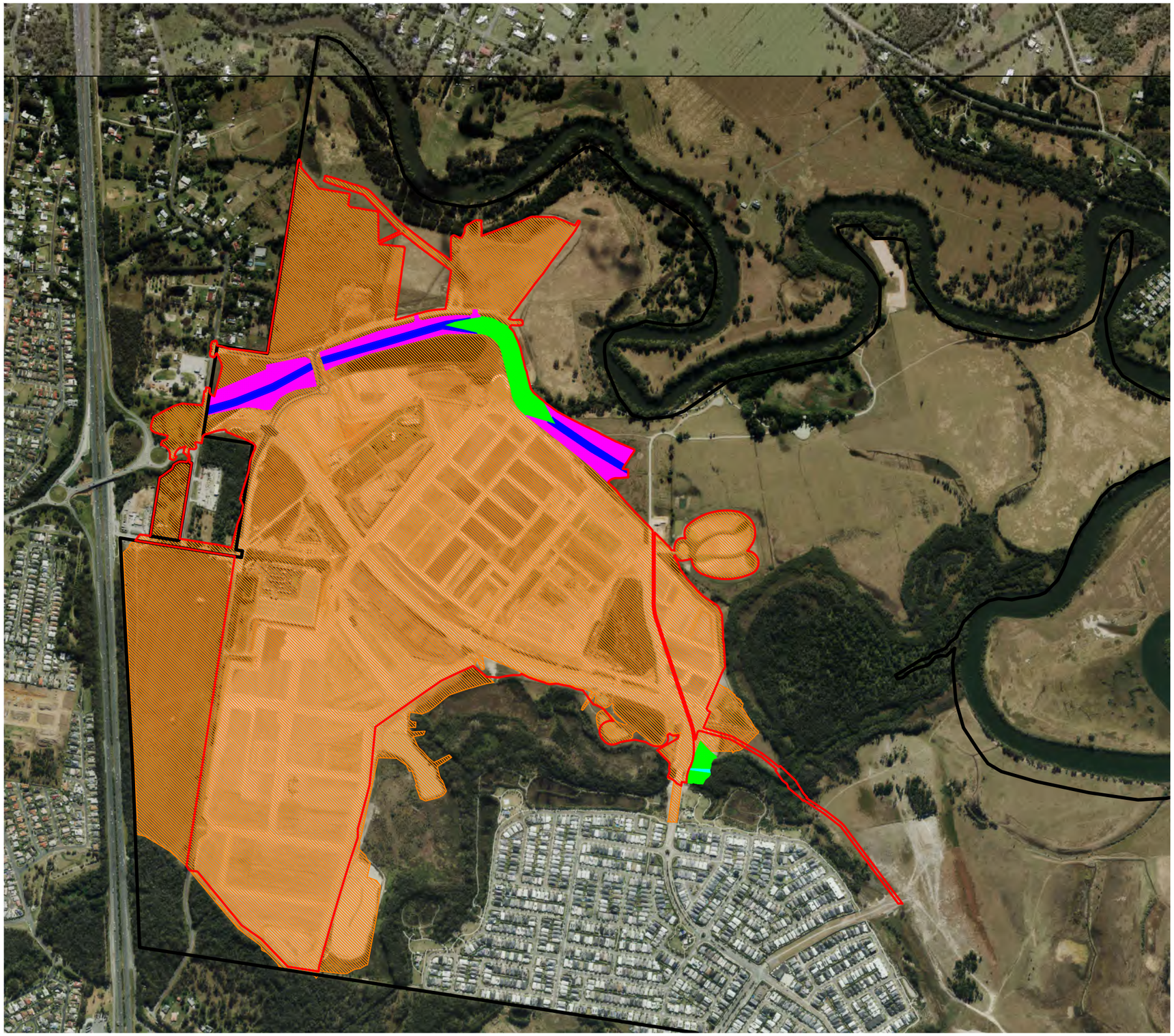
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Tectonic Geotechnical Pty Ltd (2023).Addendum to *Acid Sulfate Soil Management Plan North Harbour Mixed Industry and Business Area (MIBA)*. Report Prepared for North Harbour Holdings Pty Ltd.

APPENDIX 1 – MIBA BULK EARTHWORKS – SITE STABILISATION / ECOLOGICAL RESTORATION PLAN (PLACE DESIGN GROUP 2020 REVISED BY JWA 2023)



LEGEND

- Revised LBEMP Sub-plan 06 Site Boundary
- NEBP Site Boundary

Revegetation

- RV1 - Occasionally indundated restoration area
- RV2 - Frequently indundated restoration area
- RV3 - Seeding for stabilisation & future application
- MV2A - Marine vegetation community - Saltmarsh
- MV2B - Marine vegetation community - Saltmarsh

Refer to specification & plant schedules

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: KN Group (Ref: FLOOD DEM SLR 231110.dwg);Place Design Group 2020; Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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PROJECT
LBEMP Sub-Plan 06
NEBP MIBA Bulk Earthworks
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Moreton Bay Regional Council LGA

FIGURE 1A

PREPARED: BW
DATE: 24 November 2023
FILE: Q15003_LBEMP06_20231115.dwg

TITLE

LANDSCAPE REVEGETATION PLAN - REVISED

REVEGETATION PLANTING SCHEDULE

RV1 - OCCASSIONALLY INUNDATED AREAS

Trees @ 1/10m^2

Stratum	Botantical Name	Common Name	% of Mix
Trees	*Casuarina glauca*	Swamp she-oak	10%
	Cupaniopsis anacardioides	Tuckeroo	2%
	Elaeocarpus obovatus	Blueberry ash	5%
	Eucalyptus tereticornis	Queensland blue gum	10%
	Ficus coronata	Sandpaper fig	5%
	Glochidion sumatranum	Umbrella cheese tree	30%
	Lophostemon suaveolens	Swamp turpentine	13%
	Melaleuca linariifolia	Flax-leaved paperbark	5%
	Melaleuca quinquenervia	Broad-leaved paperbark	15%
	Melicope elleryana	Pink-flowered doughwood	5%
		Total	100%

Shrubs @ 1/5m^2

Stratum	Botantical Name	Common Name	% of Mix
Shrubs	*Acacia disparrima subsp. Disparrima*	Hickory wattle	10%
	Acacia leiocalyx	Black wattle	10%
	Acacia melanoxylon	Blackwood wattle	15%
	Alphitonia excelsa	Red ash	10%
	Banksia oblongifolia	Dwarf banksia	2%
	Glochidion ferdinandi	Cheese tree	10%
	Jagera pseudhorus	Foambark	5%
	Leptospermum polygalifolium	Tantoon	5%
	Melaleuca nodosa	Prickly-leaved paperbark	10%
	Pittosporum revolutum	Yellow pittosporum	13%
	Streblus brunonianus	Whalebone tree	5%
	Trema tomentosa	Poison peach	5%
		Total	100%

Groundcovers to Balance Area @ 1/2m^2

Stratum	Botantical Name	Common Name	% of Mix
Groundcovers, Rushes & Grasses	*Dianella caerulea var. caerulea*	Blue flax-lily	2%
	Hibbertia scandens	Climbing guinea flower	10%
	Hibbertia stricta	Erect guinea flower	5%
	Imperata cylindrica	Blady grass	20%
	Lomandra hystrix	Swamp matrush	20%
	Lomandra longifolia	Spiny-headed matrush	25%
	Melaleuca thymifolia	Thyme-leaf honey-myrtle	3%
	Themeda triandra	Kangaroo grass	12%
	Xanthorrhoea fulva	Swamp grasstree	3%
		Total	100%

RV2 - FREQUENTLY INUNDATED AREAS

Groundcovers to Balance Area @ 5m^2

Stratum	Botantical Name	Common Name	% of Mix
Groundcovers, Rushes & Grasses	*Baumea Articulata*	Jointed twigrush	7%
	Baumea rubiginosa	Soft twigrush	7%
	Blechnum indicum	Swamp water fern	7%
	Cyperus exaltatus	Tall flatsedge	7%
	Cyperus polystachyos	Bunchy sedge	7%
	Eleocharis sphacelata	Tall spikerush	7%
	Empodisma minus	Spreading rope rush	7%
	Fimbristylis ferruginea	Rusty sedge	7%
	Gahnia clarkei	Tall sawsedge	7%
	Juncus articulatus	Jointed rush	10%
	Lepironia articulata	Grey sedge	7%
	Lygodium microphyllum	Snake fern	7%
	Persicaria decipiens	Slender knotweed	6%
	Philydrum langinosum	Frogmouth	7%
		Total	100%

MARINE PLANT MITIGATION PLANTING

MV2A - MARINE PLANT VEGETATION COMMUNITY 2 - SALTMARSH WITH MULCH

Plants @ 3/m^2

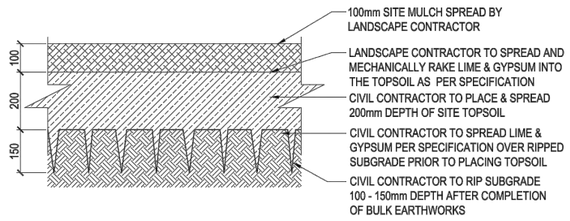
Stratum	Botantical Name	Common Name	% of Mix
Shrubs / Groundcovers	*Enchylaena tomentosa*	Ruby saltbush	20%
	Fimbristylis ferruginea	Rusty sedge	20%
	Sesuvium portulacastrum	Sea purslane	10%
	Sporobolus virginicus	Salt couch	15%
	Suaeda australis	Seabite	10%
	Triglochin striata	Streaked arrow grass	25%
		Total	100%

MV2B - MARINE PLANT VEGETATION COMMUNITY 2 - SALTMARSH WITHOUT MULCH

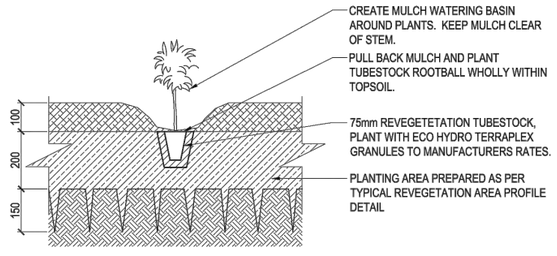
Plants @ 5/m^2

Stratum	Botantical Name	Common Name	% of Mix
Shrubs / Groundcovers	*Enchylaena tomentosa*	Ruby saltbush	20%
	Fimbristylis ferruginea	Rusty sedge	20%
	Sesuvium portulacastrum	Sea purslane	10%
	Sporobolus virginicus	Salt couch	15%
	Suaeda australis	Seabite	10%
	Triglochin striata	Streaked arrow grass	25%
		Total	100%

GENERAL NOTES:
REFER TO SPECIFICATION FOR RATES FOR LIME & GYPSUM.
TOPSOILING & MULCHING TO IMMEDIATELY FOLLOW BULK EARTHWORKS TO MINIMISE TIME THAT SITE IT EXPOSED AND AT RISK FROM EROSION.



1 TYPICAL REVEGETATION AREA SOIL PREPARATION DETAIL
SCALE 1:10



2 TYPICAL TUBESTOCK REVEGETATION PLANTING DETAIL
SCALE 1:2

Revegetation Methadology / Specification

1. Conduct soil testing of the subsoil at completion of the bulk earthworks cut operation to determine Ph & Salinty Levels. Soil testing is to include recommended rates for spreading lime and gypsum to the subsoil to ensure that it is suitable for supporting plant growth
2. Civil Contractor to rip the subsoil with the tines of their grader to 100-150mm depth and apply lime and gypsum at the recommended application rate per item 1 above.
3. Civil Contractor to spread 200mm depth of site topsoil over the rehabilitation area
4. Landscape Contractor to apply lime and gypsum to the site topsoil at the following rates: Agricultural Lime @ 150gms per m2; Gypsum @ 250gms per m2; and mechanically rake into the topsoil.
5. Spread site mulch or approved equivalent to 100mm depth across the revegetation area
6. Plant tubestock - with an all in one plant starter additive (soil conditioner, fertiliser and water retention product) such as ECO Hydro Terraplex granules or approved equal to manufacturers rates.
7. Soak the revegetation area thoroughly with water truck to ensure full penetration of water to the topsoil mass.
8. Undertake an 8 week establishment irrigation program. Ensuring that plant rootballs remain moist at all times.
9. Continue to monitor moisture levels in the soil and in the event of prolonged dry periods and setback of plant species seek authorisation for supplementary irrigation during the maintenance period.
10. Undertake a 12 month maintenance period. During the maintenance period weeds across the revegetation area are to be kept under control and the plants are to monitored and treated for disease and pest attack. Site visits are to be a minimum of 2 times a month evenly spaced.

Please note that Council require a 5m firebreak and maintenance access to adjoining properties. This firebreak is to be grass seeded and to be slashed throughout the maintenance period to maintain a maximum 300mm grass height.

Grass Seeding of Future Application

1. Civil Contractor to conduct soil testing of the subsoil at completion of the bulk earthworks cut operation to determine Ph & Salinty Levels. If levels are within normal tolerances continue as per below. Otherwise seek advice or treat soil as required under Acid Sulphate Soil Management Plan if applicable.
2. Civil Contractor to spread 100mm depth of site topsoil over the area to be seeded.
3. Civil Contractor to apply lime and gypsum to the site topsoil at the following rates: Agricultural Lime @ 150gms per m2; Gypsum @ 250gms per m2; and mechanically rake into the topsoil.
4. Areas not at high risk of erosion are to be drill seeded with a seasonally appropriate grass seed mix. Areas at risk of erosion are to hydroseeded with a bonding agent.
5. Grass areas are to be slashed to maintain a maximum height of approximately 300mm

Revegetation Performance Objectives and Monitoring

1. The revegetation is to be monitored to ensure that it establishes successfully and is performing as expected prior to hand over to Council at the end of the 12 month maintenance period. The contractor is to establish (peg the location of) fixed monitoring points at 250m centres. A photographic record shall be taken at each monitoring point and be provided to the Landscape Architect at planting and 3 monthly intervals to record the progress of the revegetation.
2. Progress towards rehabilitation success is to be measured against the criteria listed in Table 6 & 7 of the Raff Creek Restoration Concept Plan prepared by JWA Pty Ltd.

SOURCE: Place Design Group (2020) MIBA Bulk Earthworks - Restoration Plan

SCALE: As shown

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LBEMP Sub-Plan 06
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FIGURE 1B

PREPARED: BW
DATE: 24 November 2023
FILE: Q15003_LBEMP06_20231115.dwg

TITLE
REVEGETATION PLANT SCHEDULE & SOFTSCAPE DETAILS

APPENDIX 2 - SITE REHABILITATION PLAN - OPEN SPACE AREAS A, B AND C1, NORTH HARBOUR (JWA 2024A)

SITE REHABILITATION PLAN

Open Space Areas A, B and C1, North Harbour

A Report Prepared for
North Harbour Holdings Pty Ltd

APRIL 2024

JWA Pty Ltd

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DOCUMENT CONTROL

Document

Title	Site Rehabilitation Plan
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Version and Date	RW3 24/04/24
Client	North Harbour Holdings Pty Ltd

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RW1	DRAFT	19/12/22	Client	1	.pdf	Email
RW2	FINAL	10/08/23	JWA	1	Word	Email
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RW3	FINAL	23/04/24	JWA	1	Word	Email
RW3	FINAL	24/04/24	Client	1	.pdf	Email

Client Issue

Version	Date	Author		Approved by	
		Name	Initials	Name	Initials
RW1	19/10/22	Nicole Davies/ Adam McArthur	ND/ AM	Adam McArthur	AM
RW2	10/08/23	Grant Brearley	GB	Adam McArthur	AM
RW3	24/04/24	Grant Brearley	GB	Adam McArthur	AM

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1 INTRODUCTION

1.1 Background

JWA Pty Ltd (JWA) have been engaged by North Harbour Holdings Pty Ltd to complete a Site Rehabilitation Plan (SRP) for Open Space Areas A, B and C1 at the North Harbour development, Burpengary East (**FIGURE 1**).

It is understood that Open Space Areas A, B and C1 are proposed to be handed to Council at the end of 2023 and that Moreton Bay Regional Council (MBRC) have advised that these areas should be subject to rehabilitation works prior to handover. A Rehabilitation Plan for these areas is required in accordance with the following documents:

- Planning Scheme Policy: Environmental Areas and Corridors; and
- Planning Scheme Policy: Integrated Design -Appendix D Landscape Design and Street Trees.

This SRP provides details of the proposed rehabilitation works to be completed on the site. The plan includes specifics of the revegetation and regeneration areas and methods, maintenance activities and monitoring.

1.2 Proposed Rehabilitation Areas

Rehabilitation works are proposed to be completed in Open Space Areas A (OS-A), B (OS-B) and C1 (OS-C1) at the North Harbour development, as shown in **FIGURE 2**. The proposed rehabilitation areas cover a total of approximately 19.64 ha. Aerial photographs of the rehabilitation areas is provided in **FIGURES 3A & 3B.**

1.3 Rehabilitation Objectives

The objectives of this SRP are:

1. Revegetate using locally native trees, shrubs and groundcovers to achieve a desired vegetation structure and composition with multiple layers.
2. Encourage natural regeneration through weed control and supplementary planting as required.
3. To improve the value of the subject site as habitat for fauna groups.
4. To manage weeds using plantings of endemic species and best practice control methods.
5. To buffer retained vegetation and waterways from edge effects and other disturbance related impacts from the proposed development.
6. To utilise endemic species to reduce runoff, nutrient and sediment loads in neighbouring waterways and other potential impacts arising from the proposed development.



LEGEND

- Rehabilitation Areas
- North Harbour Site Boundary

REGIONAL CONTEXT



Scale 1 : 40 000

0 400m 800m 1200m 1600m 2000m

SOURCE: Google Maps

SCALE: 1 : 40 000 @ A3

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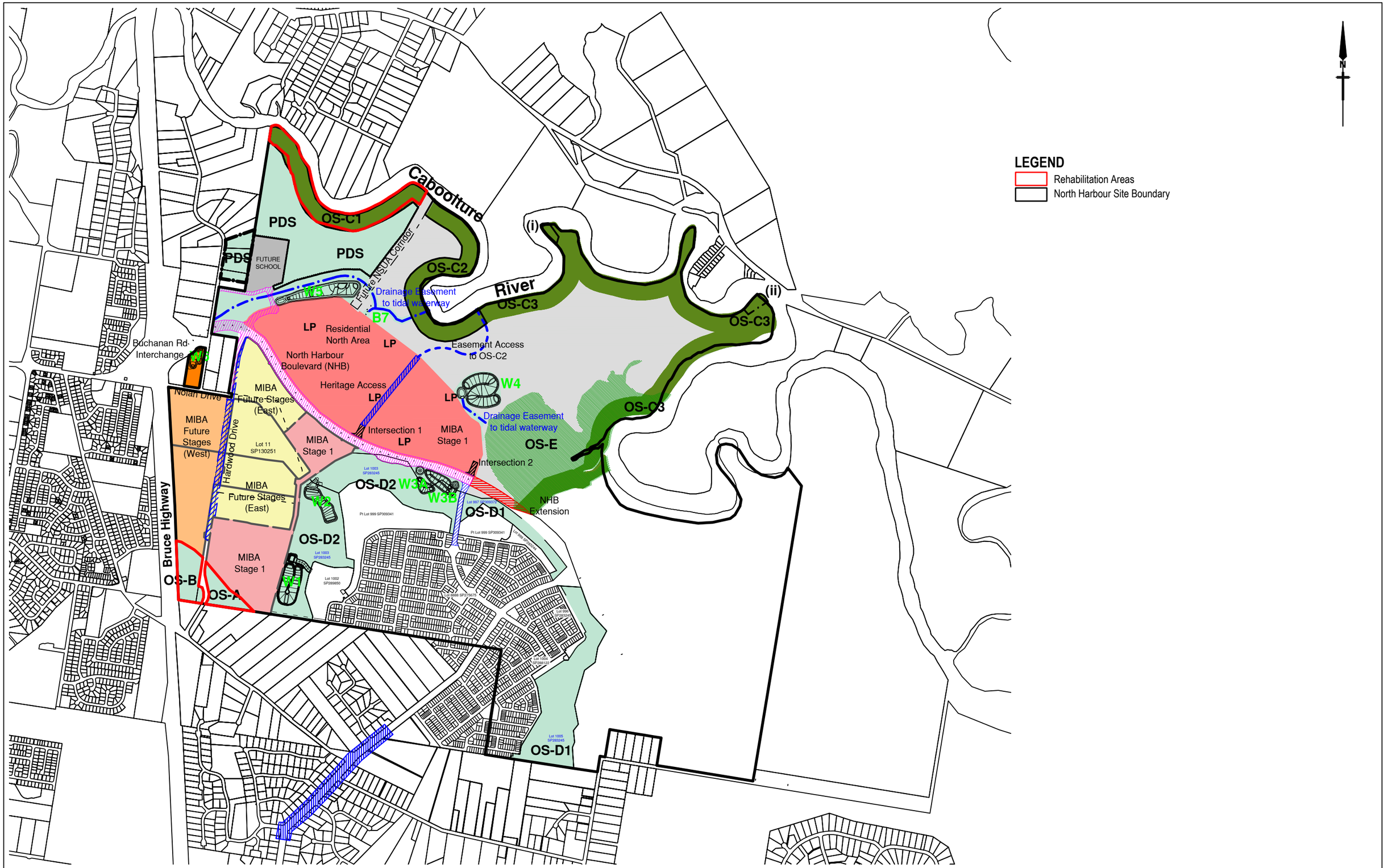
PROJECT
Site Rehabilitation Plan
North Harbour Open Space Areas A, B & C1
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 1

PREPARED: BW
DATE: 10 August 2023
FILE: Q15003_SRP_20230810.dwg

TITLE

LOCALITY PLAN



Scale 1 : 20 000

0 200m 400m 600m 800m 1000m

SOURCE: North Harbour - Land contributions & Work Contributions dwg No. NH-IA-2022 (Ref: 221206_NH_MIBA-RN MGA_JWA.dwg)
SCALE: 1 : 20 000 @ A3

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Site Rehabilitation Plan
North Harbour Open Space Areas A, B & C1
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 2

PREPARED: BW
DATE: 10 August 2023
FILE: Q15003_SRP_20230810.dwg

TITLE

NORTH HARBOUR DEVELOPMENT



LEGEND

- Rehabilitation Areas - Open Space Areas A & B
- North Harbour Site Boundary

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: MetroMap Aerial dated 26/07/22

SCALE: 1 : 2000 @ A3

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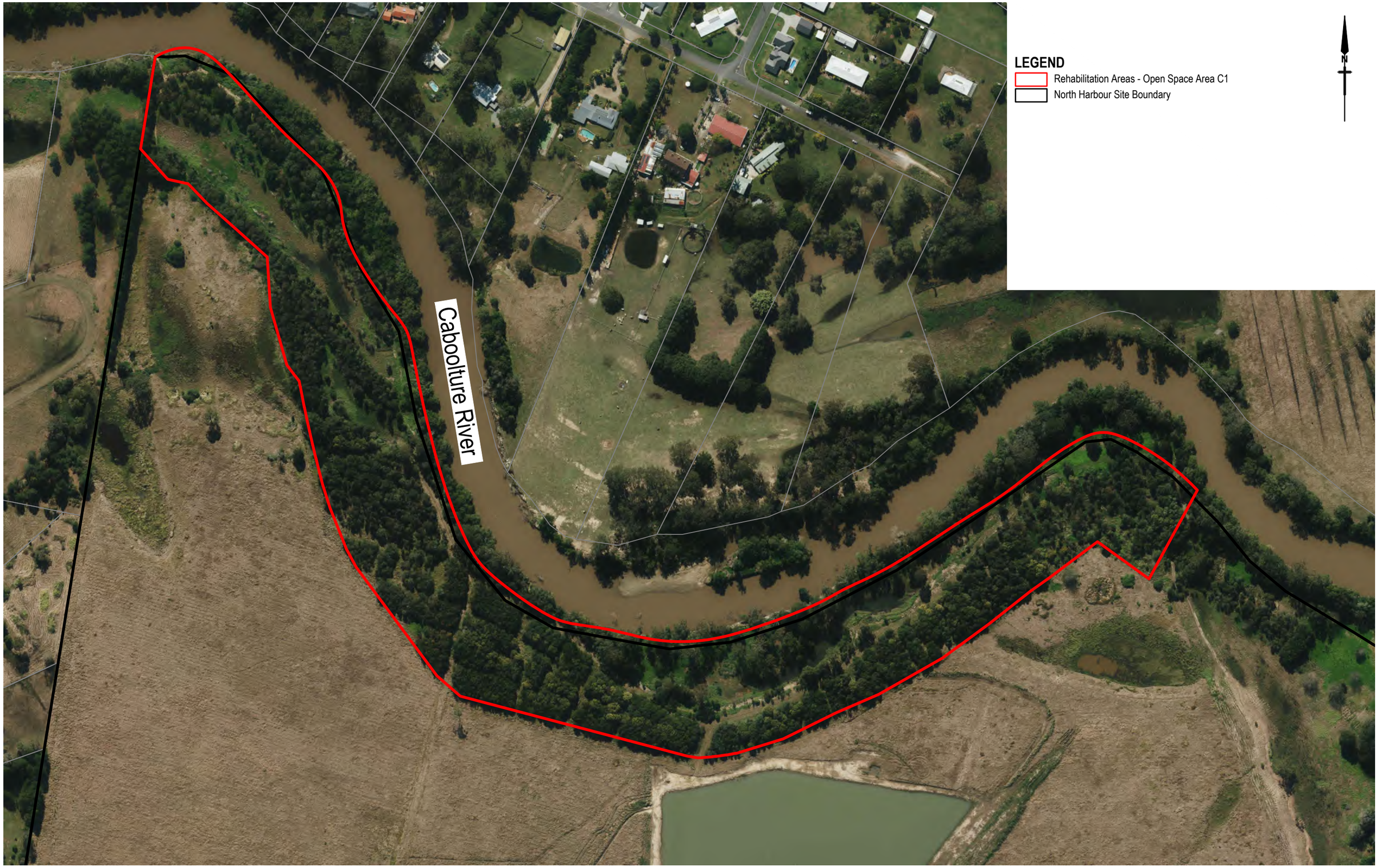
CLIENT
North Harbour Holdings Pty Ltd

PROJECT
Site Rehabilitation Plan
North Harbour Open Space Areas A, B & C1
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 3A

PREPARED: BW
DATE: 10 August 2023
FILE: Q15003_SRP_20230810.dwg

TITLE
AERIAL PHOTOGRAPH - OPEN SPACE AREAS A & B



LEGEND

- Rehabilitation Areas - Open Space Area C1
- North Harbour Site Boundary

N

Scale 1 : 3000

0 50m 100m 150m 200m

SOURCE: MetroMap Aerial dated 26/07/22

SCALE: 1 : 3000 @ A3

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PROJECT
Site Rehabilitation Plan
North Harbour Open Space Areas A, B & C1
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 3B

PREPARED: BW
DATE: 10 August 2023
FILE: Q15003_SRP_20230810.dwg

TITLE
AERIAL PHOTOGRAPH - OPEN SPACE AREA C1

2 IDENTIFICATION OF REHABILITATION AREAS

2.1 Introduction

This section describes the current condition of the rehabilitation areas and details the proposed types of rehabilitation works to be completed within each area.

2.2 Vegetation mapping

JWA were engaged to collect site specific ecological data to map vegetation communities and weed infestations. Two (2) JWA ecologists completed the site inspection on the 22nd November 2022. The site inspection identified the following four (4) vegetation communities (**FIGURES 4A & 4B).**

Community 1: *Melaleuca quinquenervia* and *Eucalyptus racemosa subsp. racemosa* mixed woodland

Dominant canopy species within this area include Broad-leaf paperbark (*Melaleuca quinquenervia*) and Scribbly gum (*Eucalyptus racemosa subsp. racemosa*). The midstorey is predominately comprised of a mix of Broad-leaf paperbark, Pink bloodwood (*Corymbia intermedia*), Swamp box (*Lophostemon suaveolens*), Acacia spp., and Red ash (*Alphitonia excelsa*).

Groundcover is predominately comprised of Spikey-headed mat-rush (*Lomandra longifolia*), Dianella sp., Wiry panic (*Entolasia stricta*), Scrambling lily (*Geitonoplesium cymosum*), Bracken fern (*Pteridium esculentum*), Tape vine (*Stephania japonica*), Graceful grass (*Ottochloa gracillima*) and Fringe-lily (*Thysanctus patersonii*).

Weed infestations vary throughout this community from scattered occurrences to significant infestations (refer to **SECTION 2.3**). Significant weed infestations occur along and within approximately 30m of the creek line. Exotic species include, Slash pine* (*Pinus elliottii*), Ochna* (*Ochna serrulata*), Lantana* (*Lantana camara*), Singapore daisy* (*Sphagneticola trilobata*), Camphor laurel* (*Cinnamomum camphora*), Corky passion vine* (*Passiflora suberosa*), Taro* (*Colocasia esculenta*), Cocos palm* (*Syagrus romanzoffiana*) and exotic grasses.

This vegetation community is representative of RE 12.5.3 (**Endangered**) and RE 12.3.5 (Least Concern) – transition zone between the two REs.

Community 2: *Eucalyptus tereticornis* fringing woodland

The canopy is dominated by Qld blue gum (*Eucalyptus tereticornis*).

The midstorey and ground layer is predominately comprised of exotic species, however some native species are present including Pennywort (*Centella asiatica*), Blady grass (*Imperata cylindrica*), Native wandering jew (*Commelina cyanea*), Foam bark (*Jagera pseudorhus*) and regenerating Eucalyptus species.



N

LEGEND

Rehabilitation Areas - Open Space Areas A & B

North Harbour Site Boundary

Vegetation Communities

Community 1: *Melaleuca quinquenervia* and *Eucalyptus racemosa* subsp. *racemosa* mixed woodland

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations; MetroMap Aerial dated 26/07/22

SCALE: 1 : 2000 @ A3

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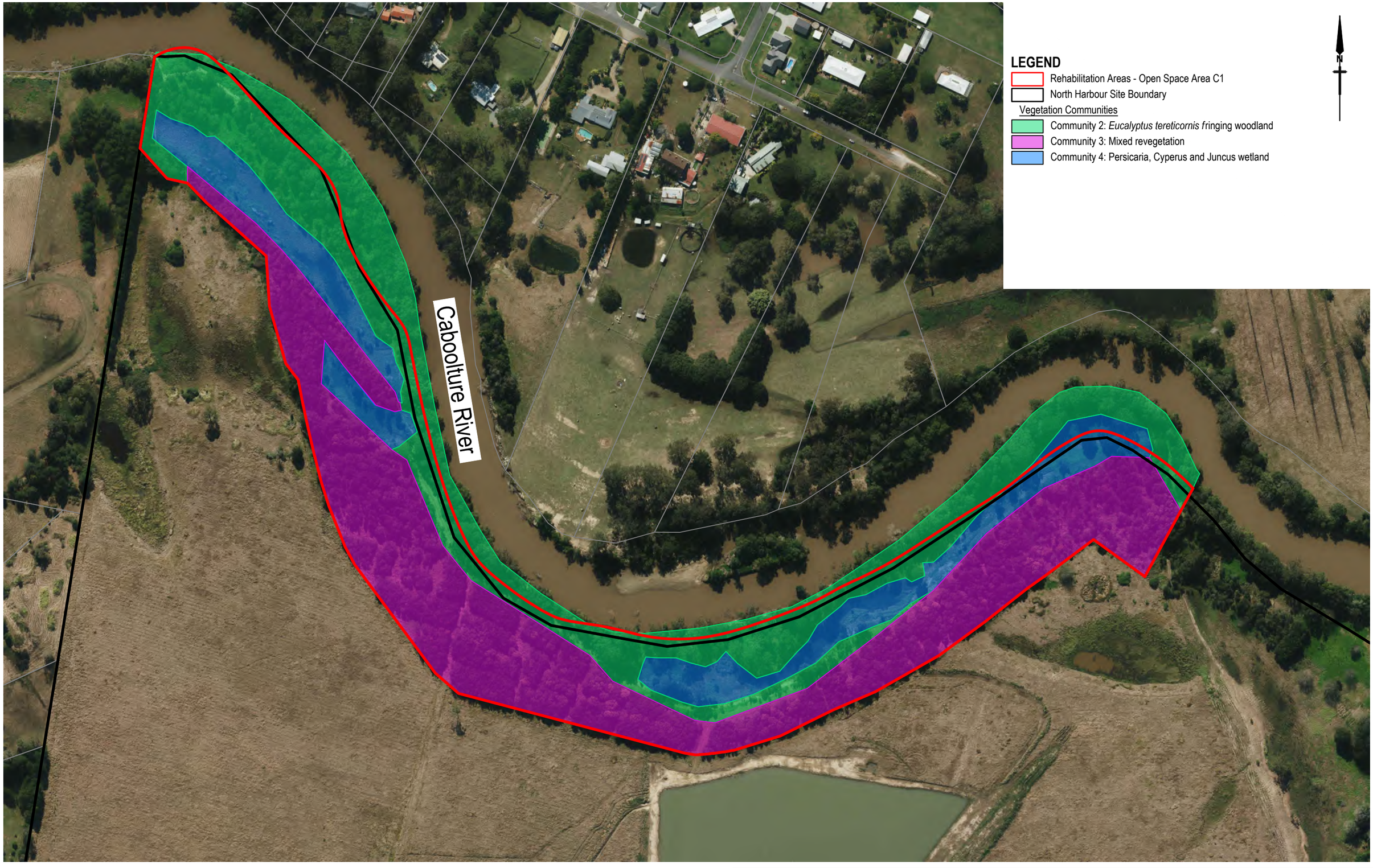
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FIGURE 4A

PREPARED: BW
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FILE: Q15003_SRP_20230810.dwg

TITLE
VEGETATION COMMUNITIES - OPEN SPACE AREAS A & B



LEGEND

- Rehabilitation Areas - Open Space Area C1
- North Harbour Site Boundary

Vegetation Communities

- Community 2: *Eucalyptus tereticornis* fringing woodland
- Community 3: Mixed revegetation
- Community 4: Persicaria, Cyperus and Juncus wetland

N

Scale 1 : 3000

0 50m 100m 150m 200m

SOURCE: JWA Site Investigations; MetroMap Aerial dated 26/07/22

SCALE: 1 : 3000 @ A3

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FIGURE 4B

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TITLE
VEGETATION COMMUNITIES - OPEN SPACE AREA C1

Exotic species include Lantana*, Bull thistle* (*Cirsium vulgare*), Paspalum sp.*, Purple top vervain* (*Verbena bonariensis*), Aster sp.* (*Symphyotrichum sp.*), Thickhead* (*Crassocephalum sp.*), Brazilian nightshade* (*Solanum seaforthianum*), Brazilian cherry* (*Eugenia uniflora*), Bitter melon* (*Momoroica charantia*), Mile-a-minute* (*Ipomoea cairica*), Groundsel* (*Baccharis halimifolia*), Wild tobacco tree* (*Solanum mauritianum*), Broad-leaved pepper tree* (*Schinus terebinthifolius*), Yellow bells* (*Tecoma stans*), Camphor laurel* (*Cinnamomum camphor*), and Giant devil's fig (*Solanum chrysotrichum*).

This vegetation is a disturbed representative of RE 12.3.7 (Least Concern).

Community 3: Mixed revegetation

This area has progressively been planted since December 2011. Planted species consist of Broad-leaf paperbark, Corymbia sp., Eucalypt sp., Acacia sp., Swamp oak (*Casuarina glauca*), and Macaranga (*Macaranga tanarius*). Dianella sp. Lomandra sp., and native grasses are also present.

Exotic species that has regenerated in this area include exotic grasses, Cobbler's pegs* (*Bidens Pilosa*), Blue billygoat* (*Ageratum houstonianum*), Caesarweed* (*Urena lobata*), Mile-a-minute* (*Ipomoea cairica*), Caster oil* (*Ricinus communis*), Slash pine* (*Pinus elliottii*), Lantana* (*Lantana camara*), Camphor laurel* (*Cinnamomum camphora*), and Broad leaf pepper tree* (*Schinus terebinthifolius*).

Community 4: *Persicaria, Cyperus* and *Juncus* wetland.

This area occurs in low-lying wet areas and predominately consists of native groundcover including Spotted knotweed (*Persicaria praetermissa*), Pale persicaria (*Persicaria lapathifolia*), Cyperus sp. and Juncus sp.

Exotic grasses are the main weed in this area.

2.3 Existing Weed Infestations

Significant weed infestations to be targeted during rehabilitation works (in accordance with **SECTION 5**) are identified in **FIGURES 5A & 5B.** The weed infestations have been split into the following five (5) Weed Zones (WZ) based on species and infestation extent:

- **WZ1:** The bulk of this zone is in a previously revegetated area (**PLATE 1**). Exotic groundcover and vines are the main concern in WZ1. Scattered exotic shrubs and trees are also present in some areas (particularly outside revegetated areas closer to the Caboolture River). Exotic species include grasses and forbs, Lantana*, Giant devil's fig*, Wild tobacco tree*, Caster oil*, Broad-leaved pepper tree*, Yellow bells*, Camphor laurel*, Slash pine*, Brazilian cherry*, Brazilian nightshade*, Bitter melon* and Mile-a-minute*.
- **WZ2:** WZ2 occurs along the bank of the Caboolture River. Exotic trees are the major concern in WZ2, particularly Broad-leaved pepper tree* (**PLATE 2**). Other exotic species include grasses and forbs, Lantana*, Giant devil's fig, Wild tobacco tree*,



LEGEND

- Rehabilitation Areas - Open Space Area C1
- North Harbour Site Boundary

Weed Zones

- Weed Point
- Weed Zone 3
- Weed Zone 4
- Weed Zone 5

Area	Common Name	Species
Weed Zone 3	Slash pine	*Pinus elliottii*
	Ochna	*Ochna serrulata*
	Lantana	*Lantana camara*
	Camphor laurel	*Cinnamomum camphora*
	Cocos palm	*Syagrus romanzoffiana*
Weed Zone 4	Singapore daisy	*Sphagneticola trilobata*
	Taro	*Colocasia esculenta*
	Ochna	*Ochna serrulata*
	Exotic grasses	
Weed Zone 5	Slash pine	*Pinus elliottii*
	Exotic grasses	
	Lantana	*Lantana camara*
Point 1	Lantana	*Lantana camara*
	Slash pine	*Pinus elliottii*
	Umbrella tree	*Schefflera actinophylla*
Point 2	Lantana	*Lantana camara*
	Ochna	*Ochna serrulata*
	Molasses grass	*Melinis minutiflora*
Point 3	Lantana	*Lantana camara*
	Corky passion vine	*Passiflora suberosa*
Point 4	Slash pine	*Pinus elliottii*
	Lantana	*Lantana camara*
Point 5	Camphor laurel	*Cinnamomum camphora*
	Slash pine	*Pinus elliottii*
	Lantana	*Lantana camara*
Point 6	Easter cassia	*Senna pendula var. glabrata*
	Broad-leaved pepper tree	*Schinus terebinthifolius*
Point 7	Molasses grass	*Melinis minutiflora*
	Blue billygoat	*Ageratum houstonianum*
	Lantana	*Lantana camara*
	Slash pine	*Pinus elliottii*
Point 8	Broad-leaved pepper tree	*Schinus terebinthifolius*
Point 9	Lantana	*Lantana camara*
	Corky passion vine	*Passiflora suberosa*
Point 10	Lantana	*Lantana camara*
Point 11	Cocos palm	*Syagrus romanzoffiana*
	Camphor laurel	*Cinnamomum camphora*
Point 12	Ground asparagus	*Asparagus aethiopicus*
Point 13	Paspalum	*Paspalum sp.*
	Camphor laurel	*Cinnamomum camphora*
	Easter cassia	*Senna pendula var. glabrata*
Point 14	Ochna	*Ochna serrulata*
	Camphor laurel	*Cinnamomum camphora*
	Broad-leaved pepper tree	*Schinus terebinthifolius*
Point 15	Camphor laurel	*Cinnamomum camphora*
	Umbrella tree	*Schefflera actinophylla*
Point 16	Ochna	*Ochna serrulata*
	Lantana	*Lantana camara*
	Broad-leaved pepper tree	*Schinus terebinthifolius*
Point 17	Ochna	*Ochna serrulata*
	Lantana	*Lantana camara*

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations; MetroMap Aerial dated 26/07/22

SCALE: 1 : 2000 @ A3

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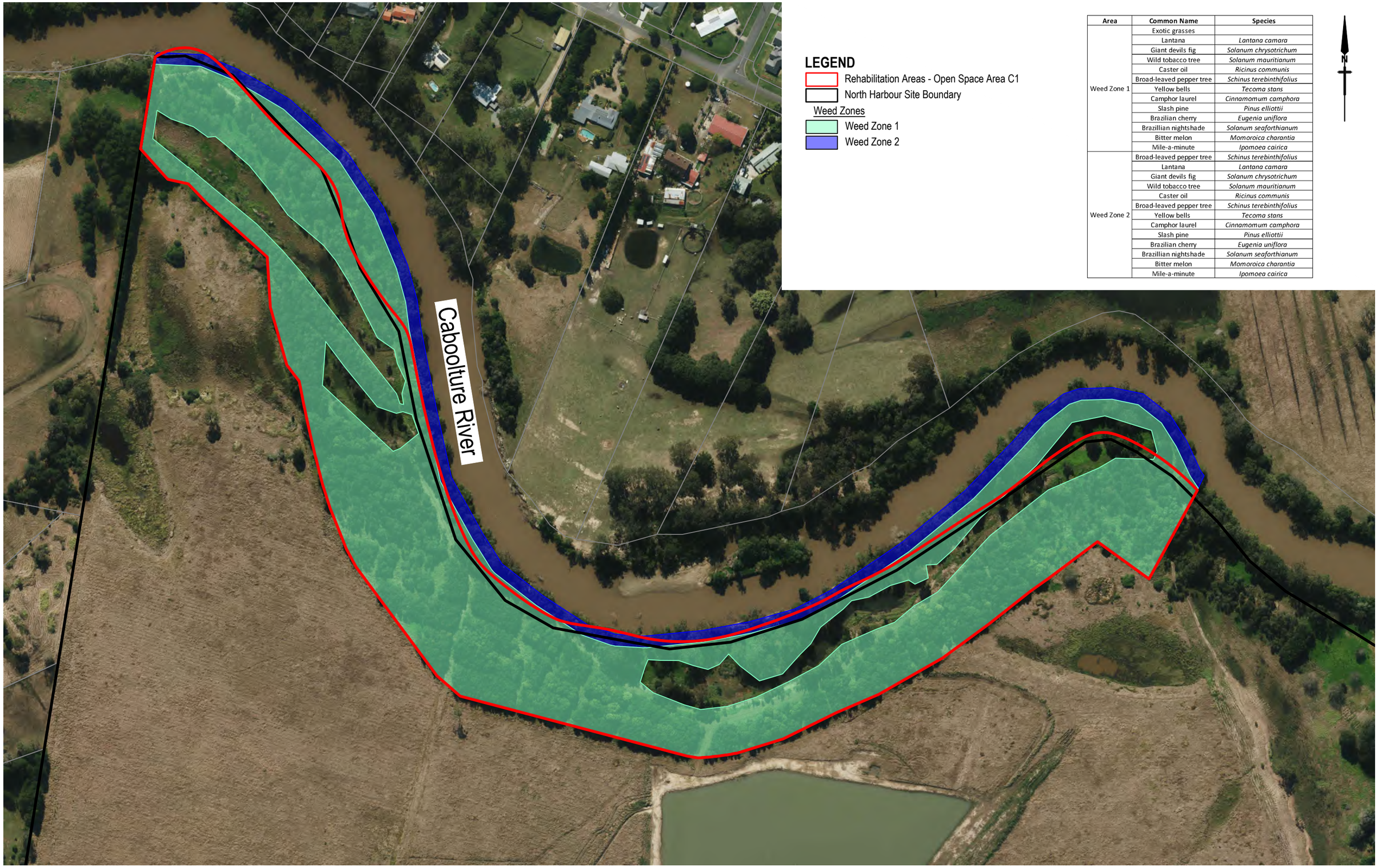
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FIGURE 5A

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TITLE
WEED ZONES
- OPEN SPACE
AREAS A & B



LEGEND

- Rehabilitation Areas - Open Space Area C1
- North Harbour Site Boundary

Weed Zones

- Weed Zone 1
- Weed Zone 2

Area	Common Name	Species
Weed Zone 1	Exotic grasses	
	Lantana	*Lantana camara*
	Giant devils fig	*Solanum chrysotrichum*
	Wild tobacco tree	*Solanum mauritianum*
	Caster oil	*Ricinus communis*
	Broad-leaved pepper tree	*Schinus terebinthifolius*
	Yellow bells	*Tecoma stans*
	Camphor laurel	*Cinnamomum camphora*
	Slash pine	*Pinus elliottii*
	Brazilian cherry	*Eugenia uniflora*
	Brazillian nightshade	*Solanum seaforthianum*
	Bitter melon	*Momoroica charantia*
	Mile-a-minute	*Ipomoea cairica*
Weed Zone 2	Broad-leaved pepper tree	*Schinus terebinthifolius*
	Lantana	*Lantana camara*
	Giant devils fig	*Solanum chrysotrichum*
	Wild tobacco tree	*Solanum mauritianum*
	Caster oil	*Ricinus communis*
	Broad-leaved pepper tree	*Schinus terebinthifolius*
	Yellow bells	*Tecoma stans*
	Camphor laurel	*Cinnamomum camphora*
	Slash pine	*Pinus elliottii*
	Brazilian cherry	*Eugenia uniflora*
	Brazillian nightshade	*Solanum seaforthianum*
	Bitter melon	*Momoroica charantia*
	Mile-a-minute	*Ipomoea cairica*

N

Scale 1 : 3000

0 50m 100m 150m 200m

SOURCE: JWA Site Investigations; MetroMap Aerial dated 26/07/22

SCALE: 1 : 3000 @ A3

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FIGURE 5B

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DATE: 10 August 2023
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TITLE
WEED ZONES - OPEN SPACE AREA C1

Caster oil*, Broad-leaved pepper tree*, Yellow bells*, Camphor laurel*, Slash pine*, Brazilian cherry*, Brazilian nightshade*, Bitter melon* and Mile-a-minute*.

- **WZ3:** Scattered occurrences of weeds occur throughout WZ3 and are predominately shrub and tree species (**PLATE 3**) including Slash pine*, Ochna*, Lantana*, Camphor laurel* and Cocos palm*.
- **WZ4:** Significant weed infestations occur along and within approximately 30 m of the creek line (**PLATE 4**). Singapore daisy*, Taro*, Ochna* and exotic grasses are the major weed species within this area.
- **WZ5:** Occurs approximately 15 m on either side of Nolan Dr (**PLATE 5**). Predominant weeds include Slash pine*, exotic grasses and Lantana*.

TABLE 1 provides a list of exotic species recorded on site.

TABLE 1: EXOTIC SPECIES ON SITE

Common Name	Scientific Name
Blue billygoat	*Ageratum houstonianum*
Ground asparagus	*Asparagus aethiopicus*
Groundsel	*Baccharis halimifolia*
Cobbler's pegs	*Bidens pilosa*
Chinese elm	*Celtis sinensis*
Camphor laurel	*Cinnamomum camphora*
Bull thistle	*Cirsium vulgare*
Taro	*Colocasia esculenta*
Thickhead	*Crassocephalum sp.*
	Cudrania cochinchinensis
Water hyacinth	*Eichhornia crassipes*
Cockspur coral tree	*Erythrina crista-galli*
Brazilian cherry	*Eugenia uniflora*
Mile-a-minute	*Ipomoea cairica*
Lantana	*Lantana camara*
Molasses grass	*Melinis minutiflora*
Bitter melon	*Momoroica charantia*
Ochna	*Ochna serrulata*
Paspalum	*Paspalum sp.*
Vasey's grass	*Paspalum urvillei*
Corky passion vine	*Passiflora suberosa*
Slash pine	*Pinus elliottii*
Guava	*Psidium guajava*
Caster oil	*Ricinus communis*
Umbrella tree	*Schefflera actinophylla*
Broad-leaved pepper tree	*Schinus terebinthifolius*
Easter cassia	*Senna pendula var. glabrata*
Smooth senna	*Senna septemtrionalis*
Giant devil's fig	*Solanum chrysotrichum*
Wild tobacco tree	*Solanum mauritianum*
Brazilian nightshade	*Solanum seaforthianum*

Common Name	Scientific Name
Singapore daisy	*Sphagneticola trilobata*
Cocos palm	*Syagrus romanzoffiana*
Aster	*Symphyotrichum sp.*
Yellow bells	*Tecoma stans*
Purple top vervain	*Verbena bonariensis*



PLATE 1: WZ1 examples



PLATE 2: WZ2 examples



PLATE 3: WZ3 examples



PLATE 4: WZ4 examples



PLATE 5: WZ5 examples

2.4 Restoration Potential and Management Zones

To determine the rehabilitation requirements, the proposed rehabilitation area has been divided into categories based on (i) restoration potential, and (ii) proposed management intent. This was completed to ensure that resources could be utilised in the most efficient way by focusing on those areas that contain particular management issues (i.e. weed infestations, lack of canopy cover, poor species diversity) and matching the appropriate restoration measures for those issues. The six (6) management categories are based on the McDonald (1996) vegetation restoration system and are shown in **TABLE 2.**

TABLE 2
VEGETATION MANAGEMENT CATEGORIES AND ACTIONS

Management Categories (Based on restoration potential)	**Management Actions**
1 – Very good condition. Structure and composition of vegetation community generally intact. Low evidence of degradation. Likely to recover fully with passive intervention.	Maintenance
2 – Good condition. Structure somewhat altered by low level impacts. Likely to recover fully if casual factors and their secondary impacts are removed by active intervention. Likely to degrade further if no remedial action taken.	Natural or Assisted regeneration
3 – Moderate condition. Structure altered by high level impacts. High level visual impacts may be present. Likely to recover fully if casual factors and their secondary impacts removed by active intervention, but will take longer to recover that a site of higher condition.	Assisted regeneration
4 – Poor condition. Structure and/or composition highly altered. Sufficient biota remain for natural regeneration if casual factors and their secondary impacts are removed and dynamic processes reinstated. Reintroduction of some species may be required.	Assisted regeneration/ Revegetation
5 – Very poor condition. Structure and/or composition severely altered. Either insufficient biota remain for natural regeneration (except some ruderal species), or severe weed infestation occurs and is likely to prevent native regeneration.	Assisted regeneration/ Revegetation
6 – Nil native vegetation.	Revegetation

Category 1, 2 and 3 areas will be subject to weed control techniques in accordance with **SECTION 5**. Subsequently, assisted natural regeneration will be encouraged in accordance with **SECTION 6.2**. Assisted natural regeneration will be monitored for the life of the program, and any areas that require extensive weed control, or where revegetation is considered necessary to achieve performance targets, will be revegetated in accordance with **SECTION 6.3**.

Category 4, 5 and 6 areas require weed control in accordance with **SECTION 5** followed by revegetation in accordance with **SECTION 6.3**. Areas have been further subdivided into revegetation types based on planting/offset requirements (refer **SECTION 6.3.2**).

Areas of the site to be rehabilitated and their respective management categories and zones are shown in **FIGURES 6A & 6B.**



LEGEND

- Rehabilitation Areas - Open Space Area C1
- North Harbour Site Boundary

Rehabilitation Zones

- Rehabilitation Category 2
- Rehabilitation Category 4 - Type A
- Rehabilitation Category 4 - Type B

N

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations; MetroMap Aerial dated 26/07/22

SCALE: 1 : 2000 @ A3

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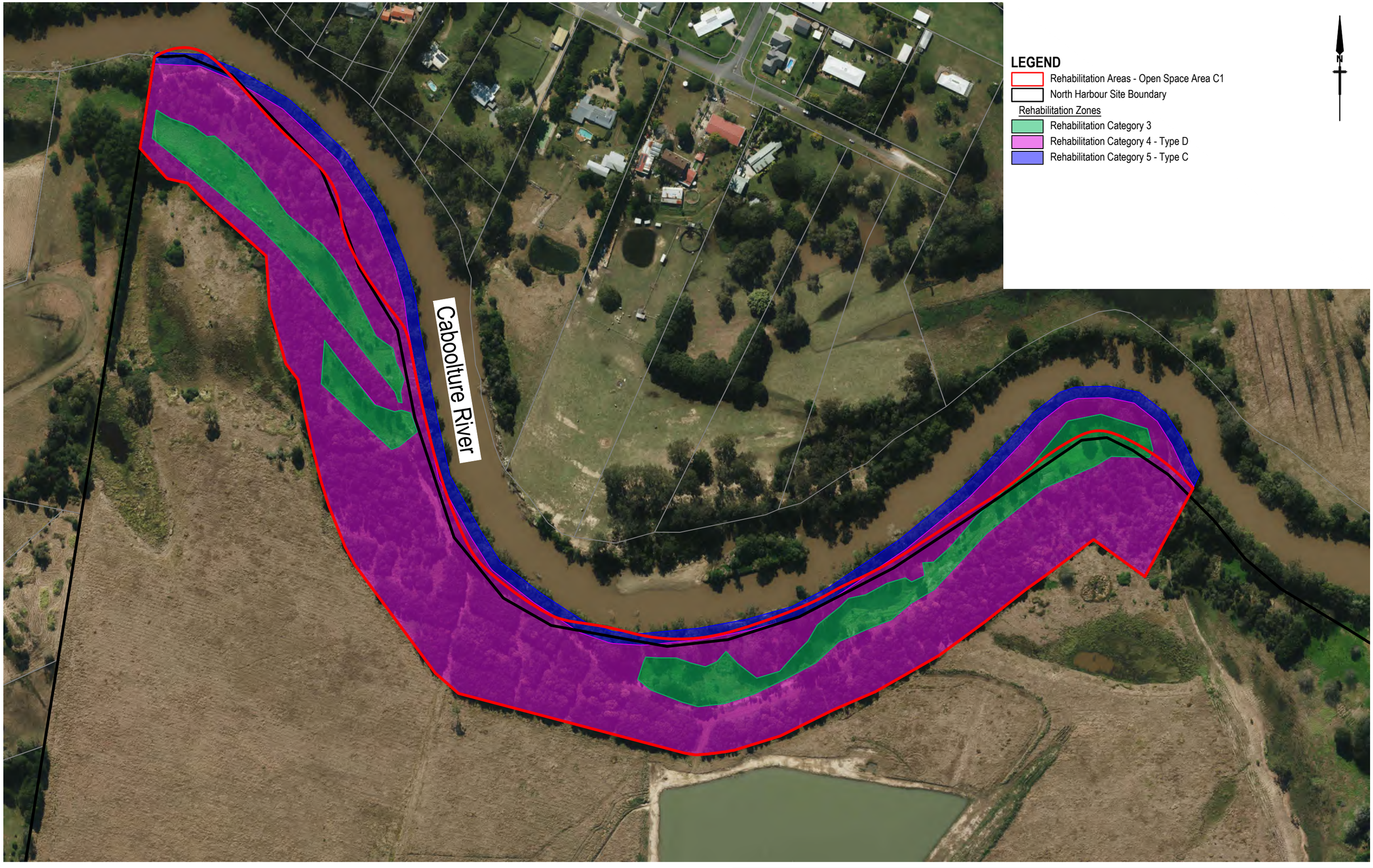
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FIGURE 6A

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TITLE
REHABILITATION ZONES - OPEN SPACE AREAS A & B



LEGEND

- Rehabilitation Areas - Open Space Area C1
- North Harbour Site Boundary

Rehabilitation Zones

- Rehabilitation Category 3
- Rehabilitation Category 4 - Type D
- Rehabilitation Category 5 - Type C

N

Scale 1 : 3000

0 50m 100m 150m 200m

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FIGURE 6B

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TITLE
REHABILITATION ZONES - OPEN SPACE AREA C1

3 REHABILITATION PHASES

Site rehabilitation works within each rehabilitation zone identified in **FIGURE 6** will be undertaken in four (4) phases. These phases are as follows:

- **Phase 1: Site Preparation and Weed Management** – aims to prepare the site for regeneration works and revegetation planting. Phase 1 will commence after bulk earthworks are completed.
- **Phase 2: Establishment Period** – aims to bring vegetation to a point where maintenance is not required in excess of the standard council maintenance regime. A twelve (12) week establishment period is proposed. The following is to be undertaken as part of the establishment period:
    - Initial planting in revegetation areas - will commence as soon as the rehabilitation consultant is satisfied that weed species have been appropriately controlled;
    - Growth and maintenance (i.e. weeding) will continue in the revegetation and regeneration areas for the remainder of the establishment period; and
    - Supplementary planting to replace dead seedlings in the revegetation areas will be undertaken prior to the end of the establishment period.
- **Phase 3: On-maintenance Period** - will continue for a minimum period of twelve (12) months from the completion of the establishment period. Site works during on-maintenance will include weeding, rubbish control and replanting if necessary. Monitoring during this phase will include monitoring against revegetation criteria and against the performance indicators.
- **Phase 4: Off-maintenance Period** – MBRC will assess the success of the rehabilitation and accept it as off-maintenance.

Details of works to be carried out during each of the rehabilitation phases are provided in the following sections.

4 SITE PREPARATION

4.1 Introduction

This section outlines the steps required to prepare the site for rehabilitation works. This includes site worker responsibilities, fencing and protection measures.

4.2 Site Workers Responsibilities

All site workers and contractors are to be fully aware of responsibilities under this SRP and other relevant management plans before they start work on site.

The following activities prohibited in the rehabilitation area:

- Storage of goods and equipment;
- Mixing of materials;
- Vehicle parking;
- Liquid disposal;
- Machinery repairs and/or refuelling;
- Construction site office or shed;
- Combustion of any material;
- Stockpiling of soil, rubble or debris; and
- Unauthorised pesticide, herbicide or chemical applications.

4.3 Disposal of Debris

All rubbish and foreign matter within the rehabilitation areas is to be removed and appropriately disposed of off-site.

Where vegetation is cleared or removed, vegetation waste shall be mulched and retained on site for re-use in landscape works. Any vegetation not suitable for mulching (i.e. fertile weed specimens) will be transported to an appropriate facility.

Hollow logs, if found, shall not be mulched until inspected by a qualified Ecologist. If any hollow logs are located on site, they will be relocated to the rehabilitation area as habitat features.

4.4 Prevention of Erosion and Sediment Control

Erosion and sediment control works shall be undertaken in accordance with any approved Soil and Erosion Management Plan prepared for the site or in general accordance with Soil Erosion and Sediment Control: Engineering Guidelines produced by the Queensland Institution of Engineers Australia (Qld IEA 1996).

As construction activities may cause potential sedimentation impacts on retained vegetation, temporary erosion and sedimentation control fencing is to be provided on site. All sediment fencing is to be in place before site preparation and other earthworks commence. The sediment fencing will be placed in such a way to stop any sediment entering the Rehabilitation Area and neighbouring areas of the subject site from the construction zone.

Prior to any site preparation operations the Project Manager (or other suitably qualified personnel) shall undertake an inspection of all sediment fencing. Erosion and sediment control measures will require inspection and maintenance throughout the course of construction works, during the maintenance period and following each rainfall event.

Where sediment deposition has occurred as a consequence of construction activities, work will be undertaken to relocate the sediment to a stabilised area. Such restoration will be completed in a reasonable timeframe.

The erosion and sediment control measures are not to be dismantled until all works on site have been completed and all areas within the Rehabilitation Area where soils have been disturbed have been revegetated or lined with jute matting. Jute matting has been selected over mulching due most of the rehabilitation areas being below the MBRC flood scenario mapping[1].

4.5 Site Protection and Access Fencing

The rehabilitation areas will be protected from unauthorised access by permanent fencing. Fencing will be fauna friendly (i.e. star pickets and three strands of smooth wire) and positioned on the boundaries of the Rehabilitation Area as indicated in **FIGURES 6A & 6B**. Signage will include the words “No entry – Rehabilitation area” and the contact details of the site person responsible for the rehabilitation area. Fencing will be erected immediately prior to rehabilitation work commencing. Any required maintenance access to the Rehabilitation Area will be via lockable gates.

[1] https://www.arcgis.com/apps/webappviewer/index.html?id=cc4aca419684475e979b27a59763a4bd

5 WEED MANAGEMENT

5.1 Introduction

Weeds are defined as a translocated or alien plant species occurring at a place outside its historically known natural range because of intentional or accidental spread by human activities which pose a threat by invasion or competition to exclude indigenous species.

Weeding is to commence during or immediately following site preparation works. Weed species identified on site, or considered likely to occur on site, and their preferred treatments are provided in **APPENDIX 1**.

5.2 Management Actions

The weed management program will apply to all Category 1 – 6 areas and will include the following strategic management actions:

- Weeds should be managed such that alternative weeds do not become established where weeds have been removed;
- Specifically, for WZ2, Broad-leaved pepper trees are currently assisting with bank stabilisation, so the following approach is recommended to achieve a minimum 50% reduction prior to handover:
    - 25% removal within WZ2 during the establishment phase, followed by planting of native species; and
    - 25% removal within WZ2 during the ongoing maintenance period, followed by planting of native species.
- Specifically, for WZ4, Singapore daisy in highly unlikely to be controlled closer to the site boundary due to cross-property infestations. A 50 m buffer from adjacent properties is considered appropriate, whereby Singapore daisy will be treated but may still be present during handover. Weed control should be completed using a staged approach that incorporates jute matting (where bare soil is present), and follow up weed control in areas disturbed as a result of initial weed removal; and
- Assisted regeneration shall encourage native plant regeneration and ensure that soil stability is maintained despite the removal of weeds.

5.3 Weeding Protocols

Weed management protocols are as follows:

- The rehabilitation contractor will control / minimise (see **SECTION 5.2**) all weeds on site during the establishment and the on-maintenance periods.
- Weeds will be managed using suitable control measures (i.e. chemical and/or physical control).
- Machinery must not introduce weed material to the site or spread such material throughout the site. Weed free certification will be required where applicable.

- All nursery stock shall be weed, pest and disease free and certified as such by the supplier where feasible. The certificates are to be obtained prior to the commencement of any regeneration/revegetation works on site.
- All mulch produced on site (by mulching cleared vegetation and trees) shall specifically exclude fertile material from weed species (where a risk of propagation exists) and be kept outside of the Rehabilitation Area. Vegetation mulching will be suitably controlled to avoid contamination. Any fertile weed material shall be transported from the site to an approved disposal facility.
- Jute matting or other measures should be applied to suppress weed growth and spread in the revegetation areas and areas disturbed by weed removal. Jute matting has been chosen over mulch due to the relevance of MBRC flood scenario mapping.
- Jute matting or other measures should be applied as appropriate to ensure water quality is maintained. Where appropriate treat erosion prone areas with Jute mat / geo-fabric and plant at higher densities to mitigate erosion potential. Earthwork may be required to assist planting and maintenance access and minimise erosion processes. Leaving dead trees intact along the banks may help to prevent erosion and over-exposure.

5.4 Primary Weeding

Weed eradication will be undertaken on a progressive basis through localised treatment of grass species via mechanical removal (hoe/rake, hand pulling and/or slashing) or with Roundup Biactive. Woody weed species will be hand pulled or controlled using weed control techniques listed within **APPENDIX 1**.

All chemical users should be experienced and licensed in accordance with the relevant legislation. Utmost care must be taken when using chemicals to ensure that no drift occurs outside of the treatment area. Spraying should not occur on windy days or within 24 hours of predicted rainfall.

Primary weeding should commence at the start of the active growing period if possible (approximately November), or on an as needed basis. Manual clearing of weeds from around native plants must be carried out prior to spraying of broader areas. Small native plants less than 20 cm in height are to be marked with a stake to indicate retention.

Weed material that does not contain any fertile parts will be mulched and spread on the ground while any weeds that may have fertile parts present will be disposed of at an approved waste disposal facility such as Council landfills or transfer stations.

5.5 Secondary Weeding

Secondary weeding involves the eradication of weeds that have been overlooked or re-shoot after the primary treatment. Secondary weeding will occur two (2) to four (4) months but no later than six (6) months after primary weeding.

5.6 Weed Maintenance

Areas undergoing rehabilitation works will require weed removal as part of the rehabilitation establishment and maintenance periods. Weed maintenance visits will be undertaken monthly during the establishment period and every three (3) months during the ongoing maintenance period. Once the rehabilitation areas have become established (i.e. achieve canopy closure) it is likely that weed incidence will be minimised through competition with maturing native species. Maintenance requirements in these areas are therefore likely to be reduced over time.

6 REHABILITATION STRATEGY

6.1 Introduction

Within disturbed areas, competition between native propagules and exotic weeds often favours exotic pioneering species. Thus, in order to enhance the ecological functioning of areas degraded by exotic species, revegetation works will provide a framework by which indigenous species may reclaim lost habitat via the processes of natural recruitment and succession. Therefore, the aim of revegetation works is to restore the historical ecological values of the site through the use of weed removal techniques and the planting of indigenous tree and shrub species.

Revegetation will commence when the area has been designated as suitable for revegetation after site preparation (**SECTIONS 4 & 5**).

6.2 Assisted Natural Regeneration

Natural regeneration refers to the natural process by which plants replace or re-establish themselves. Plant species may recover through re-sprouting or germination from remnant soil seed banks or seed that naturally disperse from nearby vegetation (Standards Reference Group SERA 2016).

Natural regeneration is a powerful tool that can be used to re-establish native vegetation. It ensures that the new growth is derived from genetic material (i.e. parents) that currently occupies the site and as such is adapted to local conditions. Additionally, the chance of outbreeding depression is reduced.

Natural regeneration will be the focus of rehabilitation efforts in Category 1 – 3 areas (**FIGURES 6A & 6B)** but will also be encouraged throughout the Rehabilitation Area. Existing native trees and shrubs, which have regenerated since the start of rehabilitation works, should be retained in the Rehabilitation Area.

Where natural recruitment is determined to be not currently occurring within retained vegetation and Rehabilitation Areas (e.g. areas devoid of native vegetation after weed control works), active revegetation through planting will be completed. Revegetation methods (if necessary) will follow those outlined below.

6.3 Revegetation Areas

6.3.1 Introduction

Site revegetation works within the Category 4 – 6 areas identified in **FIGURES 6A & 6B** will be undertaken in six (6) stages:

- **Stage 1: Site Preparation** - will commence as soon as possible after disturbance and when the area has been designated as suitable for revegetation.

- **Stage 2: Initial Planting** - will commence as soon as the rehabilitation consultant is satisfied that weed species have been successfully controlled or minimised (i.e., Broad-leaved pepper tree, Singapore daisy – see **SECTION 5.2**).
- **Stage 3: Growth and Maintenance**.
- **Stage 4**: **Supplementary Planting to Replace Dead Seedlings** - will commence within two (2) months of the initial planting in each area and replacement of any seedlings that have perished will occur.
- **Stage 5: Additional Plantings** - works can commence where advanced canopy growth is evident and the rehabilitation consultant determines that supplementary planting is necessary to satisfy the aims of the site revegetation plan.
- **Stage 6: Ongoing Maintenance** - will continue for a minimum period of twelve (12) months from the completion of Stage 1.

6.3.2 Revegetation Types

Category 4 – 6 rehabilitation areas have been subdivided into the following revegetation types with consideration of planting objectives:

- Type A – Erosion control areas – groundcover species consistent RE 12.3.5/12.5.3. Jute matting or planting at higher densities may be required near the creek line to mitigate erosion potential after Singapore daisy* infestations have been controlled;
- Type B – Infill planting of tree, shrub and groundcover species consistent with 12.3.5/12.5.3;
- Type C – Bank stabilisation – tree, shrub and groundcover consistent with RE 12.3.7. Planting at higher densities along the riverbank to stabilise the riverbank; and
- Type D - Infill planting of tree, shrub and groundcover species consistent with RE 12.3.7.

If assisted natural regeneration discussed in **SECTION 6.2** are not successful, the following revegetation types will be used.

- Category 2 – Revegetation Type B (**FIGURE 6A**); and
- Category 3 – Revegetation Type D (**FIGURE 6B**).

6.3.3 Planting Specifications

Any native trees, shrubs, or groundcovers, which have regenerated since the start of rehabilitation works, should be retained within revegetation areas.

Flora species to be utilised in revegetation plantings and their recommended planting densities are provided in **TABLES 3 & 4**. Densities are based on MBRC recommendations. Planting at higher densities (i.e. suggest 1.5x the densities outlined in **TABLES 3** and **4**) may be required near the creek line and river bank to mitigate erosion potential after weed infestations have been controlled.

TABLE 3
TYPE A & B REHABILITATION SPECIES LIST (RE 12.3.5/12.5.3)

Strata	Common Name	Scientific Name	% Strata*	Spacing (m)
Trees	Broad-leaved paperbark	*Melaleuca quinquenervia*	25%	Canopy: 1 per 5m^2 Midstorey: 1 per 3m^2
	Swamp box	*Lophostemon suaveolens*	15%	
	Scribbly gum	*Eucalyptus racemosa subsp. racemosa*	15%	
	Black sheoak	*Allocasuarina littoralis*	10%	
	Pink bloodwood	*Corymbia intermedia*	10%	
	Rusty gum	*Angophora leiocarpa*	3%	
	Smudgee	*Angophora woodsiana*	2%	
	Tallowwood	*Eucalyptus microcorys*	5%	
	Brush box	*Lophostemon confertus*	5%	
	Northern grey ironbark	*Eucalyptus siderophloia*	5%	
	Queensland blue gum	*Eucalyptus tereticornis*	1%	
	Snow-in-summer	*Melaleuca linariifolia*	1%	
	Umbrella cheese tree	*Glochidion sumatranum*	1%	
	Hard quandong	*Elaeocarpus obovatus*	1%	
	Pink flowered doughwood	*Melicope elleryana*	1%	
Shrubs	Southern salwood	*Acacia disparrima subsp. disparrima*	20%	2 per 2m^2
	Black wattle	*Acacia leiocalyx*	20%	
	Coast banksia	*Banksia integrifolia*	20%	
	Snow-in-summer	*Melaleuca linariifolia*	15%	
	Dwarf banksia	*Banksia oblongifolia*	5%	
	Australian blackwood	*Acacia melanoxylon*	5%	
	Soap tree	*Alphitonia excelsa*	5%	
	Poison peach	*Trema tomentosa*	5%	
	Swamp banksia	*Banksia robur*	3%	
	Dogwood	*Jacksonia scoparia*	1%	
	Cheese tree	*Glochidion ferdinandi*	1%	
Ground Covers	Swamp water fern	*Blechnum indicum*	15%	2 per 1m^2
	Kangaroo grass	*Themeda triandra*	10%	
	Variable swordsedge	*Lepidosperma laterale var. laterale*	10%	
	Rough saw-sedge	*Gahnia aspera*	10%	
	Red-fruit saw-sedge	*Gahnia sieberiana*	10%	
	Wiry panic	*Entolasia stricta*	5%	
	Barbed wire grass	*Cymbopogon refractus*	5%	
	Native rush	*Baloskion pallens*	5%	
	Soft twig-rush	*Baumea rubiginosa*	5%	
	Red-fruit saw-sedge	*Gahnia sieberiana*	5%	
	Blady grass	*Imperata cylindrica*	5%	

Strata	Common Name	Scientific Name	% Strata*	Spacing (m)
	Grey sedge	*Lepironia articulata*	4%	
	Bracken fern	*Pteridium esculentum*	1%	
	Hairy panic	*Panicum effusum*	1%	
	Small-flowered finger grass	*Digitaria parviflora*	1%	
	Spotted knotweed	*Persicaria strigosa*	1%	
	Swamp rice grass	*Leersia hexandra*	1%	
	Golden spray	*Lomandra confertifolia subsp. pallida*	1%	
	Dwarf papyrus	*Cyperus haspan*	1%	
	Leafy flat-sedge	*Cyperus lucidus*	1%	
	Tall saw sedge	*Gahnia clarkei*	1%	
	Spiny-head mat-rush	*Lomandra longifolia*	1%	

TABLE 4
TYPE C & D REHABILITATION SPECIES LIST (RE 12.3.7)

Strata	Common Name	Scientific Name	% Strata*	Spacing (m)
Trees	Qld blue gum	*Eucalyptus tereticornis*	40%	Canopy: 1 per 5m^2 Midstorey: 1 per 3m^2
	River oak	*Casuarina cunninghamiana subsp. cunninghamiana*	40%	
	Moreton Bay ash	*Corymbia tessellaris*	5	
	Pink bloodwood	*Corymbia intermedia*	5	
	Ribbonwood	*Euroschinus falcatus var falcatus*	2	
	Swamp box	*Lophostemon suaveolens*	2	
	Black tea-tree	*Melaleuca bracteata*	2	
		Melaleuca fluviatilis	2	
	Weeping lilly pilly	*Waterhousea floribunda*	2	
Shrubs	Coffee bush	*Breynia oblongifolia*	15	2 per 2m^2
	Southern salwood	*Acacia disparrima subsp. disparrima*	15	
	Poison peach	*Trema tomentosa*	15	
	Black wattle	*Acacia leiocalyx*	10	
	Red kamala	*Mallotus philippensis*	10	
	Cockspur thorn	*Maclura cochinchinensis*	8	
	Black tea-tree	*Melaleuca bracteata*	5	
	Flaxleaf paperbark	*Melaleuca linariifolia var trichostachya*	5	
	Weeping bottlebrush	*Melaleuca viminalis*	5	
	Sandpaper fig	*Ficus coronata*	5	
	Cheese tree	*Glochidion ferdinandi*	5	
	Native elm	*Aphananthe philippinensis*	1	

Strata	Common Name	Scientific Name	% Strata*	Spacing (m)
	Brush cherry	*Syzygium australe*	1	
Ground Covers	Green mat-rush	*Lomandra hystrix*	45	2 per 1m^2
	Pitted bluegrass	*Bothriochloa decipiens var. decipiens*	25	
	Creeping beard grass	*Oplismenus aemulus*	15	
	Slender flat sedge	*Cyperus gracilis*	5	
		Eragrostis spartinoides	2	
	Black speargrass	*Heteropogon contortus*	2	
	Pademelon grass	*Ottochloa gracillima*	2	
	Kangaroo grass	*Themeda triandra*	2	
	Swamp rice grass	*Leersia hexandra*	2	

6.3.4 Planting Program

Planting will occur at the optimum time of the year when there is high soil moisture (between January and May), unless irrigation is available and accessible. Revegetation is to undergo a minimum twelve (12) week establishment period.

The following planting program will be utilised:

- Seedlings will be sufficiently developed so as to have a significant chance of survival. Seedlings will be at least the sixth leaf stage and/or 20 cm in height.
- Seedlings will be sun hardened (plants should be held in full sunlight and systematically stressed to the point of wilting for at least two (2) months prior to planting) prior to transport to the site.
- Seedling sites will be spot sprayed with Roundup Biactive © one (1) week prior to commencement.
- Seedlings shall be planted on the same day as their transport from the nursery, or planted as soon as practically possible. No seedlings will be left unprotected on the site whilst awaiting planting.
- Planting in areas exposed to full sun or westerly sun shall be avoided in the peak summer months, where possible.
- All seedlings will be soaked in water overnight prior to planting.
- All seedlings will be provided with a wetting agent such as rain-saver[2] crystals.
- A native TPK fertiliser can be placed in the planting environment.
- All seedlings will be protected by a tree guard (commercial tubing or equivalent).

[2] Rain-saver is a polymer water crystal that has been specifically developed for plants. The polymer absorbs and holds water and nutrients at a specific tension which makes it available to plant roots but does not release to the soil. Rain-saver has proven very successful in more difficult environments (e.g. Roadside plantings on the Pacific Motorway between Brisbane and the Gold Coast and in frontal dunes at Pottsville (R. Keene *pers comm*. 2000).

- Freshly planted tube stock seedlings shall be watered with at least one (1) bucket of water (6-9 litres) on the day of planting. Ongoing watering will be undertaken after the seedlings have been planted on an 'as needed' basis to be assessed by the rehabilitation contractor.
- Tube stock should have no signs of being root bound and should be free of disease and/or pests.
- In no areas will the ground surface be left bare.

If required, the rehabilitation contractor may make minor alterations to this revegetation program depending on the site requirements.

6.4 Maintenance Schedule

Maintenance work will be undertaken for a minimum period of twelve (12) months after the establishment period. An indicative maintenance schedule has been formulated to provide the best rehabilitation outcomes (**TABLE 5**).

TABLE 5
INDICATIVE MAINTENANCE SCHEDULE

Activity	Timing
Watering	During planting and as needed within the first six (6) weeks after planting.
Jute matting	Applied where necessary (i.e. where native groundcover species are not present) after the site preparation has been completed.
Weed and Litter control	Initial weed control during site preparation. Secondary weeding two (2) to three (3) months after primary weeding. Ongoing weed maintenance every three (3) months for the duration of the establishment and maintenance periods.
Sediment control and fencing inspections	Every month for the duration of the establishment period, and every six (6) months during the maintenance period.
Replacement plantings	Plant survival will be assessed during maintenance visits. A 95% survival rate will be required during the maintenance period.

7 MONITORING AND REPORTING

7.1 Introduction

Monitoring and reporting are critical in ensuring the continuing success of any SRP and will be carried out for the duration of this plan. This section provides the proposed monitoring and reporting regime.

7.2 Bush Regeneration Team Monitoring

The bush regenerator will keep detailed work sheets for all works completed within the Rehabilitation Area, recording the following:

- All work completed each day;
- Site conditions;
- Chemicals used;
- Problems encountered; and
- Future works required.

An example daily work sheet template is attached in **APPENDIX 2**. These records and general comments on progress will be provided to the Ecologist for consideration and inclusion in the annual monitoring reports (**SECTION 7.4**).

7.3 Rehabilitation Monitoring

7.3.1 Background

Rehabilitation monitoring will be completed by a suitably qualified ecologist within the rehabilitation area using plot-based vegetation surveys (transects and plots) and photo point monitoring.

7.3.2 Methodology

7.3.2.1 Plot-Based Vegetation Surveys

Plot-based vegetation surveys (transects and plots) will be undertaken at each monitoring site. Vegetation survey sites will be permanently marked (i.e. star pickets or wooden stakes) and the end positions identified on a sitemap using a hand-held Global Positioning System (GPS).

The plot-based vegetation surveys will be based on a 20 m × 20 m plot (or 400 m^2 equivalent for linear areas). Survey plots should be established around a central 50 m transect as follows:

a) One (1) 400 m^2 plot (standard 20 m x 20 m) is used to assess all performance indicators as set out in **TABLE 6** below.

b) Five (5) 1 m^2 sub-plots can be added to the program for the first monitoring event to assess groundcover recruitment for the plot. A decision as to the utility of these plots can be made after the first or second monitoring events.

The assessor will assess the plot for the information contained in **TABLE 6**.

TABLE 6
VEGETATION SURVEY DATA TO BE COLLECTED

Attribute	Survey Required
Seedling Survival	The first monitoring event will require a count of the total number of seedlings, individual species counts and a count of the number of dead or dying seedlings of each species. Subsequent monitoring events will only require counts of dead or dying seedlings and their species identification.
Native Canopy Cover	Native canopy cover will be measured via the 'line intercept method' along the 50 m transect. Key canopy species will be noted.
Weed Canopy Cover	Weed canopy cover will be measured via the 'line intercept method' along the 50 m transect. Individual canopy weed species should be assessed separately.
Native Midstorey Cover	Estimate the % foliage cover of each native species within the midstorey across the 400 m^2 plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2…), or whole numbers up to 5% (1, 2, 3…), or to the nearest 5% where greater than 5% cover (5, 10, 15, 20, 25…).
Weed Presence in the Midstorey	Estimate the % foliage cover of each weed species within the midstorey across the 400 m^2 plot. Cover should be recorded in decimals if less than 1% (0.1, 0.2…), or whole numbers up to 5% (1, 2, 3…), or to the nearest 5% where greater than 5% cover (5, 10, 15, 20, 25…).
Groundcover species	Estimate percentage cover of native species vs. weeds within each of the five (5) 1 m^2 sub-plots. Cover should be recorded in decimals if less than 1% (0.1, 0.2…), or whole numbers up to 5% (1, 2, 3…), or to the nearest 5% where greater than 5% cover (5, 10, 15, 20, 25…). Identify each native and weed groundcover species
Shrub and Groundcover Recruitment	Identify the numbers of native shrub and groundcover species recruiting within each of the five (5) 1 m^2 sub-plots. The identification of individual recruits may not be possible when they first appear. These should be recorded as unidentified until the next or subsequent monitoring events.

7.3.2.2 Photo Point Monitoring

Photo-monitoring points will be completed as a means of demonstrating compliance or otherwise with performance criteria. Permanent photo stations are to be located on the transect at each monitoring location. Four (4) photos are to be taken from each photo point. Photos are to be taken to the north, south, east and west. Photos should be labelled with the:

- Transect code or photo point code;
- Direction of view; and
- Date and time.

Photos must be supplied in the Annual Monitoring Reports in a form of prints no smaller than 4" x 6" and must be colour.

7.3.3 Timing of Monitoring Visits

Monitoring events should occur:

- To set up monitoring transects and quadrats, and to collect baseline monitoring data prior to completions of primary weeding and initial plant-out;
- At the end of the twelve (12) week establishment period; and
- Then six (6) monthly during the maintenance period or until maintenance period performance criteria are met.

7.3.4 Performance Targets and Corrective Actions

TABLE 7 provides the performance indicators and targets for the proposed rehabilitation strategy. Corrective actions are provided that are to be implemented if performance targets are not met.

TABLE 7
PERFORMANCE TARGETS AND CORRECTIVE ACTIONS

Performance Indicator	Target – Establishment Period	Target – Maintenance Period	Corrective Actions
Survival and continued growth of seedlings (i.e. planted stock).	>95% survival of plantings during all monitoring events.	>95% survival of plantings during all monitoring events.	Irrigation if required. Additional planting if required.
Establishment of native ground cover within revegetation zones.	Planted ground covers substantially established*.	Increase in native ground cover %.	Supplementary planting if considered necessary to achieve performance targets.
Establishment of native shrub cover within revegetation zones.	Planted shrubs substantially established*.	Increase in native shrub cover %.	Supplementary planting if considered necessary to achieve performance targets.
Establishment of native canopy cover within revegetation zones.	Planted trees substantially established*.	Increase in native canopy cover %.	Monitoring and maintenance period must be extended until the targets are met.
Natural recruitment of native species throughout rehabilitation areas.	Evidence of natural recruitment of shrub and ground cover species.	Increasing natural recruitment of shrub and groundcover species.	Supplementary planting if considered necessary to achieve performance targets.

Performance Indicator	Target – Establishment Period	Target – Maintenance Period	Corrective Actions
All identified weeds controlled to an acceptable level (except where mentioned below)	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points reduced to <10%.	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points maintained at <10%.	Weed control as necessary.
Broad-leaved pepper tree in WZ2 reduced to an acceptable level and replaced with native species for bank stabilisation	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points reduced to <50%.	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points maintained at <50%.	Weed control as necessary.
All Singapore daisy controlled in WZ4 to an acceptable level outside the 50 m site boundary buffers	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points reduced to <10%.	Foliage Projective Cover (FPC) (%) assessed using eye estimates or photo points maintained at <10%.	Weed control as necessary.
Plant density	Maintained	Maintained	Supplementary planting if considered necessary to achieve performance targets.
Notes: * "Substantial establishment" of plantings means the plantings have progressed beyond the need for intensive maintenance e.g. weed control, watering etc. and are clearly established by way of persisting through a recognised growth period.			

7.4 Reporting

Monitoring Reports will be prepared six (6) monthly and will discuss the results of the monitoring of rehabilitation areas against the Performance Criteria identified in **TABLE 7.** The information provided in the report should include, but not necessarily be limited to:

- Works undertaken (i.e. A summary of bush regenerators daily reports);
- A presentation of the results of the particular monitoring event/s;
- A detailed discussion of the results of each particular monitoring event;
- A detailed comparison with the monitoring results and previous monitoring data, as appropriate;
- A statement of compliance with the Performance Criteria identified in **TABLE 7**;
- Any problems since the previous inspection (death of a significant number of seedlings, broken fences etc.) and what effects these issues have had on the regeneration area;

- Success or failure of measures implemented to rectify previously identified problems;
- Measures to be taken to rectify new problems.

Each Monitoring Report will be submitted to MBRC within two (2) months of completion of the relevant monitoring.

REFERENCES

Chenoweth EPLA and Bushland Restoration Services (2012) South East Queensland Ecological Restoration Framework: Manual. Prepared on behalf of SEQ Catchments and South East Queensland Local Governments, Brisbane.

McDonald, M.C. (1996) Ecosystem resilience and the restoration of damaged plant communities: A discussion focusing on Australian case studies. Ph.D. Dissertation, University of Western Sydney.

Queensland Institution of Engineers Australia (Qld IEA) (1996) Soil Erosion and Sediment Control: Engineering Guidelines. Australian Institute of Engineers, Queensland Division, Brisbane.

APPENDIX 1 – WEED SPECIES AND TREATMENT METHODS

The following are control techniques that are to be utilised during site regeneration works (Chenoweth EPLA and Bushland Restoration Services 2012):

- **Manual Weed Control** - Manual weed control involves either hand-removal or chipping/grubbing of weeds using a hand tool such as a hoe or knife.
- **Cut-Scrape-Paint** - Cut-scrape-paint is a modification of the cut-paint technique. Cut the stem of the plant close to the ground (approximately 1-2cm) ensuring that soil does not come in contact with the cut surface. The cut can be made at a slight angle in order to increase the surface area that is exposed to the chemical. Apply herbicide immediately to the cut stump using poison pot and brush or dripper bottle. Using a knife, scrape the sides of the stump thoroughly to expose the green tissue. Apply herbicide to the scraped stump. The chemical must be applied within 10 seconds of the cut or scrape being made in order for it to be fully effective. The depth of the scrape depends on the depth and thickness of the bark of the plant. For example, ochna (*Ochna serrulata*) and cherry guava (*Psidium cattleianum*) have a thin cambium layer a short distance under the surface and should only be scraped very lightly. Other plants such as umbrella trees and wild tobacco can be scraped more deeply. Note that, if when using this technique the stem of the plant is too thick to cut easily with loppers or hand saw, the plant is probably better suited to stem-injection.
- **Cut-Paint -** Cut the stem of the plant close to ground level. Apply herbicide to the cut stump using poison pot and brush or dripper bottle. This method is best suited to easy-to-treat weeds such as small-leaved privet (*Ligustrum sinense*), provided that the diameter of the stem at ground level is less than approximately three centimetres. If a glyphosate-/ metsulfuron methyl herbicide mix is being used in the poison pot, a greater range of weeds can be controlled using this method e.g. Easter cassia.
- **Scrape-Paint -** Scrape as much of the stem as possible (one side of the stem) using a knife and apply herbicide to the scrape. Leave a small section of the vine unscraped, and then twist the vine so that the next scrape is made on the opposite side of the stem to the preceding scrape. Continue along the length of the vine, scraping and painting as much of the stem as possible, with scraping to be concentrated along the thicker stems close to the root of the plant. This is the best method to use for madeira vine, as it allows the chemical to translocate to the underground storage organs and aerial tubers which may be hanging in large clusters above head height. This avoids the potential problem of tubers from cut stems left hanging in the trees from dropping to the ground and sprouting. When scraping madeira vine stems a deep scrape is advisable – scrape right through to the fibrous, stringy section of the stem, taking care not to sever the vine. This method is also suitable for treatment of ochna. Case Study 3 describes how this method was used successfully to control cat's claw creeper (*Macfadyena unguis-cati*).
- **Over-Spraying -** Over-spraying involves the use of knapsacks or power sprayers to treat large expanses of weed such as lantana thickets. The foliage must be covered

with herbicide but not to the point of running off the plant. The dead plants remain in place and can be cut down at a later stage or left *in situ* to provide protection for emerging seedlings. Prior to over-spraying, any weeds that are growing closely around established native plants must be hand removed or treated by cut-scrape-paint. It may be necessary to cut access tracks so that all sections of the expanse of weed are easily reached by the operator. Tracks that are cut must take into account the distance that the chemical can be projected, which will depend on the equipment that is being used. Tracks must be created so that they DO NOT result in a permanent increase to fragmentation and/or edge effects to rehabilitation areas. Generally, power sprayers can project the chemical further than is possible with a knapsack, though power spraying is often not suitable on sites where native plants are present due to the likelihood of off-target damage. Native and exotic vines may take advantage of the dead frames and timely follow-up is necessary. Over-spraying is advantageous as it leaves the dead plants intact to prevent erosion and over-exposure of large areas, protects native seedlings from herbivores such as wallabies, retains the structure and avoids trampling by humans. Leave the sprayed plants intact for as long as possible so that native seedlings can establish under the shelter provided. Boom spraying is of limited application for most ecological restoration work, however, it may occasionally be useful when preparing large areas for planting (either Reconstruction or Fabrication).

- **Splatter Gun -** This small gas-powered injector kit is fitted into a knapsack for easy carrying and delivers large droplets in a stream over the weed. The gun is used to deliver a concentrated herbicide (glyphosate or metsulfuron methyl) across large dense expanses of weed. The method is used for species such as lantana (ratio of 1:9 of glyphosate:water). Splatter gun involves spraying strips at one to two metre intervals over the thicket. The herbicide is then translocated throughout the entire plant. Because it is gas-powered, the splatter gun can project the herbicide long distances, reducing the number of access tracks that need to be cut prior to spraying in large or difficult to access sites. The method does not require the whole plant to be covered as in over-spray.
- **Spot-Spraying -** A knapsack filled with an appropriate herbicide mix is used by the operator to selectively control environmental weeds. A keen eye and an ability to distinguish between the native and weed species likely to be present, especially at seedling stage, is essential. Marker dye is added to the chemical mix to allow the operator to see what has already been sprayed, thus covering the ground weeds comprehensively and thoroughly. Glyphosate and metsulfuron methyl are the main herbicides used for spot-spraying in ecological restoration, together with the addition of a penetrant and/or surfactant and marker dye. Dilution rates of chemical used in the knapsack will vary depending on the weed species present.
- **Roll-hang -** Vines such as mile-a-minute (*Ipomoea cairica*) which produce long stolons extending many metres along the surface of the ground, are suited to the roll-hang method. Locate the base of the plant and carefully pull up the runners and roll them up. The resulting roll of vine is then hung in the fork of a tree to dry out as if it is left on the ground it is likely to re-shoot. Where runners are climbing up into a tree they are cut off at head height prior to the runner being rolled up –

there is no need to pull cut vines down from trees as this action is likely to damage the tree. The base of the vine is treated using the cut-scrape-paint method.

- **Gouge-paint -** This method applies to plant species that have a fleshy underground storage organ, such as the large tuber that is often found at the base of madeira vine. It is also particularly appropriate for the treatment of climbing asparagus (*Protasparagus plumosus*). If using this technique on climbing asparagus, first cut the stems that are growing into the canopy at head height and also at the base. The fleshy rhizome can then be gouged, or alternatively in the case of climbing asparagus, it may be struck several times firmly with the head of a pair of loppers, allowing the brown outer covering of the crown to peel away exposing the white fleshy inner section of the rhizome for application of herbicide. Gouge out sections of the fleshy base with a knife and apply herbicide using a paint pot and brush or dripper bottle within 10 seconds
- **Basal Barking -** This method involves mixing an oil-soluble herbicide in diesel/kerosene and painting or spraying the full circumference of the trunk or stem of the plant from ground level to a height of approximately 45cm. Basal bark application is suitable for thin-barked woody weeds including saplings, regrowth and multi-stemmed shrubs. The method will usually result in the mortality of difficult-to-control woody weeds at any time of the year, provided the bark is not wet or too thick to enable the herbicide to penetrate. The method should not be used in wet weather, adjacent to waterways or in areas where native trees and shrubs are located. The use should be restricted to situations where a weed is particularly difficult to control e.g. cherry guava and where other methods have been unsuccessful.
- **Wick Wiping -** Wick wipers can be manually used with a sponge or wick applicator, attached to a container filled with herbicide or as an attachment towed by a tractor. The manual method can be used to selectively apply herbicide to the leaves of weeds growing in sensitive situations. The hand held container can leak and generally spot spraying would be recommended. The use of a tractor drawn wick wiper is used to control taller growing species such as introduced grasses and to encourage the growth of lower growing species. This method could be used in preparation for planting.
- Stem-injection - Large woody weeds such as camphor laurel, coral trees (*Erythrina spp, Privet Ligustrum spp*) and umbrella trees are generally treated by stem-injection. Holes are drilled at regular intervals around the base of the tree and exposed roots using a drill powered by either batteries or a generator. A tree injection syringe attached to a small capacity knapsack is used to fill the holes with the herbicide. Stem-injection of trees can also be undertaken using a hatchet to create cuts in a 'brickwork pattern' in trunks of trees for the application of herbicide (known as tree frilling). Frilling is more labour intensive than drilling, especially where trees are multi-stemmed or where there is limited room to swing a hatchet. Whichever method is used, the greatest benefit of stem injection is that the trees can be left standing in situ as they die, provided there is no risk to humans or infrastructure from falling limbs. This creates convenient roosts for birds and other animals, and prevents the formation of large amounts of debris on the ground

and damage to understorey plants which would result if the trees were to be cut down using a chainsaw.

The table below contains a list of weed species occurring within the site and/or locality and includes suggested control methods for each species.

Common Name	Scientific Name	Application Method	Chemical	Rate
Blue billygoat	*Ageratum houstonianum*	Spot-spray	Glyphosate	100ml: 10L water + D
			Metsulfuron Methyl	1g MM: 10L water + D
			Fluroxypyr	30ml: 10L water
			2-4,D	30ml: 10L water
Ground asparagus	*Asparagus aethiopicus*	Spot-spray	Metsulfuron Methyl	1.5g MM: 10L water + A + D
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A/S + D
Groundsel	*Baccharis halimifolia*	Spot-spray	2-4,D	40ml: 10L water
			Glyphosate	200ml: 10L water + A + D
		Stem inject	Glyphosate	1 Gly: 1.5 water
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
Cobbler's pegs	*Bidens pilosa*	Spot-spray	Fluroxypyr	30ml: 10L water
			2-4,D	30ml: 10L water
			Glyphosate	100ml: 10L water + A + D
			Metsulfuron Methyl	1g MM: 10L water + A + D
Chinese elm	*Celtis sinensis*	Stem inject	Glyphosate	1:1.5 Gly:water
		Cut, scrape and paint	Glyphosate	1:1.5 Gly:water
		Basal bark (saplings)	Fluroxypyr	210ml:10L diesel
		Spot-spray	Glyphosate	200ml: 10L water + A + D
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + A
Camphor laurel		Stem inject	Glyphosate	1:1.5 Gly:water

Common Name	Scientific Name	Application Method	Chemical	Rate
	Cinnamomum camphora	Cut, scrape and paint	Glyphosate	1:1.5 Gly:water
		Basal bark (saplings)	Fluroxypyr	210ml:10L diesel
		Spot-spray	Glyphosate	200ml: 10L water + A + D
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + D
^Bull thistle	*Cirsium vulgare*	Spot-spray	Glyphosate	100ml: 10L water + D
^Taro	*Colocasia esculenta*	Cut, scrape and paint	Glyphosate + Metsulfuron Methyl	50% glyphosate + metsulfuron (0.05g/L) mix. Follow up four weeks later by a carefully applied spray to any emerged healthy leaves (2% glyphosate + 0.05 g/L metsulfuron + 2ml/L Pulse).
^Thickhead	*Crassocephalum sp.*	Spot-spray	Glyphosate	100ml: 10L water + D
#Water hyacinth	*Eichhornia crassipes*	Spray (Waterways, non potable water, drains, dam margins, lakes and streams)	2,4-D acid 300 g/L (e.g. Affray 300)	50 mL/10 L water (knapsack and handgun)
				1L/20L water (Sprinkler sprayer
		Spray (Aquatic areas, channels, dams, bore drains and waterways)	Amitrole 250 g/L + Ammonium thiocyanate 220 g/L (e.g. Amitrol T®)	280 mL/100 L
			Diquat 200 g/L (e.g Diqut 200 (various brands) Reglone®)	400 mL/100 L water + 150 mL
			Glyphosate 360 g/L (e.g Ken-Up Aquatic 360, Weedmaster Duo) and other formulations registered for use in aquatic areas (numerous products)	1–1.3 L/ 100 L water or 6–9 L/ha

Common Name	Scientific Name	Application Method	Chemical	Rate
Cockspur coral tree	*Erythrina crista-galli*	Spot-spray	Glyphosate	200ml: 10L water + S + A
		Basal bark (saplings)	Fluroxypyr	210ml:10L diesel
		Stem inject	Glyphosate	1:1.5 Gly:water
		Cut, scrape and paint	Glyphosate	1:1.5 Gly:water
Brazilian cherry	*Eugenia uniflora*	Cut, scrape and paint	Glyphosate	Neat (undiluted)
		Stem inject	Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly: 1.5 water
		Spot spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + D
Moon flower; Mile-a-minute; Morning glory; Blue morning glory	*Ipomoea alba; I. cairica; I. indica; I. purpurea*	Spot spray	Glyphosate + Metsulfuron Methyl	100ml Gly + 1.5g MM in 10L water + A + D
			2,4-D	30ml/ 10L water
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
Lantana	*Lantana camara*	Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
		Spot spray	Fluroxypyr	40ml/10L (spring, summer) – 60ml/10L water (Autumn, Winter)
		Spray (spot spray and overspray)	Glyphosate	100ml Gly: 10L water + D
		Spray Red Flowering species	Glyphosate	200ml Gly: 10L water + A + D
		Splatter Gun	Glyphosate	1 Gly: 9 water
Molasses grass	*Melinis minutiflora*	Spot-spray	Glyphosate	100ml: 10L water + D
#Bitter melon	*Momordica charantia*	Spray	2,4-D 500 g/L	400 mL per 100 L water
			2,4-D 625 g/L	300 mL per 100 L water
			Fluroxypyr 200 g/L	1 L per 100 L water
Ochna	*Ochna serrulata*	Basal Bark	Fluroxypyr	210ml/ 10L diesel
		Spot Spray	Fluroxypyr	30ml/ 10L water

Common Name	Scientific Name	Application Method	Chemical	Rate
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A/S + D
		Scrape (lightly) and Paint – juvenile	Glyphosate	Neat (undiluted)
		Cut Drill and Fill - mature	Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly: 1.5 water
Paspalum	*Paspalum sp.*	Spot-spray	Glyphosate	100ml: 10L water + D
Vasey's grass	*Paspalum urvillei*	Spot-spray	Glyphosate	100ml: 10L water + D
Edible passionfruit; Stinking passionflower; Corky passionfruit; White passionfruit	*Passiflora edulis; foetida; suberosa; subpeltata*	Spot spray	Glyphosate + Metsulfuron Methyl	100ml Gly + 1g MM in 10L water + A + D
			Glyphosate	200ml Gly: 10L water + A + D
			2,4D	30ml/ 10L water
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
^Slash pine	*Pinus elliottii*	Mechanical	-	-
Guava	*Psidium guajava*	Spot spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + D
		Cut, scrape and paint	Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly: 1.5 water
		Stem inject	Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly: 1.5 water
Caster oil	*Ricinus communis*	Spot spray	2,4-D	45ml/10L water
			Glyphosate	100ml/ 10L water
		Cut, scrape and paint	Glyphosate	1g MM added to 1 Gly: 1.5 water
		Stem inject	Glyphosate	1g MM added to 1 Gly: 1.5 water
Umbrella tree	*Schefflera actinophylla*	Spot spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
		Stem inject	Glyphosate	1 Gly: 1.5 water (do not stem inject when in flower)
Broad-leaved pepper tree	*Schinus terebinthifolius*	Spot spray	Glyphosate	200ml: 10L water + S + A

Common Name	Scientific Name	Application Method	Chemical	Rate
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + A
			Fluroxypyr	30ml: 10L water
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
		Basal bark (sapling)	Fluroxypyr	210ml: 10L diesel
		Stem inject	Glyphosate	1 Gly: 1.5 water
Easter cassia	*Senna pendula var. glabrata*	Spot spray	Glyphosate	200ml Gly: 10L water + A + D
		Cut and paint	Glyphosate	1 Gly: 1.5 water
		Stem Inject (mature)	Glyphosate	1 Gly: 1.5 water
Smooth senna	*Senna septemtrionalis*	Spot spray	Glyphosate	200ml Gly: 10L water + A + D
		Cut and paint	Glyphosate	1 Gly: 1.5 water
		Stem Inject	Glyphosate	1 Gly: 1.5 water
Giant devil's fig	*Solanum chrysotrichum*	Spot spray	Glyphosate	150ml Gly: 10L water + A + D
			Fluroxypyr	30ml: 10L water
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
		Basal bark (sapling)	Fluroxypyr	210ml: 10L diesel
		Stem inject	Glyphosate	1 Gly: 1.5 water
Wild tobacco tree	*Solanum mauritianum*	Spot spray	Glyphosate	150ml Gly: 10L water + A + D
			Fluroxypyr	30ml: 10L water
		Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
		Basal bark (sapling)	Fluroxypyr	210ml: 10L diesel
		Stem inject	Glyphosate	1 Gly: 1.5 water
Brazilian nightshade	*Solanum seaforthianum*	Spot spray	Fluroxypyr	30ml: 10L water
			Glyphosate	100ml Gly: 10L water + A + D
		Cut Scrape and Paint	Glyphosate	1 Gly: 1.5 water
Singapore daisy	*Sphagneticola trilobata*	Spot spray	Metsulfuron Methyl	1.5 MM in 10L water + A + D
			Glyphosate + Metsulfuron Methyl	100ml Gly + 1g MM in 10L water + A + D

Common Name	Scientific Name	Application Method	Chemical	Rate
Cocos palm	*Syagrus romanzoffiana*	Stem inject	Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly: 1.5 water
		Spot spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D
Aster	*Symphyotrichum sp.*	Spot-spray	Glyphosate	100ml: 10L water + D
Yellow bells	*Tecoma stans*	Cut, scrape and paint	Glyphosate	1 Gly: 1.5 water
		Basal bark (sapling)	Fluroxypyr	210ml: 10L diesel
		Spot spray	Glyphosate	150ml Gly: 10L water + A + D
		Stem inject	Glyphosate	1 Gly: 1.5 water
^Purple top vervain	*Verbena bonariensis*	Spot spray	Roundup Biactive	1: 100 water
		Blanket spray	Roundup Biactive	1: 100 water

^Brisbane City Council. Weed Identification Tool . https://weeds.brisbane.qld.gov.au/weeds

#Qld Government, Business Queensland. Invasive plants and weeds. https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/plants/invasive

APPENDIX 2 – EXAMPLE BUSH REGENERATOR'S DAILY WORK RECORD

Name _____

Site Name / Location _____ Date _____ Time _____ to _____

Team / Staff _____

Growing conditions	Temperature / Humidity	Weather conditions	Wind direction / Speed

Zone(s) / Work locations	Hours	Weeds treated	Method	New T.S. encountered / Location

Chemicals used / Rates / Totals								Notes and comments
Equipment used	Round-up	Associate	Herbidye	Pulse		Water	Number mixed	
Daily Chemical Totals								

APPENDIX 3 – REVISED FAUNA MANAGEMENT PLAN (JWA 2024B)

JWA PTY LTD
Ecological Consultants
ABN 56 066 448 879

REVISED FAUNA MANAGEMENT PLAN

North East Business Park
Mixed Industry and Business Area Bulk Earthworks

Lot 1 on SP266287, Lot 11 on SP130251,
Lot 15 on RP902073 and Lot 2000 on SP320584
2 and 15 Nolan Drive, Morayfield

A Report Prepared for
North Harbour Holdings Pty Ltd

JANUARY 2024

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DOCUMENT CONTROL

Document

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Client	North Harbour Holdings Pty Ltd

Revision History (office use only)

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5	RW5	FINAL	15/04/21	Client	1	.pdf	Email
6	RW6	FINAL	03/08/21	Client	1	.pdf	Email
7	RW7	DRAFT	05/12/23	Client	1	.pdf	Email
8	RW8	FINAL	22/01/24	Client	1	.pdf	Email

Client Issue

Version	Date Sent	Author		Approved by	
		Name	Initials	Name	Initials
RW2	11/08/20	Phoebe Chapman	PC	Adam McArthur	AM
RW3	27/08/20	Phoebe Chapman	PC	Adam McArthur	AM
RW4	15/04/21	Belinda Whyburn	BW	Adam McArthur	AM
RW5	15/04/21	Belinda Whyburn	BW	Adam McArthur	AM
RW6	03/08/21	Belinda Whyburn	BW	Adam McArthur	AM
RW7	05/12/23	Belinda Whyburn	BW	Adam McArthur	AM
RW8	22/01/24	Belinda Whyburn	BW	Adam McArthur	AM

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1 Introduction

1.1 Background

JWA Pty Ltd were previously engaged by North Harbour Holdings Pty Ltd to complete a Fauna Management Plan (FMP) for the proposed bulk earthworks associated with the Mixed Industry and Business Area (MIBA) within the North East Business Park (NEBP) development.

The subject site has a current preliminary approval for development allowing mixed industry, business area precincts, open space and related purposes (Court Order No. 911 of 2015, Council Ref. MCU-2002-1079). An operational works application was approved by Moreton Bay Regional Council (MBRC) (Council Ref: DA/39447/2019/V4D) on the 27th February 2020 to allow for proposed bulk earthworks and vegetation clearing over the MIBA. These works commenced in April 2021 and have significantly progressed, with the majority of the earthworks now completed.

Recently, the proposed bulk earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works has been revised based on updated flood modelling for the NEBP site. This Revised FMP has been prepared to reflect the updated bulk earthworks design. This FMP provides specific measures for mitigating and/or minimising the potential impacts on fauna as a result of development activities on the subject site.

1.2 The Subject Site

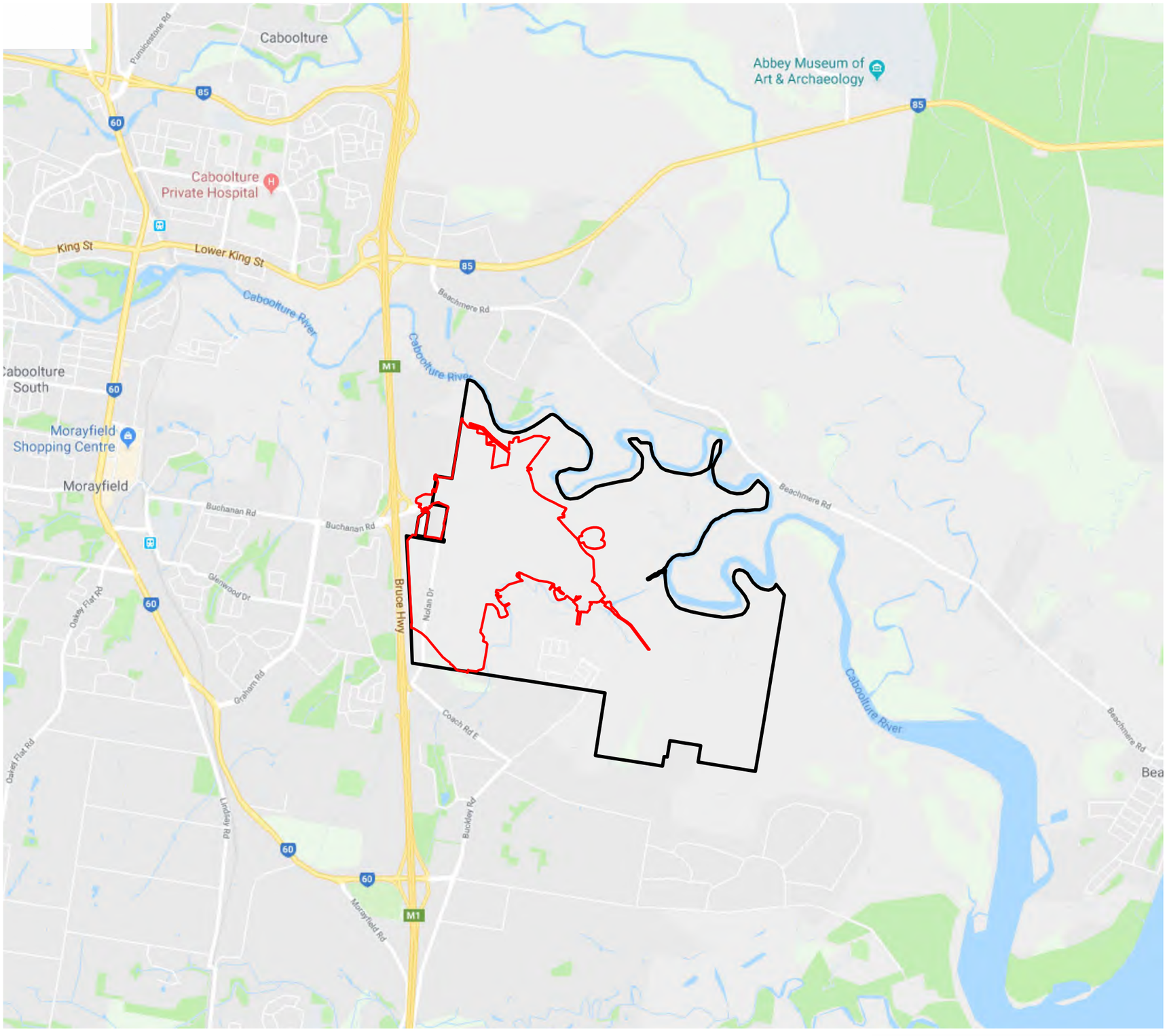
The site is located at Nolan Drive, Morayfield and is formally described as part of Lot 1 on SP266287, Lot 11 on SP130251, Lot 15 on RP902073 and part of Lot 2000 on SP320584 (**FIGURE 1**). The site is approximately 392 ha. An aerial photograph of the site is shown in **FIGURE 2**.

The majority of the site is highly disturbed and has been the subject of previous land clearing, livestock grazing and plantation forestry activities. Earthworks associated with the MIBA have recently been undertaken over the majority of the site. The remaining areas are currently used for cattle grazing. Prior to being used for grazing, the site was used for plantation forestry of *Pinus elliottii* (Slash pine).

The Caboolture River forms the northern boundary where some mature vegetation is existing along the banks of the river. This vegetation has been planted by NEBP as part of the rehabilitation of the Caboolture River. Small, isolated pockets of vegetation are scattered throughout the remainder of the site.

1.3 The Approved Development

The proposed development is for bulk earthworks associated with the MIBA area, works within Raff Creek necessary to remove the existing pipe culvert (and allow for the future extension of Moreton Bay Boulevard) and widen the creek to improve future flood conveyance, and the construction of stormwater treatment wetlands. The extent of bulk earthworks is shown in **FIGURE 3**.



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary

Scale 1:40 000

0 400m 800m 1200m 1600m 2000m

SOURCE: Google Maps

SCALE: 1 : 40 000 @ A3

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North Harbour Holdings Pty Ltd

PROJECT
Fauna Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 1

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

LOCALITY PLAN



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: Metro Maps Aerial dated 18/06/23

SCALE: 1 : 12 500 @ A3

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FIGURE 2

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

AERIAL PHOTOGRAPH



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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NEBP MIBA Bulk Earthworks
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FIGURE 3

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
BULK EARTHWORKS
EXTENT

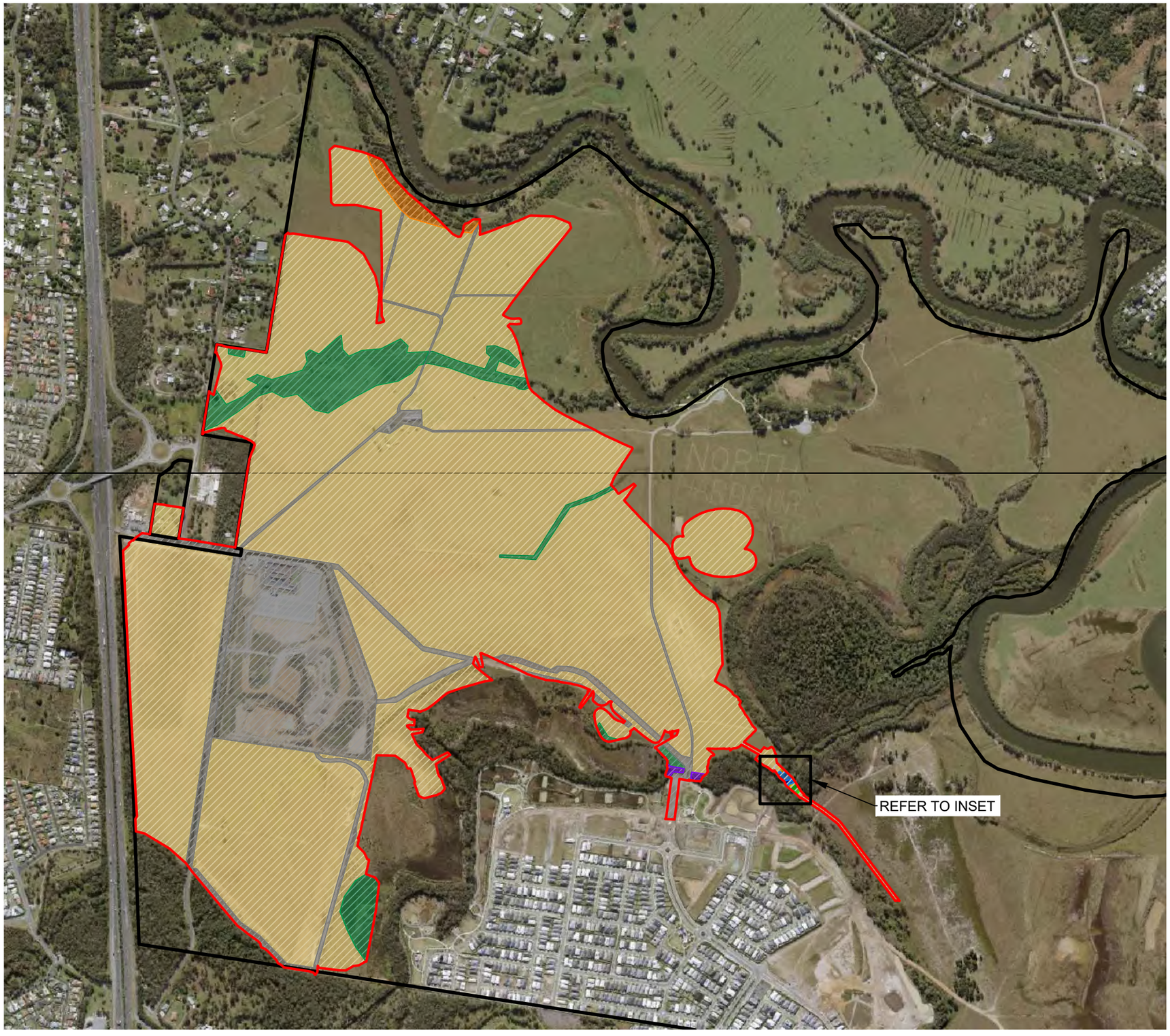
As discussed above, the proposed bulk earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works has recently been revised based on updated flood modelling for the NEBP site.

Although the entire works site will be cleared as part of the works program, the clearance of native vegetation approved under the MIBA operational works approvals was limited to the removal of a combined total of approximately 0.39 ha of intact non-remnant native vegetation (**FIGURE 4A**). These works have commenced and the majority of bulk earthworks and vegetation clearing has been completed. The revised extent of works will not impact on any additional areas of intact non-remnant native vegetation. A Revised Vegetation Clearance Plan illustrating various vegetation communities/habitat types to be cleared is provided in **FIGURE 4B.**

1.4 Approval Conditions

This FMP addresses Conditions 26, 27 and 29 of the approval conditions issued by Moreton Bay Regional Council on the 27th February 2020. These conditions are as follows:

> *26. Fauna Connectivity*
>
> *Submit an amended Fauna Management Plan (currently Section 4 of the Vegetation Management Plan) which demonstrates:*
>
> > *a) Works do not create a barrier to, and maintain or enhance ecological connectivity, including to, from and through, the following key areas:*
> >
> > > *i) Along what is locally known as the Raff Creek Corridor.*
> > >
> > > *ii) Between Lot 2 SP169551 (Category B area) and adjoining Lots and road reserves.*
> > >
> > > *iii) Along the Caboolture River frontage for a width of 100m.*
> > >
> > > *iv) Between Lot 13 RP145197, Lot 2 RP194131 and the Caboolture River Tributary (which flows from the Southbound Bruce Highway Interchange at Buchanan Road through Lot 1 SP266287 and discharges into the Caboolture River).*
> > >
> > > *v) Along the Gympie Creek Tributary (which flows from Cobb Road through Lot 2000 SP30934 7 and discharges into what is locally known as Raff Creek).*
>
> *27. No Net Loss of Fauna Habitat*
>
> *Development does not result in the net loss of fauna habitat. Where development does result in the loss of a Habitat Tree, development will provide replacement fauna nesting boxes at the following rate:*
>
> > *a) One (1) nest box for every hollow removed; or*
> >
> > *b) Where hollows have not yet formed in trees greater than 80cm in diameter at 1.3m height, three (3) nest boxes are required for every habitat tree removed.*





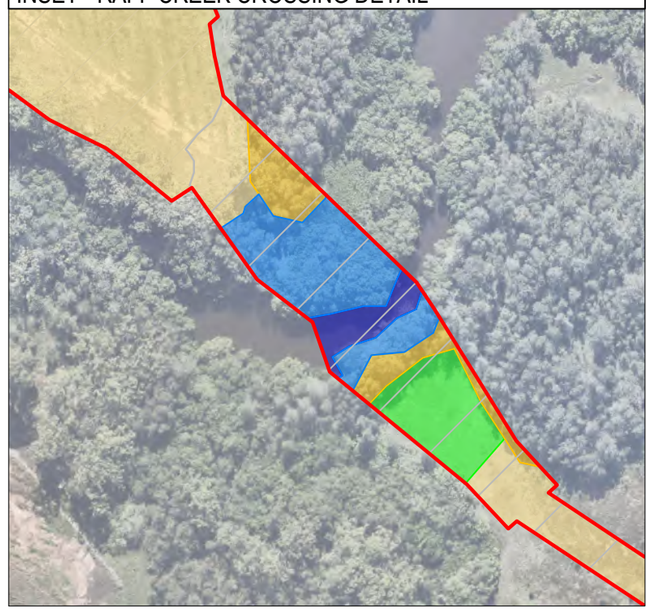
LEGEND

- Approved Extent of Works
- Approved MIBA Bulk Earthworks Boundary
- NEBP Site Boundary

Vegetation Communities

- Community 1: Disturbed wet-terrestrial grassland / sedgeland mosaic
- Community 2: Mangrove and casuarina estuarine wetlands
- Community 3: Salt couch grassland
- Community 4: Open Casuarina glauca forest
- Community 5: Mangrove shrubland to low closed forest
- Community 6: Revegetation area
- Community 7: Disturbed terrestrial grassland with scattered regrowth
- Existing roads, tracks and development
- Open Water

INSET - RAFF CREEK CROSSING DETAIL



Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: JWA Site Investigations;
KN Group (18-203-MCU02-04.dwg);
QLD Globe Aerial dated 30/05/19 -18/06/19
SCALE: 1 : 12 500 @ A3

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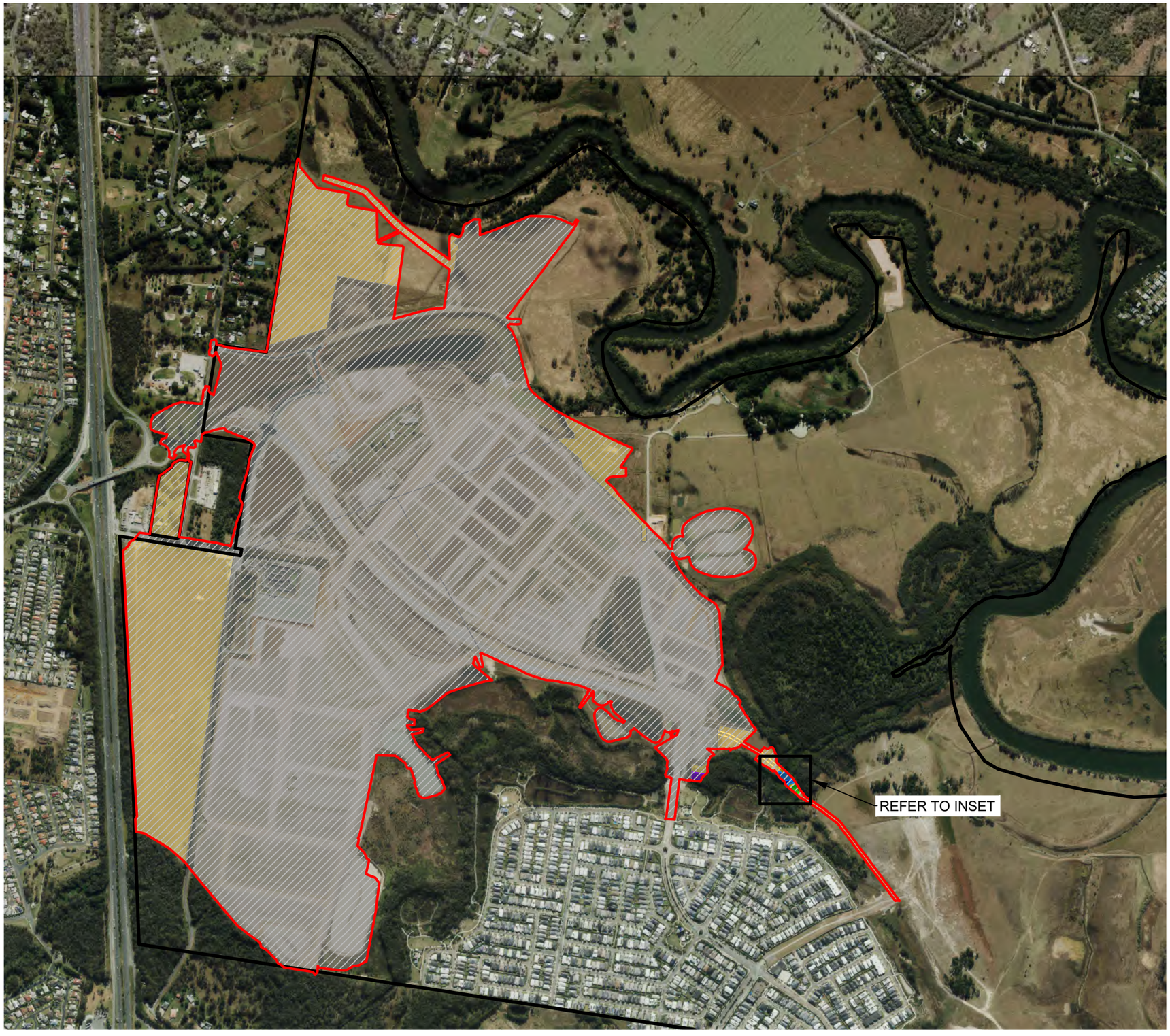
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NEBP MIBA Bulk Earthworks
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FIGURE 4A

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE
VEGETATION CLEARANCE PLAN - APPROVED



N

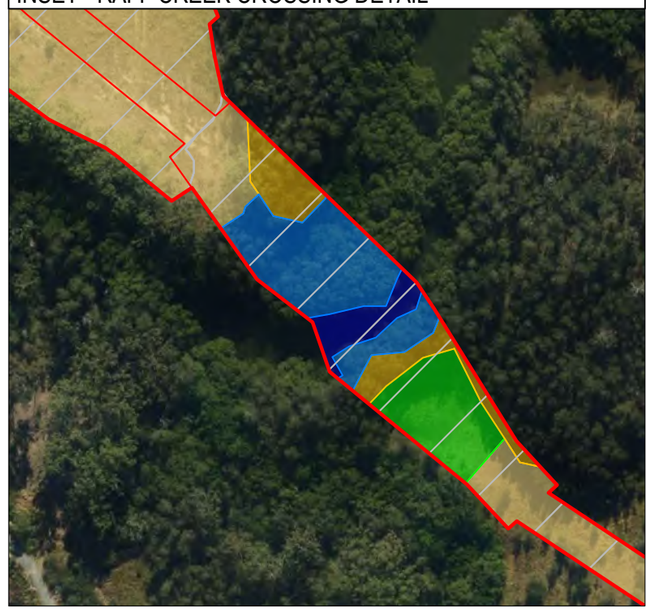
LEGEND

- Extent of Works
- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary

Vegetation Communities

- Community 1: Salt couch grassland
- Community 2: Open Casuarina glauca forest
- Community 3: Mangrove shrubland to low closed forest
- Community 4: Disturbed terrestrial grassland
- Existing roads, tracks and development
- Open Water

INSET - RAFF CREEK CROSSING DETAIL



Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: JWA Site Investigations;
KN Group (FLOOD DEM SLR 231110.dwg);
Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4B

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE
VEGETATION CLEARANCE PLAN - REVISED

29. Management of Wildlife

A. Tag all trees to be removed and inspect for any signs of wildlife. Carry out approved vegetation clearing under the supervision of a Fauna Spotter Catcher holding a valid Rehabilitation permit from the relevant State Government Agency.

B. The clearing of vegetation on premises must be carried out in a way that ensures:

a) wildlife have enough time to move from the area being cleared without human intervention; and

b) links between wildlife habitats are maintained to allow wildlife to move from the area being cleared; and

c) a tree is not cleared if wildlife is present in the tree or the crown of the tree overlaps another tree in which wildlife is present.

C. The clearing of koala habitat trees must be carried out in a way that complies with the sequential clearing conditions for Koala District A, as outlined in part 3 of the Nature Conservation (Koala) Conservation Plan 2017 and requirements for native vegetation clearing as outlined in Part 2, S8(2) of Schedule 11 of the Planning Regulation 2017, including:

a) ensuring not more than the following is cleared in any 1 stage:

i) for a clearing site with an area of 6ha or less – 50% of the site's area;

ii) for a clearing site with an area of more than 6ha – 3ha or 3% of the site's area, whichever is the greater; and

iii) ensuring that between each stage and the next there is at least 1 period of 12 hours starting at 6pm on a day and ending at 6am on the following day during which no trees are cleared on the site;

b) ensuring clearing of koala habitat trees having a trunk of a diameter of more than 10cm at 1.3m above the ground is carried out in the presence of a koala spotter.

D. Provide an activity report, to be completed by the supervising Fauna Spotter Catcher, including:

a) The number and species of any animals observed during clearing;

b) The actions taken to deal with observed animals;

c) The number of any animals that were required to be relocated;

d) The release site for any relocated animals;

e) The number (if any) of animals injured during clearing;

f) The treatment provided;

g) The outcome of any treatment; and

h) The location of the treatment.

2 Fauna Assessment

2.1 Introduction

The following section provides an assessment of the existing habitat values of the subject site and has been compiled from previous desktop assessments and site assessments of the subject site and adjacent sites undertaken by JWA, Cardno, and Yurrah between 2004 and 2020.

2.2 Desktop Assessment

Database searches were completed using the Commonwealth Protected Matters Search Tool (PMST) and the Queensland Department of Environment and Science (DES) Wildlife Online database to identify threatened fauna and migratory species that may occur within 5km of the subject site based on the availability of suitable habitats.

Threatened fauna species detected in the database searches are listed in **TABLE 1**. Migratory species identified in database searches are listed in **TABLE 2**. The conservation status of each species is shown in accordance with the Commonwealth *Environment Protection and Biodiversity Conservation Act (1999)* and the Queensland *Nature Conservation (Animals) Regulation (NCAR) (2020).* Species that will clearly not occur on the site (e.g. cetaceans, marine reptiles and oceanic birds) have been omitted.

TABLE 1
DATABASE RECORDS OF LISTED THREATENED FAUNA SPECIES WITHIN 5KM OF THE SITE

Scientific Name	Common Name	EPBC#	NCAR*
Birds			
Anthochaera phrygia	Regent honeyeater	CE	CE
Botaurus poiciloptilus	Australian bittern	E	E
Calidris canutus	Red knot	E	E
Calidris ferruginea	Curlew sandpiper	CE	CE
Calidris tenuirostris	Great knot	CE	CE
Calyptorhynchus lathami lathami	Glossy black cockatoo (eastern)	V	-
Charadrius leschenaultii	Greater sand plover	V	V
Charadrius mongolus	Lesser sand plover	E	E
Erythrotriorchis radiatus	Red goshawk	E	E
Esacus magnirostris	beach stone-curlew	-	V
Grantiella picta	Painted honeyeater	V	V
Hirundapus caudacutus	White-throated needletail	V	V
Lathamus discolor	Swift parrot	CE	E
Limosa lapponica baueri	Bar-tailed godwit	V	V
Limosa lapponica menzbieri	Northern Siberian bar-tailed godwit	CE	E
Ninox strenua	powerful owl	-	V
Numenius madagascariensis	Eastern curlew	CE	E
Rostratula australis	Australian painted snipe	E	E
Stagonopleura guttata	Diamond Firetail	V	V
Sternula nereis nereis	Australian Fairy Tern	V	-

Scientific Name	Common Name	EPBC#	NCAR*
Thinornis rubricollis rubricollis	Hooded plover (eastern)	V	-
Turnix melanogaste	Black-breasted button-quail	V	V
Frogs			
Adelotus brevis	Tusked frog	-	V
Crinia tinnula	Wallum froglet	-	V
Litoria olongburensis	Wallum sedge frog	V	V
Mixophyes fleayi	Fleay's frog	E	E
Mixophyes iteratus	Giant barred frog	V	V
Insects			
Argynnis hyperbius inconstans	Australian fritillary	CE	E
Mammals			
Chalinolobus dwyeri	Large-eared pied bat	E	E
Dasyurus hallucatus	Northern quoll	E	-
Dasyurus maculatus maculatus	Spot-tailed quoll	E	E
Macroderma gigas	Ghost bat	V	E
Petauroides volans	Greater glider	E	E
Petaurus australis australis	Yellow-bellied glider (south-eastern)	V	V
Phascolarctos cinereus	Koala	E	E
Potorous tridactylus tridactylus	Long-nosed potoroo	V	V
Pteropus poliocephalus	Grey-headed flying-fox	V	-
Xeromys myoides	Water mouse	V	V
Reptiles			
Coeranoscincus reticulatus	Three-toed snake-tooth skink	V	-
Delma torquata	Collared delma	V	V
Furina dunmalli	Dunmall's snake	V	V
Hemiaspis damelii	Grey Snake	E	E

* Queensland *Nature Conservation (Animals) Regulation (NCAR) (2020)*

Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act)

CE – Critically Endangered, E – Endangered, V – Vulnerable

TABLE 2
DATABASE RECORDS OF COMMONWEALTH LISTED MIGRATORY AND MARINE SPECIES WITHIN 5KM OF THE SITE

Scientific Name	Common Name	Status#
Actitis hypoleucos	Common Sandpiper	M
Anous stolidus	Common noddy	M
Apus pacificus	Fork-tailed swift	M
Arenaria interpres	Ruddy Turnstone	M
Calidris acuminata	Sharp-tailed Sandpiper	M
Calidris alba	Sanderling	M
Calidris canutus	Red Knot, Knot	E, M
Calidris ferruginea	Curlew Sandpiper	CE, M
Calidris melanotos	Pectoral Sandpiper	M
Calidris ruficollis	Red-necked Stint	M
Calidris tenuirostris	Great Knot	CE, M
Charadrius bicinctus	Double-banded Plover	M

Scientific Name	Common Name	Status#
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	V, M
Charadrius mongolus	Lesser Sand Plover, Mongolian Plover	E, M
Charadrius veredus	Oriental Plover, Oriental Dotterel	M
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo	M
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	M
Gallinago megala	Swinhoe's Snipe	M
Gallinago stenura	Pin-tailed Snipe	M
Hirundapus caudacutus	White-throated Needletail	V, M
Limicola falcinellus	Broad-billed Sandpiper	M
Limnodromus semipalmatus	Asian Dowitcher	M
Limosa lapponica	Bar-tailed Godwit	M
Limosa limosa	Black-tailed Godwit	M
Monarcha melanopsis	Black-faced Monarch	M
Myiagra cyanoleuca	Satin Flycatcher	M
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	CE, M
Numenius minutus	Little Curlew, Little Whimbrel	M
Numenius phaeopus	Whimbrel	M
Pandion haliaetus	Osprey	M
Philomachus pugnax	Ruff (Reeve)	M
Pluvialis fulva	Pacific Golden Plover	M
Pluvialis squatarola	Grey Plover	M
Rhipidura rufifrons	Rufous Fantail	M
Symposiachrus trivirgatus	Spectacled Monarch	M
Sternula albifrons	Little tern	M
Tringa brevipes	Grey-tailed Tattler	M
Tringa glareola	Wood Sandpiper	M
Tringa incana	Wandering Tattler	M
Tringa nebularia	Common Greenshank, Greenshank	M
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank	M
Xenus cinereus	Terek Sandpiper	M
# Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act) CE – Critically Endangered, E – Endangered, V – Vulnerable, Migratory		

2.3 Vegetation Communities

At the time of the MIBA operational works approval, six (6) distinct vegetation types occurred on the subject site (**FIGURE 4A**):

- Community 1 – Disturbed wet-terrestrial grassland / sedgeland mosaic;
- Community 2 – Mangrove and casuarina estuarine wetlands;
- Community 3 – Salt couch grassland;
- Community 4 – Open *Casuarina glauca* forest;
- Community 5 – Mangrove shrubland to low closed forest; and
- Community 6 – Disturbed terrestrial grassland with scattered regrowth.

Works approved under MIBA operational works approval have commenced and earthworks and vegetation clearing has been undertaken over the majority of the site. Currently vegetation communities present on site include (**FIGURE 4B**):

- Community 3 – Salt couch grassland;
- Community 4 – Open *Casuarina glauca* forest;
- Community 5 – Mangrove shrubland to low closed forest; and
- Community 6 – Disturbed terrestrial grassland with scattered regrowth.

2.4 Habitat Assessment

2.4.1 Introduction

Site habitats were assessed to determine their value for native fauna species. The assessment focused on identifying habitat features associated with Threatened species as well as other native fauna groups. Particular attention was paid to habitat features such as:

- The presence of mature trees with hollows, fissures and/or other suitable roosting/nesting places.
- The presence of Koala food trees.
- The presence of preferred Glossy black cockatoo feed trees (Forest oak and/or Black she-oak).
- The presence of Yellow-bellied glider feeding scars.
- Condition, flow and water quality of drainage lines and bodies of water.
- Areas of dense vegetation.
- Presence of hollow logs/debris and areas of dense leaf litter.
- Presence of fruiting flora species.
- Presence of blossoming flora species, particularly winter-flowering species.
- Vegetation connectivity and proximity to neighbouring areas of intact vegetation.
- Presence of caves and man-made structures suitable as microchiropteran bat roost sites.

The following sections discuss the habitat requirements of the broad fauna groups and the availability of suitable habitat on site.

2.4.2 Amphibians

Amphibians occurring in the region are poikilothermic, predominantly insectivorous and generally require free water for reproduction, with the exception of two highland genera (*Assa darlingtoni* and *Philoria* spp.) The habitat requirements of most species are unlikely to be determined by forest cover or floristics, but are more strongly influenced by factors such as climate, distance to water bodies, riparian vegetation, hydrological and

morphological characteristics of water bodies and the availability of suitable micro-habitat for aestivation and shelter.

The majority of species that occur within the region lay eggs in or near temporary or permanent water bodies and rely on free water for larval development and metamorphosis. Of these species, only a few are dependent on forested habitats beyond the riparian zone or beyond areas of temporary inundation. These species include the Red-eyed tree frog (*Litoria chloris*), Leseuer's frog (*Litoria leseueri*), Fletchers frog (*Lechriodus fletcheri*) and the Barred frogs of the *Mixophyes* genus.

The minor drainage lines that traverse the site is likely to provide habitat for commonly occurring amphibian species such as the Green tree frog (*Litoria caerulea*), Eastern dwarf tree frog (*Litoria fallax*) and Common eastern froglet (*Crinia signifera*). Grasslands provide suitable habitat for a range of Amphibian species, particularly along drainage depressions and soaks. Species commonly encountered in grassland communities include the Common eastern froglet, Eastern sign bearing froglet (*Crinia parinsignifera*), Striped marsh frog (*Limnodynastes peronii*), Spotted grass frog (*Limnodynastes tasmaniensis*), Eastern dwarf tree frog, Rocket frog (*Litoria nasuta*), Whistling tree frog (*Litoria verreauxii*) and Cane toad* (*Bufo marinus*). Sedgeland communities in low lying grassland areas may provide suitable habitat for these species.

It should be noted that Raff Creek is subject to tidal influences as evidenced by the presence of mangroves. It's value as frog habitat is therefore limited.

The Threatened Acid frog species, Wallum froglet (*Crinia tinnula*) has previously been recorded in the vicinity of the haul road. However, habitat in this area is considered to be marginal.

Species which typically occur in low elevation rainforest and permanent streams such as the Giant barred frog (*Mixophyes iteratus*) are unlikely to occur at the subject site.

2.4.3 Reptiles

As reptiles are poikilothermic, and predominantly insectivorous or carnivorous, their habitat requirements are less directly determined by vegetation species composition than other taxa which feed directly on plants. Reptile distributions are strongly influenced by structural characteristics of the vegetation, climate and other factors affecting thermoregulation such as shade and availability of shelter and basking sites (Smith *et al* 1994).

In a survey of the moist forest herpetofauna of North-eastern NSW, Smith *et al* (1989) found that few species discriminated between rainforest and wet sclerophyll forest, however, most species exhibited a response to differences in elevation and the availability of microhabitat components and other substrates.

The availability of microhabitats, of varying thermal properties is particularly important for most reptile species, as behavioural thermoregulation (regulation of body heat) is

important in controlling critical body functions such as digestion, foraging activity and reproduction.

Reptile diversity and abundance is often (but not always) significantly higher in drier habitat types, particularly those with a wide variety of ground substrate microhabitats. This contrasts markedly with the distribution patterns of birds, and most mammals.

The single limiting factor in terms of species diversity in coastal vegetation is the lack of shelter sites (e.g. logs, tree hollows and decorticating bark). Such habitat components characterise eucalypt forests and woodlands, where species diversity may be much higher, depending on disturbance factors.

The subject site is considered to provide low-moderate quality habitat for reptiles due to the presence of the combination of shelter and basking sites, fallen logs for shelter, forested areas with good canopy and leaf litter development in the vicinity of Raff Creek, and reliable sources of prey.

The subject site is likely to represent suitable habitat for commonly occurring reptile species such as Common garden skink (*Lampropholis delicata*), Friendly sun skink (*Lampropholis amicula*) and Carpet python (*Morelia spilota*).

Adjacent residential and commercial use may have resulted in a proliferation of introduced small mammals such as the House mouse (*Mus musculus*) and Black rat (*Rattus rattus*) which in turn provide prey for snakes such as the Red-bellied black snake (*Pseudechis porphyriacus*), Carpet python, Swamp snake (*Hemiaspis signata*) and Eastern brown snake (*Pseudonaja textilis*).

2.4.4 Birds

The significance of near coastal environments of the NSW Far North Coast and South-East Queensland as over-wintering habitat for migratory birds has been established by many observers and bird banders including Keast (1968), Robertson (1973), Gravatt (1974), Porter (1982) and Robertson and Woodall (1983). These patterns may be attributable to the relatively high winter temperatures and long growing season of this region compared with the rest of south-eastern Australia (Fitzpatrick and Nix 1973; Edwards 1979; Nix 1982; Specht *et al* 1981).

Many insectivorous birds from higher latitudes and elevation over-winter in the locality. These include species such as the Fantail cuckoo, Sacred kingfisher, Rainbow bee-eater, Noisy pitta, Tree martin, Black-faced cuckoo-shrike, Cicada bird, Golden whistler, Rufous whistler, Rose robin, Grey fantail, White-throated gerygone, Silvereye, Olive-backed oriole and Spangled drongo.

Birds such as honeyeaters and lorikeets are Blossom nomads (*ibid.*). These birds move locally in response to variation in the availability of nectar and or pollen, important components in their diet. Porter (1982) highlights the importance of Forest red gum, Broad-leaved paperbark and Coast banksia for Scaly-breasted and Rainbow lorikeets as these

species flower during the lorikeet's winter breeding period. A sequence of important nectar bearing plants in the genera Eucalyptus, Banksia, Melaleuca and Callistemon provide a continuity of food for nectivorous birds.

Studies of bird usage in rainforest remnants by Holmes (1987), Connelly and Specht (1988) and Lott & Duigan (1993) indicate that the diversity and abundance of birds is related to the size of the Rainforest patches and their degree of isolation from major areas of native forest. Lott & Duigan (1993) and Howe *et al* (1981) also note that sites with a higher diversity of vegetation and those which are closer to water generally support a greater diversity of birds. Locally nomadic and migratory rainforest species such as the Wompoo, Rose-crowned and Superb fruit-doves, Common koel and Black-faced cuckoo-shrike are known to use scattered areas of habitat as "stepping-stones" between more intact areas of forest (Date *et al* 1992; Lott & Duigan 1993).

The habitats present on and adjacent to the subject site is likely to result in a moderate diversity of resident and nomadic birds occurring on the site over the year. Habitat which occur on or adjacent to the site include sedgelands, grasslands, and tidal communities such as mangrove/casuarina forest and saltmarsh.

The subject site provides suitable habitat for a range of disturbance adapted open country birds such as the Magpie (*Gymnorhina tibicen*), Lewin's honeyeater (*Meliphaga lewinii*), Torresian crow (*Corvus orru*), Magpie-lark (*Grallina cyanoleuca*) and Noisy miner (*Manorina melanocephala*).

Waterways and drainage lines on and adjacent to the subject site are likely to generate a substantial food source for insectivorous birds such as the Willie wagtail (*Rhipidura leucophrys*), Grey fantail (*Rhipidura fuliginosa*), Spangled drongo (*Dicrurus bracteatus*), Welcome swallow (*Hirundo neoxena*) etc.

As previously discussed, residential and commercial use of adjacent land may have resulted in a proliferation of introduced small mammals. These small mammals, as well as reptile species on the site, are likely to provide a food resource for various species of diurnal raptors, such as the Black-shouldered kite (*Elanus axillaris*), Brown falcon (*Falco berigora*) and Whistling kite (*Haliastur sphenurus*), as well as for nocturnal raptors such as the Barn owl (*Tyto alba*).

Trees with hollows necessary for hollow-nesting birds are generally not present.

2.4.5 Mammals

Small terrestrial mammals generally occur in highest densities in association with a complex vegetation structure. A dense understorey layer, which provides shelter from predators and provides nesting opportunities, is particularly important. As previously discussed, residential and commercial use of adjacent land may have been likely to result in a proliferation of introduced small mammals.

In general, medium-large terrestrial mammals such as macropods select habitats which provide a dense cover for shelter and refuge and open areas for feeding. The larger species

tend to occupy drier more open habitats: the smaller species, moister and more densely vegetated habitats.

All arboreal mammals that occur in the region (with the exception of the Koala) utilise tree hollows for nesting and shelter (although the Common ringtail possum is not dependent on hollows). Smith and Lindenmeyer (1988) consider that shortage of nest hollows is likely to limit arboreal mammal populations where density of hollow bearing trees is less than 2 to 8 trees per hectare.

Trees with hollows necessary for hollow-dependent mammals are generally not present.

Arboreal folivores (*e.g.* Common ringtail possum, Greater glider) are widespread and abundant but exhibit local variation in response to such factors as tree species composition, foliage protein and fibre levels, leaf toughness, toxins, forest structure and the availability of shelter sites. Arboreal folivores are expected to be most abundant in areas of high productivity, high soil fertility and moderate climate, in conjunction with adequate shelter and suitable foraging substrate.

Arboreal nectarivore/insectivores feed on a wide variety of plant and insect exudates including the nectar of flowering eucalypts, and shrubs such as Banksia and Acacia sp. These species also feed extensively on insects, particularly under the shedding bark of eucalypts. The distribution of nectarivore/insectivores is considered to be related to the abundance of nectar and pollen producing plants, the abundance of bark shedding eucalypts which harbour insect prey, and the occurrence of sap and gum exudate producing trees (Sap feed trees) and shrubs (*e.g. Acacia* sp.). Arboreal nectarivores and insectivores are generally hollow dependent species.

The structural complexity and habitat diversity of the subject site is likely to support a low-moderate diversity and abundance of ground dwelling mammals. Expected species include Black rat, Swamp rat, House mouse, *Antechinus* sp., *Melomys* sp., and the Northern brown bandicoot.

Insectivorous bats, like insectivorous birds, overlap considerably in diet and broad vegetation preferences (Hall 1981), but specialise in foraging in specific layers or substrates within the forest (Crome and Richards 1988). Vegetation on and adjacent to the subject site is likely to provide forage habitat for a low-moderate diversity and abundance of insectivorous bats, due to the combination of open and forested areas of vegetation.

Suitable roost habitat for flying foxes are unlikely to occur on the subject site.

Potential habitat for the Water mouse (*Xeromys myoides*) occurs in mangrove communities on site.

2.5 Tree Hollows Within the Development Area

A targeted survey for potential habitat trees was completed over the site in July 2020. The locations of all potential habitat trees were recorded utilising a hand-held GPS

unit. Potential habitat trees included trees containing one or more of the following features:

- Hollows, spouts and/or fissures with obvious depth;
- Bird nests or dreys; and
- Trees with nest boxes (installed during the Pacific Highway upgrade).

The type of all potential habitat features was recorded, and the results are provided in **APPENDIX 1.** In total, thirty-five (35) potential habitat trees were recorded from the subject site (**FIGURE 5**).

An overlay of the proposed development on the locations of habitat trees recorded from the site (**FIGURE 5**) has indicated that a number of potential habitat trees will be removed. Nest boxes will be installed in retained vegetation to compensate for the loss of these habitat features in accordance with Performance Outcome PO57 of the Moreton Bay Planning Scheme. Replacement fauna nesting boxes will be required at the rate of one (1) nest box for every hollow removed. Where hollows have not yet formed in trees with a diameter greater than 0.8m at 1.3m above the ground, three (3) nest boxes will be required for every habitat tree removed. The exact number and location of nest boxes to be installed will be detailed in a Fauna Spotter/Catcher Report (**SECTION 5.2**) to be approved prior to commencement of construction. Nest boxes will be designed for a range of locally occurring hollow dependant fauna species and constructed of materials with a minimum lifespan of 10 years. Nest boxes are to be located either within the rehabilitation area adjacent to Caboolture River or Raff Creek. Where nest boxes are proposed to be installed in revegetation areas, they will be mounted on treated hardwood timber poles.

2.6 Threatened Species Considered Possible Occurrences on the Subject Site

Based on the assessment of available habitat, threatened fauna species known from the locality were assessed for the likelihood of their occurrence on the Subject site (**APPENDIX 2**). Seven (7) Threatened fauna species were known to occur or considered possible occurrences on the Subject site, including:

- Australian painted snipe (*Rostratula australis*);
- Grey-headed flying-fox (*Pteropus poliocephalus*) **– RECORDED**;
- Koala (*Phascolarctos cinereus*) – **RECORDED**;
- Red goshawk (*Erythrotriorchis radiatus*);
- Swift parrot (*Lathamus discolor*);
- Diamond Firetail (*Stagonopleura guttata*); and
- Water mouse (*Xeromys myoides*).



N

LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works
- Surveyed Habitat Trees to be Retained
- Surveyed Habitat Trees to be Removed

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 5A

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
HABITAT TREES



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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FIGURE 5B

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
HABITAT TREES



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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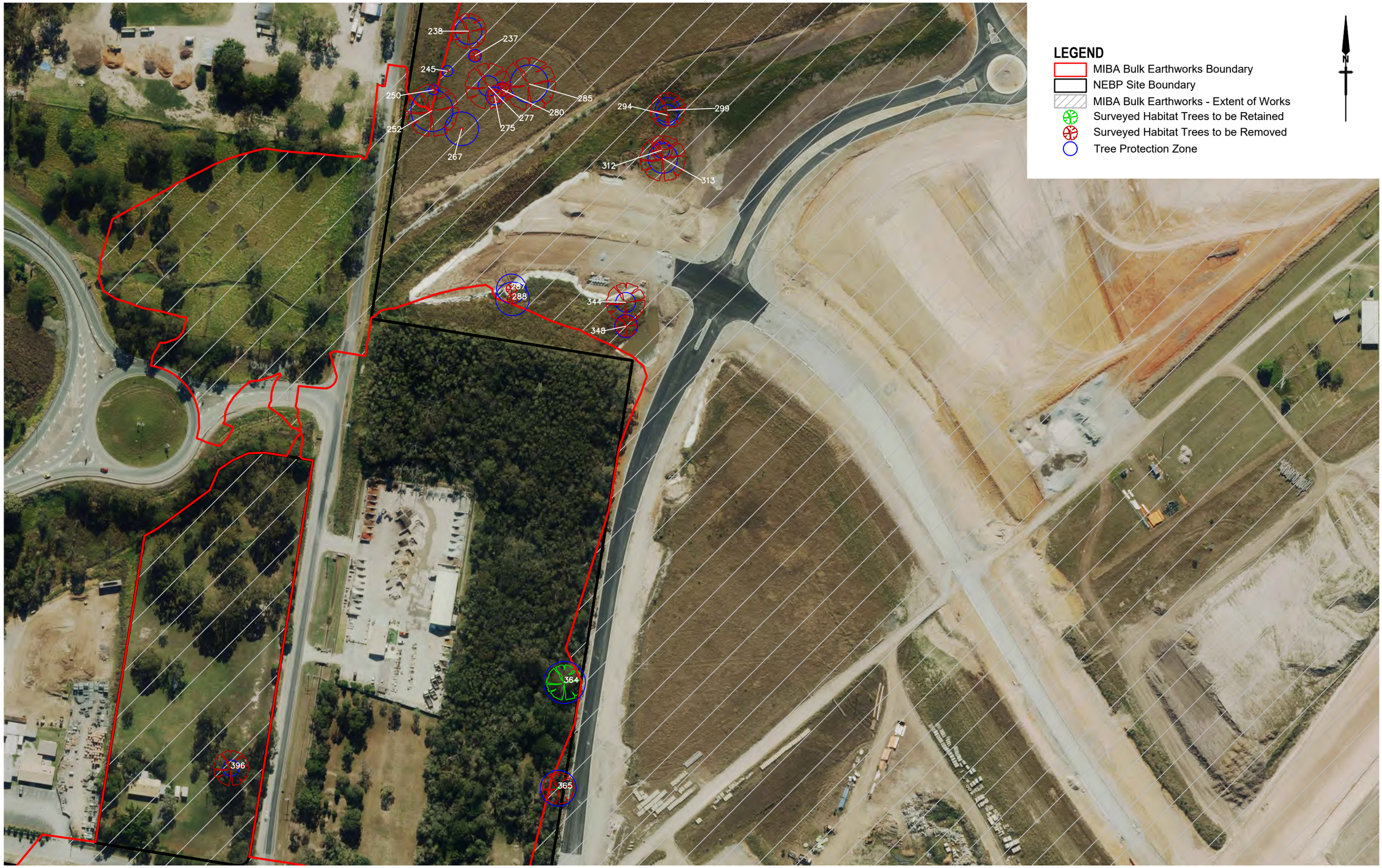
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FIGURE 5C

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
HABITAT TREES



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works
- Surveyed Habitat Trees to be Retained
- Surveyed Habitat Trees to be Removed
- Tree Protection Zone

N

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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FIGURE 5D

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
HABITAT TREES



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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FIGURE 5E

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
HBAITAT TREES

Eight (8) migratory fauna species were also considered to be possible occurrences on the subject site:

- Broad-billed sandpiper (*Limicola falcinellus*);
- Double-banded plover (*Charadrius bicinctus*);
- Fork-tailed swift (*Apus pacificus*);
- Little curlew (*Numenius minutus*);
- Marsh sandpiper (*Tringa stagnatilis*);
- Oriental plover (*Charadrius veredus*);
- Pectoral sandpiper (*Calidris melanotos*); and
- Red-necked stint (*Calidris ruficollis*).

3 Fauna Management Strategies

3.1 Introduction

This section contains species specific management strategies that have been designed to enable the aims of the FMP to be satisfied during both the construction and operational phases. These strategies incorporate general best practice measures to minimise potential adverse impacts on fauna, including significant species.

Additional recommendations for the use of felled timber, retention of conservation areas and reporting procedures are also made.

3.2 Management of Fauna During Construction

In order to ensure the most suitable ecological outcome and to ensure that possible impacts on significant species are minimised, the commencement of site work shall take place in accordance with the following:

1. All contractors and their employees are to be aware of their obligations under this Fauna Management Plan. An appropriately qualified and licenced fauna spotter/catcher shall be present at the pre-start meeting or safety induction to outline the requirements during construction.
2. The contractor will provide access to equipment that may be required by the spotter/catcher (e.g. chainsaw) as well as qualified operators.
3. The operational direction of ground clearing works shall be completed in a manner that ensures maximum fauna movement away from operational works towards areas of retained habitat (**FIGURE 4**). Electric and barbed fencing is not to be utilised within or adjacent to the construction area.
4. The clearing of vegetation and other works will be completed in a direction towards areas of retained vegetation (**FIGURE 4**). This disturbance stimuli will provide fauna with time to leave the site, thus maximising the chances of fauna survival while reducing the need for human intervention for translocation or rescue purposes. The use of temporary fauna proof barrier fencing may be necessary to direct fauna to the fauna relocation area and away from works areas.
5. Immediately prior to any clearing operations and during the felling of any identified habitat trees, the fauna spotter/catcher shall be present to inspect the trees and relocate remaining fauna.
6. Immediately prior to tree removal, the fauna spotter/catcher shall attempt to "flush out" any denning or nesting animals not observed during the initial tree inspection. This may involve hitting target trees with a sledgehammer or other heavy implement. Trees with hollows should be laid on the ground carefully.
7. If any denning or nesting animals are observed within hollow limbs, but cannot be readily removed by the fauna spotter/catcher using the methodology above, a site specific methodology must be identified. It is recommended that in these instances, hollow branches should be removed and placed in a secure location.

The ends of hollows should be plugged prior to removal of the branch. Hollow branches should be transported to the fauna relocation area and unplugged.

8. No tree is to be cleared if wildlife is present, or if the crown of the tree overlaps one in which fauna is present.

9. Following felling, a second inspection of the relevant trees shall be carried out to relocate fauna disturbed by the clearing process or remaining within the felled timber to a suitable location within retained habitat. The relocation area selected should be well vegetated and provide appropriate habitat for the species being released. Nocturnal animals (i.e. bats, gliders, etc.) should be released at dusk. The second inspection will also allow the fauna spotter catcher to accurately document the number of hollows removed (and requiring replacement with nest boxes).

10. Any injured animals requiring treatment or euthanasia shall be immediately removed and taken to an appropriately qualified veterinary surgeon. Contact details for the nearest veterinary clinics are provided below.

    Burpengary Veterinary Hospital
    51 Progress Road
    Burpengary QLD 4505
    (07) 3888 2292

    Morayfield Vet Clinic
    285 Morayfield Road
    Morayfield QLD 4506
    (07) 5498 6555

    Australia Zoo Wildlife Hospital
    1638 Steve Irwin Way
    Beerwah QLD 4519
    (07) 5436 2097

    Any animals requiring support or rehabilitation other than vet assistance will be taken to a qualified wildlife carer or centre.

11. Following the completion of each clearing stage, capture and release records will be supplied to QPWS in accordance with their licensing conditions. A copy of these records, if requested, shall be supplied to Council.

12. A report from the fauna spotter/catcher shall be provided to the clearing contractor and Council Ecologist within two (2) weeks of completion of clearing activities.

3.3 Tree Hollow Salvage and Replacement

Prior to any clearing works, the ecologist will observe trees designated for removal for additional potential hollows as well as any fallen logs that may be providing ground habitat. Any tree hollows removed or ground habitat disturbed during clearing operations should be salvaged and installed within dedicated conservation areas where possible.

In the event that additional hollows are identified and cannot be salvaged, replacement artificial nest boxes of an appropriate size and design will be installed within retained vegetation, avoiding open space or mown areas to reduce the risk of falling nest boxes injuring people.

Replacement fauna nesting boxes will be required at the rate of one (1) nest box for every hollow removed. Where hollows have not yet formed in trees with a diameter greater than 0.8m at 1.3m above the ground, three (3) nest boxes will be required for every habitat tree removed. Nest boxes will be designed for a range of locally occurring hollow dependant fauna species and constructed of materials with a minimum lifespan of 10 years. Where nest boxes are proposed to be installed in revegetation areas, they will be mounted on treated hardwood timber poles.

The ecologist will compile a list of any additional hollows identified and removed in their post-clearing report. This report will assist in determining, installing and monitoring the required artificial nest boxes.

3.4 Fauna Connectivity

In order to ensure the most suitable ecological outcome with regards to fauna connectivity and to ensure that works do not create a barrier to, from or through key environmental areas, the following management strategies will be employed to enhance and maintain connectivity:

i) Vegetation currently present along what is known locally as the Raff Creek Corridor will be subject to restoration works (Raff Creek Restoration Concept Plan, JWA 2015). Works in this area will also involve flood mitigation works, including land reprofiling for flood storage along with the installation of vegetated detention basins. The crossing over Raff Creek will take the form of a single span bridge. This design was specifically selected to facilitate the passage of fish and other fauna along Raff Creek and associated vegetation.

ii) Between Lot 2 SP169551 (Category B area) and adjoining Lots and road reserves Tree Protection Zones (TPZ) were estimated. The maximum TPZ required for retained adjoining vegetation were calculated (a sample of trees rather than every single tree were recorded – the largest trees that would have the largest TPZ were sampled). The calculation of the largest TPZs will ensure the appropriate protection of the adjoining Lots and road reserve to maintain ecological connectivity.

iii) The area along the Caboolture River will be rehabilitated to a width of 100m, which will significantly enhance the environmental corridor and available habitat along the river.

iv) Rehabilitation works are to be completed between Lot 13 RP145197, Lot 2 RP194131 and the Caboolture River Tributary (which flows from the Southbound Bruce Highway Interchange at Buchanan Road, through Lot 1 SP266287, and discharges into the Caboolture River). Rehabilitation works will be based on

ground levels and will incorporate saltmarsh and other wetland and riparian vegetation as appropriate. A detention basin will also be planted with wetland species. A Rehabilitation plan has been prepared by Place Design Group (2020).

v) Vegetation is be retained along the Gympie Creek Tributary (which flows from Cobb Road through Lot 2000 SP309348 and discharges into what is locally known as Raff Creek).

3.5 General Management Protocols for Fauna Groups

3.5.1 Introduction

A brief summary addressing the removal and relocation methods for each broad faunal group is provided in the sections below. Each summary has considered that species observed on site and those species likely to occur in the area to be disturbed.

3.5.2 Amphibians

The occurrence of suitable habitat for amphibians is limited to the creek line in the southeast of the site. Potential habitat areas due to be disturbed will be inspected for the presence of amphibians. In the event that an amphibian is identified in an area of disturbance, the animal will be captured and relocated. To reduce the risk of disease, hygiene protocols will follow the Hygiene Protocol for the Control of Disease in Frogs (DECC 2018). Amphibians will be handled with unused, non-powdered and talc-free gloves. To minimize stress and the risk of death during translocation, translocation will comply with standard operating procedures. Amphibians will be transported in single-use light weight plastic bags and released as soon as possible to reduce stress.

3.5.3 Reptiles

The absence of rocky habitats on-site diminishes the number of reptile species likely to occur on-site, however potential habitat areas due to be disturbed will be inspected for the presence of reptiles. In the event that a reptile is identified in a tree to be removed, the animal will be captured and relocated.

3.5.4 Birds

Birds will be "flushed" from areas of disturbance using appropriate techniques. The majority of birds previously recorded from the site generally occur in the canopy. These birds shall be "flushed" by gently nudging the tree with machinery prior to felling.

In the event that bird eggs are found within a tree to be felled, and are not readily identifiable as belonging to a threatened bird species, the eggs will be removed and taken to a wildlife rehabilitation centre or carer for incubation.

3.5.5 Mammals

As previously discussed, all trees to be removed are to be inspected by a suitably qualified ecologist for denning or nesting animals. All mammals occurring within a tree will be

flushed out using the earthworks machinery to nudge the tree. If the animal cannot be "flushed" from the tree the animal will be removed. The animal is to be removed by placing a pillow slip over the hollow end of the branch and removing the limb by chain sawing the other end. Koalas shall not be handled or interfered with in any way, but rather allowed to move on overnight. Refer to **SECTION 3.6.3** for management actions specific to Koalas.

3.5.6 Issues Relating to all Fauna

No dogs are to be permitted on site during clearing works.

3.6 Threatened Species Management Protocols

3.6.1 Introduction

In the event that any Commonwealth or State listed significant fauna species occur on the subject site during clearing operations, the following fauna management actions shall be implemented.

3.6.2 Acid Frogs

In the event that any acid frogs (i.e. Wallum froglets) are identified within disturbance areas, whether habitat or otherwise, the acid frogs will be captured and relocated to adjacent habitat. See **Section 4.3.2** for minimising disease risk during translocation.

3.6.3 Koalas

All koala habitat trees with a diameter of 10cm at 1.3m above ground height must only be cleared in the presence of a fauna spotter/catcher with appropriate koala experience. In the event that a koala is identified in any tree marked for removal, whether habitat or otherwise, that tree is not to be removed until the koala has dispersed from the tree and a 10m buffer is to be established within which there is to be no works occurring until the koala has moved on of its own accord. The nudging of trees with koalas is not permitted. The tree can only to be removed following inspection by the fauna spotter/catcher to ensure that the koala has dispersed and that the removal of the tree poses no direct threat to the health or survival of the koala. Koalas are not to be handled.

The Nature Conservation (Koala) Conservation Plan 2017 states that for a clearing site of greater than 6ha, no more than 3ha or 3% of the site's areas (which ever is the greater) may be cleared in any one stage. Between each stage, a minimum of one period of twelve (12) hours starting at 6pm and finishing at 6am must occur in which no trees are cleared on the site.

3.6.4 Grey-headed Flying Fox

In the event that a Grey-headed flying fox roost tree is identified, that tree is not to be removed or modified.

3.6.5 Osprey, White-bellied Sea Eagle, and Other Threatened Arboreal Bird Species

In the event that these birds are identified in any tree marked for removal, whether habitat or otherwise, that tree must not be removed until the bird(s) has dispersed from the tree. If required, the tree shall be left overnight to enable the bird(s) to move away. The tree shall only to be removed following its inspection by an appropriately qualified ecologist to ensure that the bird(s) have dispersed and that the removal of the tree poses no direct threat to the health or survival of the bird. In the event that eggs are found on site, the tree will be left until juvenile birds have fledged.

3.6.6 Wading and Wetland Bird Species

It is not anticipated that clearing works will directly impact wading and wetland birds, as the majority of this habitat will be retained. However, in the event that these birds are identified in any vegetation marked for removal, that vegetation must not be removed until the bird(s) has dispersed. The vegetation shall only to be removed following inspection by an appropriately qualified ecologist to ensure that the bird(s) have dispersed and that the removal of the vegetation poses no direct threat to the health or survival of the bird. In the event that eggs are found on site, the vegetation will be left until juvenile birds have fledged.

3.6.7 Microbats

In the event that a microbat roost is identified in a tree to be removed, the hollow is to be secured using a piece of towel or rag firmly placed in the entrance of the hollow to prevent escape. Once the hollow entrance is secured the project arborist or fauna spotter/catcher will then cut the entire hollow limb off below the cavity where the branch remains solid. Where required, a small window may be carefully cut into the hollow, allowing the spotter/catcher to plug the hollow above and below the window. The limb can then be lowered to the ground. The limb will then held in a cool, quiet location until translocation to a suitable relocation site the same day of capture, when at dusk the hollow entrance is re-opened to allow the fauna to emerge of its own accord. A replacement bat box will be installed at the release site prior to the release of the microbats in accordance with **SECTION 3.3**.

4 Performance Indicators

1. All Contractors shall be fully aware of their responsibilities under this FMP.
2. All contractors follow the scope of works outlined in the FMP.
3. No native fauna should be injured or killed during clearing operations.
4. Native fauna on site is safely moved to the relocation area.
5. Any injured wildlife is safely transport to a suitable veterinary clinic.

5 Monitoring, Maintenance and Reporting

5.1 General Requirements

The Principal Contractor shall appoint suitable Contractor(s) to undertake the selective clearing operations and, upon request by Council, the Principal Contractor shall submit the appointed Contractor(s) previous work history for perusal if requested.

The Principal Contractor shall monitor vegetation clearance and earthworks components of the Works on a continual basis to confirm that specific controls have been implemented and appropriate work practices are being adopted.

5.2 Fauna Spotter/Catcher Reports

A pre-clearing report shall be provided to Council prior to clearing which will detail any relevant observations made on site including the presence of habitat trees and requirements for the installation of nest boxes (refer to **SECTION 2.5**).

A post-clearing report shall be provided to Council within two (2) weeks of completion of clearing activities. The report shall have at least the following information:

- Conformance with conditions of the FMP;
- The length of time of the clearing;
- Details of any animal/s that were caught and/or sighted and released, and the placement of any released animals;
- Details of any animals that were destroyed due to injury; and
- Any breaches of conditions of the FMP.

6 Summary

JWA Pty Ltd have been engaged by North East Business Park Pty Ltd to complete a Fauna Management Plan (FMP) for the proposed bulk earthworks associated with the Mixed Industry and Business Area (MIBA) within the North East Business Park (NEBP) development.

This FMP provides specific measures for mitigating and/or minimising the potential impacts on fauna as a result of development activities on the subject site and addresses Conditions 26, 27 and 29 of the approval conditions issued by Moreton Bay Regional Council on the 27th February 2020.

Fauna management measures include:

- The use of a suitably qualified fauna spotter/catcher;
- General Fauna Management Protocols for:
    - Amphibians;
    - Reptiles;
    - Birds; and
    - Mammals.
- Tree hollow salvage and replacement;
- Provision/enhancement of fauna connectivity areas;
- Specific Threatened Species Management Protocols for:
    - Acid frogs;
    - Koala;
    - Grey-headed flying fox; and
    - Threatened arboreal birds.

The successful implementation of this plan will result in all native fauna being safely relocated to neighbouring vegetation and that fauna injury or death during clearing operations is avoided.

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APPENDIX 1 – Tree Survey Details

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
001	Muttonwood	*Rapanea variabilis*	30	9	8		Retain		Double stem
002	Swamp oak	*Casuarina glauca*	28	7	3		Retain		
003	Swamp oak	*Casuarina glauca*	35	15	2		Retain		
004	Swamp oak	*Casuarina glauca*	30	8	1		Retain		
005	Swamp oak	*Casuarina glauca*	40	15	4		Retain		
006	Swamp oak	*Casuarina glauca*	24	8	3		Retain		
007	Swamp oak	*Casuarina glauca*	35	12	4		Retain		
008	Muttonwood	*Rapanea variabilis*	28	8	4		Remove		
009	Acacia	*Acacia sp.*	27	7	5		Remove		Two stems
010	Acacia	*Acacia sp.*	28	6	4		Retain		Several stems
011	Grey ironbark	*Eucalyptus siderophloia*	42	19	10		Remove		
012	Grey ironbark	*Eucalyptus siderophloia*	20	10	3		Retain		
013	Swamp oak	*Casuarina glauca*	19	15	1		Retain		
014	Swamp oak	*Casuarina glauca*	19	17	2		Remove		
015	Swamp oak	*Casuarina glauca*	25	17	2		Remove		
016	Swamp oak	*Casuarina glauca*	17	15	3		Retain		
017	Swamp oak	*Casuarina glauca*	15	14	4		Retain		
018	Swamp oak	*Casuarina glauca*	20	18	3		Retain		
019	Swamp oak	*Casuarina glauca*	19	16	2		Retain		
020	Swamp oak	*Casuarina glauca*	23	16	2		Retain		
021	Swamp oak	*Casuarina glauca*	21	15	4		Retain		
022	Grey ironbark	*Eucalyptus siderophloia*	23	16	4		Retain		
023	Swamp oak	*Casuarina glauca*	26	19	3		Retain		
024	Swamp oak	*Casuarina glauca*	34	18	4		Retain		
025	Swamp oak	*Casuarina glauca*	15	11	2		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
026	Swamp oak	*Casuarina glauca*	17	13	3		Retain		
027	Swamp oak	*Casuarina glauca*	19	13	3		Remove		
028	Swamp oak	*Casuarina glauca*	17	14	4		Remove		
029	Swamp oak	*Casuarina glauca*	27	15	5		Remove		
030	Swamp oak	*Casuarina glauca*	28	16	3		Remove		
031	Swamp oak	*Casuarina glauca*	15	10	1		Remove		
032	Swamp oak	*Casuarina glauca*	26	18	4		Remove		
033	Swamp oak	*Casuarina glauca*	16	14	2		Remove		
034	Swamp oak	*Casuarina glauca*	15	15	1		Remove		
035	Swamp oak	*Casuarina glauca*	16	15	2		Remove		
036	Grey mangrove	*Avicennia marina*	35	11	8		Remove		
037	Grey mangrove	*Avicennia marina*	16	11	3		Remove		
038	Grey mangrove	*Avicennia marina*	16	6	7		Remove		
039	Swamp oak	*Casuarina glauca*	15	12	5		Remove		
040	Grey mangrove	*Avicennia marina*	30	7	5		Remove		
041	Swamp oak	*Casuarina glauca*	29	10	5		Remove		
042	Grey mangrove	*Avicennia marina*	50	8	10		Remove		
043	Swamp oak	*Casuarina glauca*	15	17	3		Remove		
044	Swamp oak	*Casuarina glauca*	21	15	4		Remove		
045	Swamp oak	*Casuarina glauca*	16	16	3		Remove		
046	Grey mangrove	*Avicennia marina*	30	15	10		Remove		
047	Grey mangrove	*Avicennia marina*	60	15	13		Remove		
048	Grey mangrove	*Avicennia marina*	50	15	13		Remove		2 stems
049	Grey mangrove	*Avicennia marina*	45	14	12		Retain		
050	Grey mangrove	*Avicennia marina*	20	13	10		Retain		
051	Grey mangrove	*Avicennia marina*	30	14	9		Retain		
052	Swamp oak	*Casuarina glauca*	23	15	3		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
053	Swamp oak	*Casuarina glauca*	15	15	3		Remove		
054	Swamp oak	*Casuarina glauca*	16	16	2		Remove		
055	Swamp oak	*Casuarina glauca*	17	17	2		Remove		
056	Swamp oak	*Casuarina glauca*	15	17	3		Remove		
057	Swamp oak	*Casuarina glauca*	15	14	5		Remove		
058	Swamp oak	*Casuarina glauca*	15	14	3		Remove		
059	Swamp oak	*Casuarina glauca*	20+16 +22	13	5		Remove		
060	Swamp oak	*Casuarina glauca*	19+9	16	3		Remove		
061	Swamp oak	*Casuarina glauca*	17	15	3		Remove		
062	Swamp oak	*Casuarina glauca*	16	15	2		Remove		
063	Swamp oak	*Casuarina glauca*	19	15	2		Remove		
064	Swamp oak	*Casuarina glauca*	17	13	4		Remove		
065	Swamp oak	*Casuarina glauca*	18	15	2		Remove		
066	Swamp oak	*Casuarina glauca*	23	18	3		Remove		
067	Swamp oak	*Casuarina glauca*	19	17	2		Remove		
068	Swamp oak	*Casuarina glauca*	26	17	4		Remove		
069	Swamp oak	*Casuarina glauca*	20	16	3		Remove		
070	Grey mangrove	*Avicennia marina*	35+40	12	12		Retain		
071	Grey mangrove	*Avicennia marina*	30	8	14		Retain		
072	Grey ironbark	*Eucalyptus siderophloia*	30	18	6		Remove		
073	Grey ironbark	*Eucalyptus siderophloia*	29	18	8		Remove		
074	Grey ironbark	*Eucalyptus siderophloia*	29	19	8		Remove		
075	Grey ironbark	*Eucalyptus siderophloia*	15	17	4		Remove		
076	Grey ironbark	*Eucalyptus siderophloia*	30	17	4		Remove		
077	Grey ironbark	*Eucalyptus siderophloia*	22	15	4		Remove		
078	Grey ironbark	*Eucalyptus siderophloia*	16	14	3		Remove		
079	Grey ironbark	*Eucalyptus siderophloia*	60	23	10		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
080	Grey ironbark	*Eucalyptus siderophloia*	34	19	7		Remove		
081	Grey ironbark	*Eucalyptus siderophloia*	28	23	3		Remove		
082	Grey ironbark	*Eucalyptus siderophloia*	29	23	10		Remove		
083	Grey mangrove	*Avicennia marina*	31+26	12	10		Remove		
084	Grey ironbark	*Eucalyptus siderophloia*	65	23	14		Remove		
085	Swamp oak	*Casuarina glauca*	20	11	3		Retain		
086	Grey mangrove	*Avicennia marina*	25	8	5		Remove		
087	Swamp oak	*Casuarina glauca*	28	10	4		Remove		
088	Swamp oak	*Casuarina glauca*	25	5	4		Remove		
089	Grey mangrove	*Avicennia marina*	29	8	9		Remove		2 stems
090	Swamp oak	*Casuarina glauca*	27	15	6		Remove		
091	Grey mangrove	*Avicennia marina*	27	10	6		Remove		
092	Grey mangrove	*Avicennia marina*	18	10	9		Remove		Multiple stems
093	Grey mangrove	*Avicennia marina*	32	10	9		Remove		
094	Swamp oak	*Casuarina glauca*	16	11	2		Retain		
095	Swamp oak	*Casuarina glauca*	18	12	3		Remove		
096	Swamp oak	*Casuarina glauca*	21	9	3		Remove		
097	Grey mangrove	*Avicennia marina*	55	9	7		Remove		Multi stems
098	Swamp oak	*Casuarina glauca*	18	11	3		Retain		
099	Swamp oak	*Casuarina glauca*	22	14	2		Retain		
100	Swamp oak	*Casuarina glauca*	15	11	3		Retain		
101	Grey ironbark	*Eucalyptus siderophloia*	60	20	11		Retain		
102	Blue gum	*Eucalyptus tereticornis*	55	24	7		Remove		
103	Blue gum	*Eucalyptus tereticornis*	60	24	8		Remove		
104	Blue gum	*Eucalyptus tereticornis*	40	23	10		Remove		
105	Blue gum	*Eucalyptus tereticornis*	70	26	9		Remove		
106	Blue gum	*Eucalyptus tereticornis*	95	25	10		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
107	Blue gum	*Eucalyptus tereticornis*	70	26	10		Remove		
108	Blue gum	*Eucalyptus tereticornis*	80	27	12		Retain		
109	Blue gum	*Eucalyptus tereticornis*	32	16	7		Retain		
110	Blue gum	*Eucalyptus tereticornis*	35	20	6		Remove		
111	Blue gum	*Eucalyptus tereticornis*	28	17	8		Retain		
112	Blue gum	*Eucalyptus tereticornis*	50	19	5		Retain		
113	Blue gum	*Eucalyptus tereticornis*	40	21	7		Retain		
114	Blue gum	*Eucalyptus tereticornis*	38	14	5		Retain		
115	Blue gum	*Eucalyptus tereticornis*	36	16			Retain		
116	Blue gum	*Eucalyptus tereticornis*	65	18	6		Retain		
117	Blue gum	*Eucalyptus tereticornis*	25	13	3		Retain		
118	Blue gum	*Eucalyptus tereticornis*	90	21	9		Retain		
119	Blue gum	*Eucalyptus tereticornis*	42	13	7		Retain		
120	Blue gum	*Eucalyptus tereticornis*	45	21	6		Retain		
121	Blue gum	*Eucalyptus tereticornis*	58	18	8		Retain		
122	Moreton Bay fig	*Ficus macrophylla*	30	10	5		Retain		
123	Blue gum	*Eucalyptus tereticornis*	55	22	8		Retain		
124	Blue gum	*Eucalyptus tereticornis*	38	18	6		Retain		
125	Blue gum	*Eucalyptus tereticornis*	60	19	7		Retain		
126	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	13	4		Retain		
127	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	10	2		Retain		
128	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	10	4		Retain		
129	Broad-leaved paperbark	*Melaleuca quinquenervia*	26	10	2		Retain		
130	Broad-leaved paperbark	*Melaleuca quinquenervia*	24	10	3		Retain		2 stems
131	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	9	4		Retain		
132	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	10	5		Retain		
133	Blue gum	*Eucalyptus tereticornis*	45	18	7		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
134	Swamp oak	*Casuarina glauca*	28	10	3		Retain		
135	Blue gum	*Eucalyptus tereticornis*	35	15	6		Retain		
136	Blue gum	*Eucalyptus tereticornis*	35	19	8		Retain		
137	Swamp oak	*Casuarina glauca*	26+16 +28+2 5	16	5		Retain		
138	Blue gum	*Eucalyptus tereticornis*	95	20	10		Retain		
139	Swamp oak	*Casuarina glauca*	14	13	4		Retain		
140	Swamp oak	*Casuarina glauca*	28	13	3		Retain		
141	Swamp oak	*Casuarina glauca*	16	11	3		Retain		
142	Blue gum	*Eucalyptus tereticornis*	35	18	4		Retain		
143	Swamp oak	*Casuarina glauca*	35	19	6		Retain		
144	Swamp oak	*Casuarina glauca*	18	10	4		Retain		
145	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	8	3		Retain		
146	Broad-leaved paperbark	*Melaleuca quinquenervia*	20+15 +10	8	1		Retain		
147	Swamp oak	*Casuarina glauca*	27	8	3		Retain		
148	Blue gum	*Eucalyptus tereticornis*	27	10	3		Retain		
149	Moreton Bay fig	*Ficus macrophylla*	100	22	22		Retain		
150	Moreton Bay fig	*Ficus macrophylla*	100	22	22		Retain		
151	Moreton Bay fig	*Ficus macrophylla*	120	22	20		Retain		
152	Moreton Bay fig	*Ficus macrophylla*	120	21	12		Retain		
153	Kamala	*Mallotus philippensis*	20	8	3		Retain		
154	Grey ironbark	*Eucalyptus siderophloia*	25	10	3		Retain		
155	Blue gum	*Eucalyptus tereticornis*	58	15	9		Retain		
156	Blue gum	*Eucalyptus tereticornis*	100	17	9		Retain		
157	Blue gum	*Eucalyptus tereticornis*	60	18	7		Retain		
158	Blue gum	*Eucalyptus tereticornis*	36	18	5		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
159	Tuckeroo	*Cupaniopsis anacardioides*	17	6	2		Retain		
160	Blue gum	*Eucalyptus tereticornis*	58	18	6		Retain		
161	Swamp oak	*Casuarina glauca*	16	9			Retain		
162	Swamp oak	*Casuarina glauca*	21	9	3		Retain		
163	Blue gum	*Eucalyptus tereticornis*	34	14	5		Retain		
164	Blue gum	*Eucalyptus tereticornis*	65	18	7		Remove		
165	Blue gum	*Eucalyptus tereticornis*	30	14	5		Remove		
166	Blue gum	*Eucalyptus tereticornis*	75	19	10		Remove		
167	Blue gum	*Eucalyptus tereticornis*	35	17	6		Remove		
168	Blue gum	*Eucalyptus tereticornis*	29	14	4		Remove		
169	Blue gum	*Eucalyptus tereticornis*	30	15	6		Remove		
170	Red ash	*Alphitonia excelsa*	26	8	3		Remove		
171	Red ash	*Alphitonia excelsa*	17	5	5		Remove		
172	Blue gum	*Eucalyptus tereticornis*	23	7	2		Remove		
173	Acacia	*Acacia sp.*	17	6	2		Remove		
174	Tuckeroo	*Cupaniopsis anacardioides*	25	5	3		Remove		
175	Acacia	*Acacia sp.*	28	5	4		Remove		
176	Tuckeroo	*Cupaniopsis anacardioides*	27	5	3		Remove		
177	Grey ironbark	*Eucalyptus siderophloia*	55	21	8		Remove		
178	Blue gum	*Eucalyptus tereticornis*	55	21	10		Remove		
179	Blue gum	*Eucalyptus tereticornis*	35	18	4		Remove		
180	Rough-leaved elm	*Aphananthe philippinensis*	40	10	6		Retain		
181	Dead	*Dead*	80	8	0	Yes	Retain	Hollows. Very rotten	
182	Blue gum	*Eucalyptus tereticornis*	50	17	6		Retain		
183	Blue gum	*Eucalyptus tereticornis*	60	25	12		Retain		
184	Broad-leaved paperbark	*Melaleuca quinquenervia*	30+29 ++28+	11	6		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
185	Broad-leaved paperbark	*Melaleuca quinquenervia*	60	12	6		Remove		
186	Grey ironbark	*Eucalyptus siderophloia*	45	25	6		Retain		
187	Grey ironbark	*Eucalyptus siderophloia*	40	19	5		Remove		
188	Grey ironbark	*Eucalyptus siderophloia*	55	23	7		Remove		
189	Blue gum	*Eucalyptus tereticornis*	34	14	4		Remove		
190	Blue gum	*Eucalyptus tereticornis*	60	16	7		Remove		
191	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	15	6		Remove		
192	Broad-leaved paperbark	*Melaleuca quinquenervia*	42	15	6		Remove		
193	Broad-leaved paperbark	*Melaleuca quinquenervia*	58	18	8		Remove		
194	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	15	6		Remove		
195	Broad-leaved paperbark	*Melaleuca quinquenervia*	39	16	6		Remove		
196	Broad-leaved paperbark	*Melaleuca quinquenervia*	34	16	5		Remove		
197	Broad-leaved paperbark	*Melaleuca quinquenervia*	60	16	6		Remove		
198	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	14	9		Remove		
199	Broad-leaved paperbark	*Melaleuca quinquenervia*	65	15	9		Remove		
200	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	13	5		Remove		
201	Broad-leaved paperbark	*Melaleuca quinquenervia*	42	16	7		Remove		
202	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	16	6		Remove		
203	Broad-leaved paperbark	*Melaleuca quinquenervia*	21	12	4		Remove		
204	Broad-leaved paperbark	*Melaleuca quinquenervia*	34	16	8		Remove		
205	Broad-leaved paperbark	*Melaleuca quinquenervia*	18	14	4		Remove		
206	Blue gum	*Eucalyptus tereticornis*	48	22	6		Remove		
207	Broad-leaved paperbark	*Melaleuca quinquenervia*	12		1		Remove		
208	Broad-leaved paperbark	*Melaleuca quinquenervia*	16	14	6		Remove		
209	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	16	7		Remove		
210	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	16	4		Remove		
211	Broad-leaved paperbark	*Melaleuca quinquenervia*	36	20	5		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
212	Broad-leaved paperbark	*Melaleuca quinquenervia*	50	21	6		Remove		
213	Pink bloodwood	*Corymbia intermedia*	35	19	8		Remove		
214	Swamp box	*Lophostemon suaveolens*	48	12	6		Remove		
215	Grey ironbark	*Eucalyptus siderophloia*	58	24	11		Remove		
216	Pink bloodwood	*Corymbia intermedia*	22	15	6		Remove		
217	Pink bloodwood	*Corymbia intermedia*	22	22	7		Remove		
218	Swamp box	*Lophostemon suaveolens*	33	17	6		Remove		
219	Swamp box	*Lophostemon suaveolens*	30	17	4		Remove		
220	Swamp box	*Lophostemon suaveolens*	29	10	9		Remove		
221	Pink bloodwood	*Corymbia intermedia*	35	23	9		Remove		
222	Pink bloodwood	*Corymbia intermedia*	50	27	10		Remove		
223	Grey ironbark	*Eucalyptus siderophloia*	64	28	10		Remove		
224	Dead	*Dead*	28	12	0		Remove		
225	Pink bloodwood	*Corymbia intermedia*	43	28	8		Remove		
226	Swamp box	*Lophostemon suaveolens*	21	11	5		Remove		
227	Rusty gum	*Angophora leiocarpa*	48	26	9		Remove		
228	Swamp box	*Lophostemon suaveolens*	24	14	6		Remove		
229	Pink bloodwood	*Corymbia intermedia*	13	10	4		Remove		
230	Swamp box	*Lophostemon suaveolens*	20	13	4		Remove		
231	Swamp box	*Lophostemon suaveolens*	19	15	4		Remove		
232	Swamp box	*Lophostemon suaveolens*	24	14	5		Remove		
233	Swamp box	*Lophostemon suaveolens*	19	16	3		Remove		
234	Pink bloodwood	*Corymbia intermedia*	27	20	7		Remove		
235	Broad-leaved white mahogany	*Eucalyptus carnea*	31	15	7		Remove		
236	Grey ironbark	*Eucalyptus siderophloia*	31	22	10		Remove		
237	Swamp box	*Lophostemon suaveolens*	30	12	3	Yes	Remove		Hollow

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
238	Pink bloodwood	*Corymbia intermedia*	63	22	10	Yes	Remove	Termite mound and potential hollows	
239	Swamp box	*Lophostemon suaveolens*	25	12	7		Remove		
240	Grey ironbark	*Eucalyptus siderophloia*	62	27	12		Remove		
241	Swamp box	*Lophostemon suaveolens*	20	17	6		Remove		
242	Swamp box	*Lophostemon suaveolens*	38	16	6		Remove		
243	Pink bloodwood	*Corymbia intermedia*	30	20	8		Remove		
244	Grey ironbark	*Eucalyptus siderophloia*	40	24	12		Remove		
245	Dead	*Dead*	26	5	0	Yes	Remove		
246	Pink bloodwood	*Corymbia intermedia*	26+27	14	8		Remove		
247	Swamp box	*Lophostemon suaveolens*	35+12	12	5		Remove		
248	Swamp box	*Lophostemon suaveolens*	23	5	3		Remove		
249	Swamp box	*Lophostemon suaveolens*	30	14	4		Remove		
250	Dead	*Dead*	23	10	0	Yes	Remove		
251	Pink bloodwood	*Corymbia intermedia*	18+17 +17	14	9		Remove		
252	Blue gum	*Eucalyptus tereticornis*	100	26	15	Yes	Remove		
253	Swamp box	*Lophostemon suaveolens*	21	12	3		Remove		
254	Swamp box	*Lophostemon suaveolens*	21	11	4		Remove		
255	Swamp box	*Lophostemon suaveolens*	20	12	4		Remove		
256	Swamp box	*Lophostemon suaveolens*	24	15	3		Remove		
257	Swamp box	*Lophostemon suaveolens*	23	15	5		Remove		
258	Swamp box	*Lophostemon suaveolens*	18	15	3		Remove		
259	Swamp box	*Lophostemon suaveolens*	10	8	2		Remove		
260	Swamp box	*Lophostemon suaveolens*	20	16	6		Remove		
261	Pink bloodwood	*Corymbia intermedia*	27	16	7		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
262	Swamp box	*Lophostemon suaveolens*	19	17	5		Remove		
263	Swamp box	*Lophostemon suaveolens*	17	9	2		Remove		
264	Pink bloodwood	*Corymbia intermedia*	28	23	10		Remove		
265	Swamp box	*Lophostemon suaveolens*	18	14	7		Remove		
266	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	20	10		Remove		
267	Dead	*Dead*	80	20	0	Yes	Remove		
268	Blue gum	*Eucalyptus tereticornis*	13	12	3		Remove		
269	Broad-leaved paperbark	*Melaleuca quinquenervia*	45	19	5		Remove		
270	Pink bloodwood	*Corymbia intermedia*	31+28 +19	23	7		Remove		
271	Swamp box	*Lophostemon suaveolens*	18	17	4		Remove		
272	Swamp box	*Lophostemon suaveolens*	29	16	6		Remove		
273	Swamp box	*Lophostemon suaveolens*	19	18	7		Remove		
274	Grey ironbark	*Eucalyptus siderophloia*	60	32	17		Remove		
275	Swamp box	*Lophostemon suaveolens*	42	6	4	Yes	Remove	Hollow	
276	Pink bloodwood	*Corymbia intermedia*	43	22	6		Remove		
277	Grey ironbark	*Eucalyptus siderophloia*	48	29	13	Yes	Remove	Hollow	
278	Dead	*Dead*	15	9	3		Remove		
279	Pink bloodwood	*Corymbia intermedia*	30	23	11		Remove		
280	Dead	*Dead*	36	15	4	Yes	Remove	Hollows	
281	Pink bloodwood	*Corymbia intermedia*	26	18	7		Remove		
282	Swamp box	*Lophostemon suaveolens*	26	14	5		Remove		
283	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	15	5		Remove		
284	Swamp box	*Lophostemon suaveolens*	28	9	4		Remove		
285	Blue gum	*Eucalyptus tereticornis*	90	30	15	Yes	Remove	Potential hollows	
286	Grey ironbark	*Eucalyptus siderophloia*	50	20	12		Remove		
287	Dead	*Dead*	70	16	3	Yes	Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
288	Dead	*Dead*	80	20	3	Yes	Remove	Hollows	
289	Blue gum	*Eucalyptus tereticornis*	75	26	12		Remove		
290	Broad-leaved paperbark	*Melaleuca quinquenervia*	16+17	14	4		Remove		
291	Broad-leaved paperbark	*Melaleuca quinquenervia*	23	17	4		Remove		
292	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	20	6		Remove		
293	Broad-leaved paperbark	*Melaleuca quinquenervia*	50+33	20	7		Remove		
294	Dead	*Dead*	40	17	0	Yes	Remove	Hollows	
295	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	19	7		Remove		
296	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	19	4		Remove		
297	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	17	4		Remove		
298	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	17	3		Remove		
299	Broad-leaved paperbark	*Melaleuca quinquenervia*	59	18	10	Yes	Remove	Potential hollows	
300	Broad-leaved paperbark	*Melaleuca quinquenervia*	46	21	7		Remove		
301	Swamp box	*Lophostemon suaveolens*	22	16	7		Remove		
302	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	17	8		Remove		
303	Broad-leaved paperbark	*Melaleuca quinquenervia*	27	19	5		Remove		
304	Swamp box	*Lophostemon suaveolens*	19	20	5		Remove		
305	Broad-leaved paperbark	*Melaleuca quinquenervia*	19	18	5		Remove		
306	Broad-leaved paperbark	*Melaleuca quinquenervia*	18+14	15	5		Remove		
307	Broad-leaved paperbark	*Melaleuca quinquenervia*	28+22	17	7		Remove		
308	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	19	5		Remove		
309	Broad-leaved paperbark	*Melaleuca quinquenervia*	26	17	6		Remove		
310	Broad-leaved paperbark	*Melaleuca quinquenervia*	27	16	7		Remove		
311	Broad-leaved paperbark	*Melaleuca quinquenervia*	58	18	9		Remove		
312	Pink bloodwood	*Corymbia intermedia*	38	19	6	Yes	Remove	Nest	
313	Blue gum	*Eucalyptus tereticornis*	70	27	13	Yes	Remove	Potential hollows	

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
314	Swamp box	*Lophostemon suaveolens*	40	18	5		Remove		
315	Swamp box	*Lophostemon suaveolens*	23	16	3		Remove		
316	Broad-leaved paperbark	*Melaleuca quinquenervia*	36	14	5		Remove		
317	Swamp box	*Lophostemon suaveolens*	29	16	7		Remove		
318	Broad-leaved paperbark	*Melaleuca quinquenervia*	55+50	19	12		Remove		
319	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	19	11		Remove		
320	Swamp box	*Lophostemon suaveolens*	25	18	4		Remove		
321	Broad-leaved paperbark	*Melaleuca quinquenervia*	47	21	5		Remove		
322	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	22	6		Remove		
323	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	19	10		Remove		
324	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	14	4		Remove		
325	Blue gum	*Eucalyptus tereticornis*	55	24	9		Remove		
326	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	15	9		Remove		
327	Broad-leaved paperbark	*Melaleuca quinquenervia*	45+30	18	9		Remove		
328	Broad-leaved paperbark	*Melaleuca quinquenervia*	55	18	10		Remove		
329	Blue gum	*Eucalyptus tereticornis*	35+35	21	7		Remove		
330	Broad-leaved paperbark	*Melaleuca quinquenervia*	31	12	10		Remove		
331	Broad-leaved paperbark	*Melaleuca quinquenervia*	42	18	5		Remove		
332	Swamp box	*Lophostemon suaveolens*	20	14	3		Remove		
333	Blue gum	*Eucalyptus tereticornis*	58	25	10		Remove		
334	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	14	8		Remove		
335	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	14	8		Remove		
336	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	18	7		Remove		
337	Broad-leaved paperbark	*Melaleuca quinquenervia*	50	17	8		Remove		
338	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	19	5		Remove		
339	Blue gum	*Eucalyptus tereticornis*	49	22	8		Remove		
340	Grey ironbark	*Eucalyptus siderophloia*	27	22	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
341	Pink bloodwood	*Corymbia intermedia*	26	15	4		Remove		
342	Broad-leaved paperbark	*Melaleuca quinquenervia*	55	17	9		Remove		
343	Broad-leaved paperbark	*Melaleuca quinquenervia*	35	17	5		Remove		
344	Blue gum	*Eucalyptus tereticornis*	47	25	11	Yes	Remove	Potential hollows	
345	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	12	4		Remove		
346	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	12	9		Remove		
347	Grey ironbark	*Eucalyptus siderophloia*	39	22	8		Remove		
348	Grey ironbark	*Eucalyptus siderophloia*	54	22	6	Yes	Remove	Potential hollows	
349	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	6	6		Remove		
350	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	13	5		Remove		
351	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	13	6		Remove		
352	Pink bloodwood	*Corymbia intermedia*	28	13	8		Remove		
353	Rusty gum	*Angophora leiocarpa*	19	12	4		Remove		
354	Pink bloodwood	*Corymbia intermedia*	29	17	6		Remove		
355	Broad-leaved paperbark	*Melaleuca quinquenervia*	36	17	7		Remove		
356	Pink bloodwood	*Corymbia intermedia*	28	20	8		Remove		
357	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	22	7		Remove		
358	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	9	10		Remove		
359	Grey ironbark	*Eucalyptus siderophloia*	52	20	9		Remove		
360	Swamp box	*Lophostemon suaveolens*	47	18	4		Retain		
361	Grey ironbark	*Eucalyptus siderophloia*	72	30	15		Retain		
362	Pink bloodwood	*Corymbia intermedia*	29	22	6		Remove		
363	Pink bloodwood	*Corymbia intermedia*	28	20	6		Remove		
364	Scribbly gum	*Eucalyptus racemosa*	100	29	10	Yes	Retain	Hollows	
365	Scribbly gum	*Eucalyptus racemosa*	85	25	9	Yes	Remove	Hollows	
366	Pink bloodwood	*Corymbia intermedia*	35	23	8		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
367	Blue gum	*Eucalyptus tereticornis*	85	26	11	Yes	Retain	Hollows	
368	Blue gum	*Eucalyptus tereticornis*	55	25	9	Yes	Retain	Hollows	
369	Blue gum	*Eucalyptus tereticornis*	70	25	10	Yes	Retain	Hollows	
370	Blue gum	*Eucalyptus tereticornis*	50	24	9	Yes	Retain		
371	Pink bloodwood	*Corymbia intermedia*	45	24	7		Retain		
372	Blue gum	*Eucalyptus tereticornis*	40	21	11		Retain		
373	Blue gum	*Eucalyptus tereticornis*	35	20	7		Retain		
374	Blue gum	*Eucalyptus tereticornis*	60	19	7		Retain		
375	Blue gum	*Eucalyptus tereticornis*	75	22	9	Yes	Retain	Hollows	
376	Blue gum	*Eucalyptus tereticornis*	60	22	9	Yes	Retain	Hollows	
377	Pink bloodwood	*Corymbia intermedia*	50	24	10		Retain		
378	Pink bloodwood	*Corymbia intermedia*	40	23	8	Yes	Remove	Termite mound	
379	Grey ironbark	*Eucalyptus siderophloia*	50	28	10		Retain		
380	Blue gum	*Eucalyptus tereticornis*	90	30	14	Yes	Retain	Hollows - lots	
381	Scribbly gum	*Eucalyptus racemosa*	55	20	6	Yes	Retain	Potential hollows	
382	Pink bloodwood	*Corymbia intermedia*	45	23	12		Retain		
383	Pink bloodwood	*Corymbia intermedia*	40	22	10	Yes	Retain	Nest box	
384	Scribbly gum	*Eucalyptus racemosa*	45	21	12		Retain		
385	Pink bloodwood	*Corymbia intermedia*	45	30	12	Yes	Retain	Hollows	
386	Blue gum	*Eucalyptus tereticornis*	40	24	12		Retain		
387	Blue gum	*Eucalyptus tereticornis*	30	20	7		Retain		
388	Scribbly gum	*Eucalyptus racemosa*	65	22	8	Yes	Remove	Hollows	
389	Grey ironbark	*Eucalyptus siderophloia*	40	27	10		Remove		
390	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	24	5		Remove		
391	Scribbly gum	*Eucalyptus racemosa*	70	22	9	Yes	Retain	Hollows	
392	Blue gum	*Eucalyptus tereticornis*	40+55	20	10		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
393	Blue gum	*Eucalyptus tereticornis*	55	24	9		Remove		
394	Blue gum	*Eucalyptus tereticornis*	22	10	3		Remove		
395	Blue gum	*Eucalyptus tereticornis*	18	10	2		Remove		
396	Blue gum	*Eucalyptus tereticornis*	38+28	23	10	Yes	Remove	Hollow	
397	Blue gum	*Eucalyptus tereticornis*	39	21	9		Remove		
398	Blue gum	*Eucalyptus tereticornis*	38	16	9		Remove		
399	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	14	4		Remove		
400	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	14	4		Remove		
401	Blue gum	*Eucalyptus tereticornis*	16	9	2		Remove		
402	Broad-leaved paperbark	*Melaleuca quinquenervia*	15*8stems	9	3		Remove		
403	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	9	2		Remove		
404	Broad-leaved paperbark	*Melaleuca quinquenervia*	20*5stem	10	4		Remove		
405	Broad-leaved paperbark	*Melaleuca quinquenervia*	16*4stem	6	3		Remove		
406	Swamp box	*Lophostemon suaveolens*	10	4	1		Remove		
407	Broad-leaved paperbark	*Melaleuca quinquenervia*	15*8stem	6	3		Remove		
408	Broad-leaved paperbark	*Melaleuca quinquenervia*	20*3stem	9	3		Remove		
409	Blue gum	*Eucalyptus tereticornis*	48	20	7		Remove		
410	Blue gum	*Eucalyptus tereticornis*	50	25	9		Remove		
411	Blue gum	*Eucalyptus tereticornis*	45	14	4		Remove		
412	Blue gum	*Eucalyptus tereticornis*	58	25	12		Remove		
413	Pink bloodwood	*Corymbia intermedia*	45	25	8		Remove		
414	Blue gum	*Eucalyptus tereticornis*	42	10	2		Remove		
415	Blue gum	*Eucalyptus tereticornis*	20	17	5		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
416	Grey ironbark	*Eucalyptus siderophloia*	30	20	8		Remove		
417	Grey ironbark	*Eucalyptus siderophloia*	30	20	8		Remove		
418	Blue gum	*Eucalyptus tereticornis*	16	10	2		Remove		
419	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	10	4		Remove		
M1	Acacia	*Acacia sp.*	13	5	3		Remove		
M2	Red ash	*Alphitonia excelsa*	12	6	3		Remove		
M3	Acacia	*Acacia sp.*	25	8	3		Remove		
M4	Acacia	*Acacia sp.*	26	8	4		Remove		
M5	Grey mangrove	*Avicennia marina*	25	8	2		Remove		Not tagged (under water). Half dead
M6	Cheese tree	*Glochidion ferdinandi*	28	8	4		Retain		
M7	Swamp oak	*Casuarina glauca*	25 + 26	11	2		Retain		
M8	Swamp oak	*Casuarina glauca*	11	6	2.5		Retain		
M9	Swamp oak	*Casuarina glauca*	23	12	2		Retain		
M10	Swamp oak	*Casuarina glauca*	13	8	2		Retain		
M11	Swamp oak	*Casuarina glauca*	16	13	2		Retain		
M12	Swamp oak	*Casuarina glauca*	34	16	3		Retain		
M13	Swamp oak	*Casuarina glauca*	13	5	3		Retain		
M14	Swamp oak	*Casuarina glauca*	19	6	3		Retain		
M15	Swamp oak	*Casuarina glauca*	11	12	2		Retain		
M16	Swamp oak	*Casuarina glauca*	11	11	2		Retain		
M17	Swamp oak	*Casuarina glauca*	15	11	2		Retain		
M18	Acacia	*Acacia sp.*	34	5	6		Retain		
M19	Swamp oak	*Casuarina glauca*	28	11	3		Retain		Not tagged (under water)
M20	Swamp oak	*Casuarina glauca*	15	11	2		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M21	Swamp oak	*Casuarina glauca*	20	11	2		Retain		
M22	Swamp oak	*Casuarina glauca*	19	11	2		Retain		
M23	Swamp oak	*Casuarina glauca*	13	9	3		Retain		
M24	Swamp oak	*Casuarina glauca*	23	9	3		Retain		
M25	Swamp oak	*Casuarina glauca*	13	9	2		Retain		
M26	Swamp oak	*Casuarina glauca*	14	12	2		Retain		
M27	Swamp oak	*Casuarina glauca*	30	10	2		Retain		
M28	Acacia	*Acacia sp.*	21	7	2.5		Retain		
M29	Blue gum	*Eucalyptus tereticornis*	48	20	5		Retain		
M30	Swamp oak	*Casuarina glauca*	23	8	2		Retain		
M31	Swamp oak	*Casuarina glauca*	22 + 20	8	2		Retain		
M32	Swamp oak	*Casuarina glauca*	21	8	2		Retain		
M33	Acacia	*Acacia sp.*	21	6	3		Retain		
M34	Acacia	*Acacia sp.*	20	6	3		Retain		
M35	Acacia	*Acacia sp.*	12	4	3		Retain		
M36	Swamp oak	*Casuarina glauca*	32	12	3		Retain		
M37	Acacia	*Acacia sp.*	32	6	5		Retain		
M38	Acacia	*Acacia sp.*	29	6	4		Retain		
M39	Acacia	*Acacia sp.*	22	6	5		Retain		
M40	Grey ironbark	*Eucalyptus siderophloia*	13	9	2		Remove		
M41	Grey ironbark	*Eucalyptus siderophloia*	44	23	10		Remove		
M42	Grey ironbark	*Eucalyptus siderophloia*	31	15	4		Remove		
M43	Swamp oak	*Casuarina glauca*	15	15	3		Remove		
M44	Grey mangrove	*Avicennia marina*	30 + 31 + 38	11	10		Remove		Not tagged (under water)
M45	Grey ironbark	*Eucalyptus siderophloia*	40	24	9		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M46	Swamp oak	*Casuarina glauca*	20	10	2		Remove		
M47	Acacia	*Acacia sp.*	35	9	4		Remove		
M48	Grey ironbark	*Eucalyptus siderophloia*	64	27	12		Remove		
M49	Grey ironbark	*Eucalyptus siderophloia*	44 + 37	21	11		Remove		
M50	Grey ironbark	*Eucalyptus siderophloia*	40	19	10		Remove		
M51	Grey ironbark	*Eucalyptus siderophloia*	21	11	5		Remove		
M52	Pink bloodwood	*Corymbia intermedia*	65	25	12		Remove		
M53	Grey ironbark	*Eucalyptus siderophloia*	74 + 40	28	13		Remove		
M54	Grey ironbark	*Eucalyptus siderophloia*	42	26	11		Remove		
M55	Grey ironbark	*Eucalyptus siderophloia*	44	26	8		Remove		
M56	Grey mangrove	*Avicennia marina*	40	15	7		Retain		
M57	Grey ironbark	*Eucalyptus siderophloia*	88 + 70	28	13		Retain		
M58	Swamp oak	*Casuarina glauca*	30	15	5		Retain		
M59	Swamp oak	*Casuarina glauca*	31	15	3		Retain		
M60	Swamp oak	*Casuarina glauca*	30	15	3.5		Retain		
M61	Swamp oak	*Casuarina glauca*	29	15	3.5		Retain		
M62	Swamp oak	*Casuarina glauca*	29	15	3.5		Retain		
M63	Grey mangrove	*Avicennia marina*	25 + 25 + 25	9	12		Retain		Not tagged
M64	Swamp oak	*Casuarina glauca*	26	15	3		Remove		
M65	Swamp oak	*Casuarina glauca*	21	16	3		Remove		
M66	Swamp oak	*Casuarina glauca*	31	18	4		Remove		
M67	Swamp oak	*Casuarina glauca*	32	17	4		Remove		
M68	Grey mangrove	*Avicennia marina*	27	9	5		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M69	Swamp oak	*Casuarina glauca*	25	10	3		Retain		
M70	Swamp oak	*Casuarina glauca*	32	17	2		Retain		
M71	Swamp oak	*Casuarina glauca*	27	16	4		Retain		
M72	Swamp oak	*Casuarina glauca*	21	16	2		Retain		
M73	Acacia	*Acacia sp.*	16	5	3		Retain		
M74	Blue gum	*Eucalyptus tereticornis*	38	20	10		Retain		
M75	Swamp oak	*Casuarina glauca*	15	15	1		Retain		
M76	Blue gum	*Eucalyptus tereticornis*	22	10	4		Retain		
M77	Swamp oak	*Casuarina glauca*	28 + 26	18	2		Retain		
M78	Swamp oak	*Casuarina glauca*	28	17	2		Retain		
M79	Swamp oak	*Casuarina glauca*	28	18	3		Retain		
M80	Swamp oak	*Casuarina glauca*	30	18	3		Retain		
M81	Swamp oak	*Casuarina glauca*	28	15	2		Retain		
M82	Swamp oak	*Casuarina glauca*	25 + 22 + 19	14	2		Retain		
M83	Blue gum	*Eucalyptus tereticornis*	46	19	12		Remove		Not tagged (under water)
M84	Blue gum	*Eucalyptus tereticornis*	60 + 35	20	10		Remove		
M85	Swamp oak	*Casuarina glauca*	27	16	3		Remove		
M86	Grey mangrove	*Avicennia marina*	17	10	5		Remove		
M87	Grey mangrove	*Avicennia marina*	45 + 55	10	5		Remove		
M88	Swamp oak	*Casuarina glauca*	12	15	2		Remove		
M89	Swamp oak	*Casuarina glauca*	36	18	5		Remove		
M90	Swamp oak	*Casuarina glauca*	14	13	3		Remove		
M91	Swamp oak	*Casuarina glauca*	37	20	6		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M92	Swamp oak	*Casuarina glauca*	22	19	3.5		Remove		
M94	Swamp oak	*Casuarina glauca*	29	19	2		Remove		
M95	Swamp oak	*Casuarina glauca*	17	19	3		Remove		
M96	Grey mangrove	*Avicennia marina*	30 - 50	11	8		Remove		6 mangroves over 100
M97	Swamp oak	*Casuarina glauca*	24	17	3		Remove		
M98	Grey mangrove	*Avicennia marina*	20	11	6		Remove		12 mangroves over 10
M99	Swamp oak	*Casuarina glauca*	15 - 20	15	2		Remove		Patch of 37 casuarina
M100	Grey mangrove	*Avicennia marina*	25	7	8		Retain		8 mangroves
M101	Swamp oak	*Casuarina glauca*	20 - 25	15	2		Retain		21 casuarina
M102	Swamp oak	*Casuarina glauca*	25	15	3		Remove		16 casuarina
M103	Grey mangrove	*Avicennia marina*	15	12	2		Remove		13 mangroves
M104	Swamp oak	*Casuarina glauca*	15	15	3		Remove		3 casuarina
N1	Broad-leaved paperbark	*Melaleuca quinquenervia*	45	18	5		Remove		
N2	Broad-leaved paperbark	*Melaleuca quinquenervia*	55	15	6		Remove		
N3	Blue gum	*Eucalyptus tereticornis*	40	18	6		Remove		
N4	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N5	Coast banksia	*Banksia integrifolia*	38	4	2		Remove		
N6	Coast banksia	*Banksia integrifolia*	30	4	4.5		Remove		
N7	Broad-leaved paperbark	*Melaleuca quinquenervia*	85 (3 stem)	12	6		Remove		
N8	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	5	2		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N9	Acacia	*Acacia sp.*	75 (3 stem)	8	7		Remove		
N10	Pink bloodwood	*Corymbia intermedia*	20	10	3		Remove		
N11	Acacia	*Acacia sp.*	70 (2 stem)	8	8		Remove		
N12	Acacia	*Acacia sp.*	50 (2 stem)	8	6		Remove		
N13	Blue gum	*Eucalyptus tereticornis*	30	8	3		Remove		
N14	Acacia	*Acacia sp.*	45 (2 stem)	6	6		Remove		
N15	Acacia	*Acacia sp.*	15	6	4		Remove		
N16	Regrowth Eucalypt Species	*Eucalyptus sp.*	20 (2 stem)	6	2		Remove		
N17	Blue gum	*Eucalyptus tereticornis*	25	8	3		Remove		
N18	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	6	3		Remove		
N19	Rusty gum	*Angophora leiocarpa*	32	18	3		Remove		
N20	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N21	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	4	1		Remove		
N22	Regrowth Eucalypt Species	*Eucalyptus sp.*	20 (2 stem)	6	3		Remove		
N23	Cadaghi	*Corymbia torelliana*	30 (3 stem)	4	3		Remove		
N24	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N25	Blue gum	*Eucalyptus tereticornis*	20	8	3		Remove		
N26	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	6	3		Remove		
N27	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N28	Broad-leaved paperbark	*Melaleuca quinquenervia*	25 (2 stem)	8	3		Remove		
N29	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	2		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N30	Regrowth Eucalypt Species	*Eucalyptus sp.*	25 (2 stem)	6	3		Remove		
N31	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	6	1		Remove		
N32	Blue gum	*Eucalyptus tereticornis*	25	8	4		Remove		
N33	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	3		Remove		
N34	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	3		Remove		
N35	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N36	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	8	3		Remove		
N37	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	8	3		Remove		
N38	Blue gum	*Eucalyptus tereticornis*	25	10	4		Remove		
N39	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	6	4		Remove		
N40	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	7	4	yes	Remove	Bird Nest	
N41	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	2		Remove		
N42	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	2		Remove		
N43	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	2		Remove		
N44	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N45	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N46	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N47	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N48	Acacia	*Acacia sp.*	10	8	4		Remove		
N49	Broad-leaved paperbark	*Melaleuca quinquenervia*	35	8	4		Remove		
N50	Broad-leaved paperbark	*Melaleuca quinquenervia*	35 (2 stem)	8	3		Remove		
N51	Pink bloodwood	*Corymbia intermedia*	15	8	3		Remove		
N52	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N53	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N54	Acacia	*Acacia sp.*	10	5	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N55	Broad-leaved paperbark	*Melaleuca quinquenervia*	30 (2 stem)	7	4		Remove		
N56	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N57	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N58	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N59	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N60	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N61	Regrowth Eucalypt Species	*Eucalyptus sp.*	15	10	3		Remove		
N62	Acacia	*Acacia sp.*	15	8	5		Remove		
N63	Regrowth Eucalypt Species	*Eucalyptus sp.*	20	12	4		Remove		
N64	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	2		Remove		
N65	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	7	3		Remove		
N66	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N67	Acacia	*Acacia sp.*	35 (4 stem)	5	3		Remove		
N68	Acacia	*Acacia sp.*	15	6	3		Remove		
N69	Acacia	*Acacia sp.*	15	6	3		Remove		
N70	Fringed wattle	*Acacia fimbriata*	12	4	3		Remove		
N71	Fringed wattle	*Acacia fimbriata*	12	6	5		Remove		
N72	Acacia	*Acacia sp.*	25	8	6		Remove		
N73	Fringed wattle	*Acacia fimbriata*	10	6	4		Remove		
N74	Acacia	*Acacia sp.*	25	7	5		Remove		
N75	Grey ironbark	*Eucalyptus siderophloia*	20	10	4		Remove		
N76	Acacia	*Acacia sp.*	30 (2 stem)	6	4		Remove		
N77	Acacia	*Acacia sp.*	25 (2 stem)	6	4		Remove		
N78	Pink bloodwood	*Corymbia intermedia*	12	6	2		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N79	Acacia	*Acacia sp.*	25	6	5		Remove		
N80	Acacia	*Acacia sp.*	40 (3 stem)	7	5		Remove		
N81	Acacia	*Acacia sp.*	12	7	3		Remove		
N82	Acacia	*Acacia sp.*	10	7	3		Remove		
N83	Acacia	*Acacia sp.*	42 (3 stem)	7	4		Remove		
N84	Acacia	*Acacia sp.*	45	8	6		Remove		
N85	Acacia	*Acacia sp.*	20	8	5		Remove		
N86	Acacia	*Acacia sp.*	22	8	5		Remove		
N87	Acacia	*Acacia sp.*	30 (2stem)	3	2		Remove		
N88	Acacia	*Acacia sp.*	15	5	3		Remove		
N89	Swamp box	*Lophostemon suaveolens*	10	5	1		Remove		
N90	Acacia	*Acacia sp.*	60 (2stem)	8	6		Remove		
N91	Acacia	*Acacia sp.*	15 (2 stem)	7	4		Remove		
N92	Fringed wattle	*Acacia fimbriata*	12	4	3		Remove		
N93	Swamp oak	*Casuarina glauca*	20	8	4		Remove		
N94	Grey ironbark	*Eucalyptus siderophloia*	15	8	3		Remove		
N95	Grey ironbark	*Eucalyptus siderophloia*	22	8	4		Remove		
N96	Acacia	*Acacia sp.*	55 (2 stem)	7	5		Remove		
N97	Grey ironbark	*Eucalyptus siderophloia*	15	7	3		Remove		
N98	Acacia	*Acacia sp.*	18	7	4		Remove		
N99	Grey ironbark	*Eucalyptus siderophloia*	20	10	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N100	Pink bloodwood	*Corymbia intermedia*	18	8	3		Remove		
N101	Grey ironbark	*Eucalyptus siderophloia*	13	9	2		Remove		
N102	Acacia	*Acacia sp.*	10	5	4		Remove		
N103	Grey ironbark	*Eucalyptus siderophloia*	10	7	2		Remove		
N104			12 (2 stem)	6	2		Remove		
N105	Swamp oak	*Casuarina glauca*	10	4	1		Remove		
N106	Acacia	*Acacia sp.*	15	6	4		Remove		
N107	Swamp oak	*Casuarina glauca*	23	8	2		Remove		
N108	Grey ironbark	*Eucalyptus siderophloia*	10	6	2		Remove		
N109	Swamp oak	*Casuarina glauca*	18	6	4		Remove		
N110	Rusty gum	*Angophora leiocarpa*	23 (2 stem)	7	4		Remove		
N111	Acacia	*Acacia sp.*	15	7	6		Remove		
N112	Pink bloodwood	*Corymbia intermedia*	12	8	2		Remove		
N113	Rusty gum	*Angophora leiocarpa*	13	8	2		Remove		
N114	Swamp oak	*Casuarina glauca*	15	7	3		Remove		
N115	Grey ironbark	*Eucalyptus siderophloia*	25	12	4		Remove		
N116	Acacia	*Acacia sp.*	20	7	6		Remove		
N117	Acacia	*Acacia sp.*	15	10	4		Remove		
N118	Grey ironbark	*Eucalyptus siderophloia*	15	10	3		Remove		
N119	Rusty gum	*Angophora leiocarpa*	18	12	4		Remove		
N120	Acacia	*Acacia sp.*	17	8	5		Remove		
N121	Acacia	*Acacia sp.*	13	5	4		Remove		
N122	Acacia	*Acacia sp.*	18	5	5		Remove		
N123	Blue gum	*Eucalyptus tereticornis*	25 (2 stem)	8	3		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N124	Rusty gum	*Angophora leiocarpa*	18 (2 stem)	10	2		Remove		
N125	Pink bloodwood	*Corymbia intermedia*	10	6	2		Remove		
N126	Swamp box	*Lophostemon suaveolens*	10	5	1		Remove		
N127	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	7	1		Remove		
N128	Swamp box	*Lophostemon suaveolens*	10	5	2		Remove		
N129	Grey ironbark	*Eucalyptus siderophloia*	11	10	4		Remove		
N130	Pink bloodwood	*Corymbia intermedia*	16	12	3		Remove		
N131	Pink bloodwood	*Corymbia intermedia*	10	8	3		Remove		
N132	Acacia	*Acacia sp.*	10	5	4		Remove		
N133	Grey ironbark	*Eucalyptus siderophloia*	20	12	2		Remove		
N134	Grey ironbark	*Eucalyptus siderophloia*	15	7	2		Remove		
N135	Acacia	*Acacia sp.*	12	5	3		Remove		
N136	Grey ironbark	*Eucalyptus siderophloia*	23	14	3		Remove		
N137	Pink bloodwood	*Corymbia intermedia*	100	7	2		Remove		
N138	Acacia	*Acacia sp.*	11	7	4		Remove		
N139	Acacia	*Acacia sp.*	10	6	3		Remove		
N140	Acacia	*Acacia sp.*	10	6	3		Remove		
N141	Acacia	*Acacia sp.*	20	7	4		Remove		
N142	Rusty gum	*Angophora leiocarpa*	15	7	2		Remove		
N143	Acacia	*Acacia sp.*	25 (2 stem)	4	4		Remove		
N144	Acacia	*Acacia sp.*	11	6	4		Remove		
N145	Rusty gum	*Angophora leiocarpa*	10	7	2		Remove		
N146	Rusty gum	*Angophora leiocarpa*	10	7	2		Remove		
N147	Rusty gum	*Angophora leiocarpa*	15	7	2		Remove		
N148	Acacia	*Acacia sp.*	35 (3 stem)	5	6		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N149	Acacia	*Acacia sp.*	15	7	4		Remove		
N150	Grey ironbark	*Eucalyptus siderophloia*	10	6	1		Remove		
N151	Acacia	*Acacia sp.*	15 (2 stem)	6	5		Remove		
N152	Acacia	*Acacia sp.*	12	7	6		Remove		
N153	Acacia	*Acacia sp.*	15	5	5		Remove		
N154	Blue gum	*Eucalyptus tereticornis*	20	12	4		Remove		
N155	Acacia	*Acacia sp.*	13	6	5		Remove		
N156	Pink bloodwood	*Corymbia intermedia*	25	10	4		Remove		
N157	Blue gum	*Eucalyptus tereticornis*	25 (2 stem)	7	3		Remove		
N158	Scribbly gum	*Eucalyptus racemosa*	10	8	3		Remove		
N159	Swamp box	*Lophostemon suaveolens*	13	8	3		Remove		
N160	Pink bloodwood	*Corymbia intermedia*	13	8	2		Remove		
N161	Regrowth Eucalypt Species	*Eucalyptus sp.*	13	8	2		Remove		
N162	Pink bloodwood	*Corymbia intermedia*	10	5	1		Remove		
N163	Regrowth Eucalypt Species	*Eucalyptus sp.*	25 (2 stem)	7	3		Remove		
N164	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	7	2		Remove		
N165	Acacia	*Acacia sp.*	10	6	2		Remove		
N166	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	7	2		Remove		
N167	Pink bloodwood	*Corymbia intermedia*	17	12	3		Remove		
N168	Regrowth Eucalypt Species	*Eucalyptus sp.*	12	8	2		Remove		
N169	Acacia	*Acacia sp.*	32 (3 stem)	8	5		Remove		
N170	Acacia	*Acacia sp.*	12	8	3		Remove		
N171	Pink bloodwood	*Corymbia intermedia*	10	6	3		Remove		
N172	Pink bloodwood	*Corymbia intermedia*	15	8	3		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N173	Pink bloodwood	*Corymbia intermedia*	22	12	3		Remove		
N174	Pink bloodwood	*Corymbia intermedia*	18	12	3		Remove		
N175	Acacia	*Acacia sp.*	32 (2 stem)	8	4		Remove		
N176	Swamp box	*Lophostemon suaveolens*	10	8	3		Remove		
N177	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	2		Remove		
N178	Acacia	*Acacia sp.*	10	8	4		Remove		
N179	Pink bloodwood	*Corymbia intermedia*	38 (3 stem)	12	4		Remove		
N180	Regrowth Eucalypt Species	*Eucalyptus sp.*	20	8	3		Remove		
N181	Pink bloodwood	*Corymbia intermedia*	13	7	3		Remove		
N182	Regrowth Eucalypt Species	*Eucalyptus sp.*	11	8	3		Remove		
N183	Acacia	*Acacia sp.*	10	7	4		Remove		
N184	Acacia	*Acacia sp.*	10	6	3		Remove		
N185	Swamp box	*Lophostemon suaveolens*	12	6	3		Remove		

APPENDIX 2 – Habitat Suitability Assessment

LIKELIHOOD OF OCCURRENCE OF THREATENED FAUNA SPECIES ON SUBJECT SITE

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
Actitis hypoleucos	Common Sandpiper	Unlikely	This species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. This species has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. This species generally forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. Birds sometimes venture into grassy areas adjoining wetlands. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves (Dept. Environment 2012).
Adelotus brevis	Tusked frog	Unlikely	The tusked frog inhabits wet eucalypt forest, rainforest and sometimes dry eucalypt forest in close proximity to suitable breeding habitat (i.e. permanent ponds / pools, slow moving sections of streams, and sometimes cattle tracks) (Rowland 2013).
Anous stolidus	Common noddy	Unlikely	During the breeding season, the Common Noddy usually occurs on or near islands, on rocky islets and stacks with precipitous cliffs, or on shoals or cays of coral or sand.
Anthochaera phrygia	Regent honeyeater	Unlikely	This species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. They prefer woodlands that have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp mahogany and Spotted gum forests, particularly on the central coast and occasionally on the upper north coast. This species is very rarely recorded in the locality. However, the Coffs

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			Harbour area is known as a preferred coastal foraging area for this species.
Apus pacificus	Fork-tailed swift	**Possible**	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. They sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines (DoE 2016).
Arenaria interpres	Ruddy Turnstone	Unlikely	In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats.
Argynnis hyperbius inconstans	Australian fritillary	Unlikely	They are restricted to open, swampy, coastal areas where the larval food plant, *Viola betonicifolia*, grows as a small, insignificant ground herb in association with *Lomandra longifolia* (long leaved matrush) and grasses, especially the grass *Imperata cylindrica* (blady grass). Habitat does not occur on the site.
Botaurus poiciloptilus	Australian bittern	Unlikely	The Australasian bittern is widespread but uncommon in south-west and south-east Australia, generally preferring freshwater

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			habitats with tall, dense vegetation with bulrushes and spikerushes.
Calidris acuminata	Sharp-tailed Sandpiper	Unlikely	These birds forage on grasslands and mudflats. This species prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves (Dept. Environment 2017).
Calidris alba	Sanderling	Unlikely	In Australia, the species is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed.
Calidris canutus	Red knot	Unlikely	Suitable habitat for this species includes tidal reefs and pools, weed-covered rocks, pebbly, shelly and sandy shores with stranded seaweed, and mudflats (Dept. Environment 2012).
Calidris ferruginea	Curlew sandpiper	Unlikely	Suitable habitat for this species includes tidal reefs and pools, weed-covered rocks, pebbly, shelly and sandy shores with stranded seaweed, and mudflats (Dept. Environment 2012).
Calidris melanotos	Pectoral Sandpiper	**Possible**	Small, migratory wader that prefers shallow fresh to saline wetlands. This species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.
Calidris ruficollis	Red-necked Stint	**Possible**	In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and,

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation (Higgins & Davies 1996).
Calidris tenuirostris	Great knot	Unlikely	In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, saltlakes and non-tidal lagoons. The Great Knot rarely occurs on inland lakes and swamps (Higgins & Davies 1996).
Calyptorhynchus lathami lathami	Glossy black cockatoo (eastern)	Unlikely	The Glossy black-cockatoo is found in coastal forests and open inland woodland of eastern Australia. The Glossy Black's distribution is limited to habitat containing sufficient seed reserves of their three favoured species: *Allocasuarina littoralis*, *A. torulosa* and *A. verticillata* (Forshaw, 1981) in addition to suitable large hollow bearing trees for nesting. Suitable habitat exists within the study area.
Chalinolobus dwyeri	Large-eared pied bat	Unlikely	This species roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Hirundo ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. It is usually recorded in well-timbered areas containing gullies. Suitable habitat does not occur within the study area.

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
Charadrius bicinctus	Double-banded Plover	**Possible**	The Double-banded Plover is found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. The species is sometimes associated with coastal lagoons, inland saltlakes and saltworks.
Charadrius leschenaultii	Greater sand plover	Unlikely	In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons (Bamford 1988; Blakers et al. 1984; Lane 1987; Sibson 1948; Stewart et al. 2007), and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs (Abbott 1982; Morris 1989; Sedgwick 1978). They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps (C.D.T. Minton 2002 pers.comm; Sibson 1953; Storr 1964b, 1977; Storr et al. 1986). They seldom occur at shallow freshwater wetlands (Storr 1977).
Charadrius mongolus	Lesser sand plover	Unlikely	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.
Charadrius veredus	Oriental Plover, Oriental Dotterel	**Possible**	Immediately after arriving in non-breeding grounds in northern Australia, Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland (Bigg 1981; Bransbury 1985; Crawford 1972; Murlis et al. 1988; Serventy & Whittell 1976; Storr 1977, 1980, 1984b). Thereafter they usually inhabit flat, open, semi-arid

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps (Boekel 1980; Carruthers 1966; Close 1982; Fletcher 1980; Pedler 1982; Storr 1980), or open areas that have been recently burnt (Boekel 1980; Chatto 2003; Crawford 1972; Garnett 1986; Storr 1977).
Coeranoscincus reticulatus	Three-toed snake-tooth skink	Unlikely	Rainforest and occasionally moist eucalypt forest, on loamy or sandy soils. The Three-toed Snake-tooth Skink lives in loose soil, leaf litter and rotting logs, and feeds on earthworms and beetle grubs. Garden beds and urban yards under leaf litter on alluvial soils.
Crinia tinnula	Wallum froglet	Unlikely	The Wallum froglet is found in coastal areas from South-East Qld to the central coast of NSW. It is found only in acid Paperbark swamps and sedge swamps of the coastal 'wallum' country. The Wallum froglet is found in Paperbark swamps growing in areas with acid sandy (Wallum) soils, warm temperate grassland or near the edge of ponds.
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo	Unlikely	*Cuculus optatus* (also known as *C. saturatus optatus*) uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types (DoE 2016).
Dasyurus hallucatus	Northern quoll	Unlikely	The Northern Quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert (Threatened Species Scientific Committee 2005aq).
Dasyurus maculatus maculatus	Spot-tailed quoll	Unlikely	The Spotted-tailed quoll occurs along the escarpments, tablelands and coast of the eastern seaboard. It inhabits a range of habitats including dry and moist sclerophyll forests, woodlands, coastal heathlands and rainforests. The Quolls require large intact habitat

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			patches and are generally only recorded from forested areas of the Great Dividing Range.
Delma torquata	Collared delma	Unlikely	The Collared Delma normally inhabits eucalypt-dominated woodlands and open-forests
Erythrotriorchis radiatus	Red goshawk	**Possible**	The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia (Marchant & Higgins 1993). Riverine forests are also used frequently (Debus 1991, 1993).
Esacus magnirostris	Beach stone-curlew	Unlikely	Beach Stone-curlews are found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.
Furina dunmalli	Dunmall's snake	Unlikely	Dunmall's Snake has been found in a broad range of habitats, including: • Forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (*Acacia harpophylla*), other Wattles (A*. burowii, A. deanii, A. leioclyx*), native Cypress (*Callitris spp.*) or Bull-oak (*Allocasuarina luehmannii*) (Brigalow Belt Reptiles Workshop 2010; Covacevich et al. 1988; Stephenson & Schmida 2008).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			• Various Blue Spotted Gum (*Corymbia citriodora*), Ironbark (*Eucalyptus crebra and E. melanophloia*), White Cypress Pine (*Callitris glaucophylla*) and Bulloak open forest and woodland associations on sandstone derived soils (Brigalow Belt Reptiles Workshop 2010; Stephenson & Schmida 2008, Threatened Species Network 2008).
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Unlikely	This species prefers freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). No suitable habitat is present on this site.
Gallinago megala	Swinhoe's Snipe	Unlikely	This species inhabits shallow freshwater wetlands of various kinds including paddy fields, swamps and sewage farms, with bare mud or shallow water for feeding, with nearby vegetation cover. This species is also known to occur in grasslands, drier cultivated areas and market gardens (Higgins and Davies 1996). Most species records are from the Northern Territory.
Gallinago stenura	Pin-tailed Snipe	Unlikely	Most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands (Higgins & Davies 1996).
Grantiella picta	Painted honeyeater	Unlikely	Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.
Hemiaspis damelii	Grey Snake	Unlikely	Favours woodlands (typically brigalow (Acacia harpophylla and belah Casuarina cristata), usually on heavier, cracking clay soils, particularly in association with water bodies or in areas with small gullies and ditches (gilgais) (Wilson and Swan 2010; Hobson 2012).
Hirundapus caudacutus	White-throated needletail	Unlikely	The White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground.

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps (DoE 2016).
Lathamus discolor	Swift parrot	**Possible**	Mainland populations of this species favour winter-flowering eucalypt forest and woodland, usually where abundant supplies of Eucalypt nectar exist. This species is rarely recorded in the locality.
Limicola falcinellus	Broad-billed Sandpiper	**Possible**	The Broad-billed Sandpiper occurs in sheltered parts of the coast, favouring estuarine mudflats but also occasionally occur on saltmarshes, shallow freshwater lagoons, saltworks and sewage farms, and in areas with large soft intertidal mudflats, which may have shell or sandbanks nearby. Occasionally they occur on reefs or rocky platforms. They have also been recorded in creeks, swamps and lakes near the coast, particularly those with bare mudflats or sand exposed by receding water.
Limnodromus semipalmatus	Asian Dowitcher	Unlikely	The Asian Dowitcher occurs in sheltered coastal Environments, such as embayments, coastal lagoons, estuaries and tidal creeks. They are known to frequent shallow water and exposed mudflats or sandflats. The species feeds on inter-tidal mudflats
Limosa lapponica baueri	Bar-tailed godwit	Unlikely	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas (Marchant & Higgins 1993).
Limosa lapponica menzbieri	Northern Siberian bar-tailed godwit	Unlikely	The bar-tailed godwit (northern Siberian) occurs mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It has also been recorded in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats (Higgins & Davies 1996).
Limosa limosa	Black-tailed Godwit	Unlikely	In Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets.
Litoria olongburensis	Wallum sedge frog	Unlikely	This species occurs in coastal areas from Frazer Island in south-east Qld to Yuraygir National Park in northern NSW. It inhabits paperbark swamps and sedge swamps of the coastal 'wallum' country.
Macroderma gigas	Ghost bat	Unlikely	The ghost bat is a monotypic species endemic to northern Australia, where they rely of roost sites that include caves, rock crevices and disused mine adits. This species is recorded from a wide range of habitats from rainforest, monsoon and vine scrub in the tropics to open woodlands and arid areas (Churchill 2008).
Mixophyes fleayi	Fleay's frog	Unlikely	Fleay's Frog is associated with montane rainforest (Corben & Ingram 1987) and open forest communities adjoining rainforest (Hines 2001, pers. comm.). The species occurs along stream habitats from first to third order streams (i.e. small streams close to their origin through to permanent streams with grades of 1 in 50) and is not found in ponds or ephemeral pools.

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
Mixophyes iteratus	Giant barred frog	Unlikely	Giant barred frogs forage and live amongst deep, damp leaf litter in rainforests, moist eucalypt forest and nearby dry eucalypt forest, at elevations below 1000m. They breed around shallow, flowing rocky streams from late spring to summer. Suitable habitat does not occur within the study area.
Monarcha melanopsis	Black-faced Monarch	Unlikely	This species occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. During winter or migration, this species also occurs in marginal habitats such as 20-30 years old regrowth rainforest, nearby open eucalypt forest (mainly wet sclerophyll forests), especially in gullies with a dense, shrubby understorey as well as dry sclerophyll forests and woodlands, often with a patchy understorey. (Dept. Environment 2012).
Myiagra cyanoleuca	Satin Flycatcher	Unlikely	Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than the Leaden Flycatcher, *Myiagra rebecula*, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1400 m above sea level, and in the ACT, they occur mainly between 800 m above sea level and the treeline (DoE 2016).
Ninox strenua	Powerful owl	Unlikely	The Powerful Owl is found in open forests and woodlands, as well as along sheltered gullies in wet forests with dense understoreys, especially along watercourses. Will sometimes be found in open areas near forests such as farmland, parks and suburban areas, as

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			well as in remnant bushland patches. Needs old growth trees to nest.
Numenius madagascariensis	Eastern curlew	Unlikely	This wading species is usually associated with estuaries, bays and lagoons where intertidal mud and sandflats occur. Occasionally also found on beaches, reefs and rocky islets.
Numenius minutus	Little Curlew, Little Whimbrel	**Possible**	The Little Curlew is most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used (Higgins & Davies 1996).
Numenius phaeopus	Whimbrel	Unlikely	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. It has been infrequently recorded using saline or brackish lakes near coastal areas. It also used saltflats with saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and saltfields (Higgins & Davies 1996).
Pandion haliaetus	Osprey	Unlikely	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia (Johnstone & Storr 1998; Marchant & Higgins 1993; Olsen 1995). They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
Petauroides volans	Greater glider	Unlikely	The greater glider is an arboreal nocturnal marsupial, largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. Suitable habitat for this species is not considered to occur on the Subject site.
Petaurus australis australis	Yellow-bellied glider (south-eastern)	Unlikely	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Feed primarily on plant and insect exudates, including nectar, sap, honeydew and manna with pollen and insects providing protein.
Phascolarctos cinereus	Koala	**Possible**	The Koala occurs in Eucalypt woodlands and forests throughout eastern Australia. They inhabit areas where there are appropriate food trees. No signs of Koala activity were recorded during surveys. Preferred food trees occur on the site.
Philomachus pugnax	Ruff (Reeve)	Unlikely	In Australia the Ruff is found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges. It is found in terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands. They are occasionally seen on sheltered coasts, in harbours, estuaries, seashores and are known to visit sewage farms and saltworks.
Pluvialis fulva	Pacific Golden Plover	Unlikely	In non-breeding grounds in Australia this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Pacific Golden Plovers usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks.
Pluvialis squatarola	Grey Plover	Unlikely	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons. They also occur around terrestrial wetlands such as near-coastal lakes and swamps, or salt-lakes. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes (Marchant & Higgins 1993 and references therein).
Potorous tridactylus tridactylus	Long-nosed potoroo	Unlikely	This species inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.
Pteropus poliocephalus	Grey-headed flying-fox	**Possible**	This species occurs from central eastern Qld south to Victora. In NSW the Grey-headed flying fox mainly occurs in coastal areas and along river valleys. They typically roost in conspicuous camps in Lowland rainforest and Swamp forest, often in isolated remnants or on islands in rivers. They forage on fruit, nectar and pollen in Rainforests and Eucalypt forests.
Rhipidura rufifrons	Rufous Fantail	Unlikely	The Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E.cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis*) or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests, where they have been recorded in temperate Lilly

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			Pilly (*Acmena smithi*) rainforest, with Grey Myrtle (*Backhousia myrtifolia*), Sassafras (*Doryphora sassafras*) and Sweet Pittosporum (*Pittosporum undulatum*) subdominants. They occasionally occur in secondary regrowth, following logging or disturbance in forests or rainforests. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including Spotted Gum (*Eucalyptus maculata*), Yellow Box (*E. melliodora*), ironbarks or stringybarks, often with a shrubby or heath understorey (DoE 2016).
Rostratula australis	Australian painted snipe	**Possible**	The Painted Snipe occurs in the better watered areas of eastern Australia and the NT. They are generally rare and prefer shallow freshwater swamps or saltmarsh areas.
Stagonopleura guttata	Diamond Firetail	**Possible**	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season).
Sternula albifrons	Little tern	Unlikely	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records).
Sternula nereis nereis	Australian Fairy Tern	Unlikely	The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (Higgins & Davies 1996; Lindsey 1986a). The bird roosts on beaches at night (Higgins & Davies 1996).

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
Symposiachrus trivirgatus	Spectacled Monarch	Unlikely	The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves. Also inhabits Rainforests, eucalypt woodlands, coastal scrubs, damp gullies in rainforest, eucalypt forest, when migrating, more open woodlands (Birdlife Australia 2016; Pizzey and Knight 2002).
Thinornis rubricollis rubricollis	Hooded plover (eastern)	Unlikely	In south-eastern Australia Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs. They regularly use near-coastal saline and freshwater lakes and lagoons, often with saltmarsh.
Tringa brevipes	Grey-tailed Tattler	Unlikely	The Grey-tailed Tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide. It has been found around shores of rock, shingle, gravel or shells and also on intertidal mudflats in embayments, estuaries and coastal lagoons, especially fringed with mangroves.
Tringa glareola	Wood Sandpiper	Unlikely	The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums Eucalyptus camaldulensis and often with fallen timber. They also frequent inundated grasslands, short herbage or wooded floodplains, where floodwaters are temporary or receding, and irrigated crops

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
Tringa incana	Wandering Tattler	Unlikely	The Wandering Tattler is generally found on rocky coasts with reefs and platforms, points, spits, piers, offshore islands and shingle beaches or beds. It is occasionally seen on coral reefs or beaches, and tends to avoid mudflats (Higgins & Davies 1996). Foraging habitat is among rocks or shingle, or in shallow pools at edges of reefs or beaches, mainly along the tideline. Wandering Tattlers have been recorded roosting or perching on top of boulders surrounded by or close to water (Higgins & Davies 1996).
Tringa nebularia	Common Greenshank, Greenshank	Unlikely	This species is known to occupy habitat associated with estuaries.
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank	**Possible**	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes
Turnix melanogaste	Black-breasted button-quail	Unlikely	In north-east NSW, there are few reliable records, all north of the Bruxner Highway and east of the Great Divide. This species prefers drier rainforests and viney scrubs, often in association with Hoop Pine and a deep, moist leaf litter layer.
Xenus cinereus	Terek Sandpiper	Unlikely	The Terek Sandpiper mostly forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons. The species has also been recorded on islets, mudbanks, sandbanks and spits, and near mangroves and occasionally in samphire (Halosarcia spp.). Birds are seldom near the edge of water, however, birds may wade into the water (Marchant & Higgins 1993).
Xeromys myoides	Water mouse	**Possible**	Although the water mouse had been documented in three distinct locations (Northern Territory, central south Queensland, south-east Queensland) they require similar habitat including mangroves

Scientific Name	Common Name	Likelihood of occurrence on the Subject site	Habitat Requirements
			and the associated saltmarsh, sedgelands, clay pans, heathlands and freshwater wetlands. The main habitat difference at each location is the littoral, supralittoral and terrestrial vegetation which differs in structure and composition. These differences dictate the species' nesting behaviour.

APPENDIX 4 – REVISED VEGETATION MANAGEMENT PLAN (JWA 2024D)

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Ecological Consultants
ABN 56 066 448 879

REVISED VEGETATION MANAGEMENT PLAN

North East Business Park
Mixed Industry and Business Area Bulk Earthworks

Lot 1 on SP266287, Lot 11 on SP130251,
Lot 15 on RP902073 and Lot 2000 on SP320584
2 and 15 Nolan Drive, Morayfield

A Report Prepared for
North Harbour Holdings Pty Ltd

JANUARY 2024

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Document

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6	RW6	FINAL	03/08/21	Client	1	.pdf	Email
7	RW7	DRAFT	05/12/23	Client	1	.pdf	Email
8	RW8	FINAL	22/01/24	Client	1	.pdf	Email

Client Issue

Version	Date Sent	Author		Approved by	
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1 Introduction

1.1 Background

JWA Pty Ltd were previously engaged by North Harbour Holdings Pty Ltd to complete a Vegetation Management Plan (VMP) for the proposed bulk earthworks associated with the Mixed Industry and Business Area (MIBA) within the North East Business Park (NEBP) development.

The subject site has a current preliminary approval for development allowing mixed industry, business area precincts, open space and related purposes (Court Order No. 911 of 2015, Council Ref. MCU-2002-1079). An operational works application was approved by Moreton Bay Regional Council (MBRC) (Council Ref: DA/39447/2019/V4D) on the 27th February 2020 to allow for proposed bulk earthworks and vegetation clearing over the MIBA. These works commenced in April 2021 and have significantly progressed, with the majority of the earthworks now completed.

Recently, the proposed bulk earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works has been revised based on updated flood modelling for the NEBP site. This Revised VMP has been prepared to reflect the updated bulk earthworks design. This VMP provides specific measures for mitigating and/or minimising the potential impacts on vegetation as a result of development activities on the subject site. The VMP also aims to ensure the long-term health and safety of trees to be retained on site.

1.2 The Subject Site

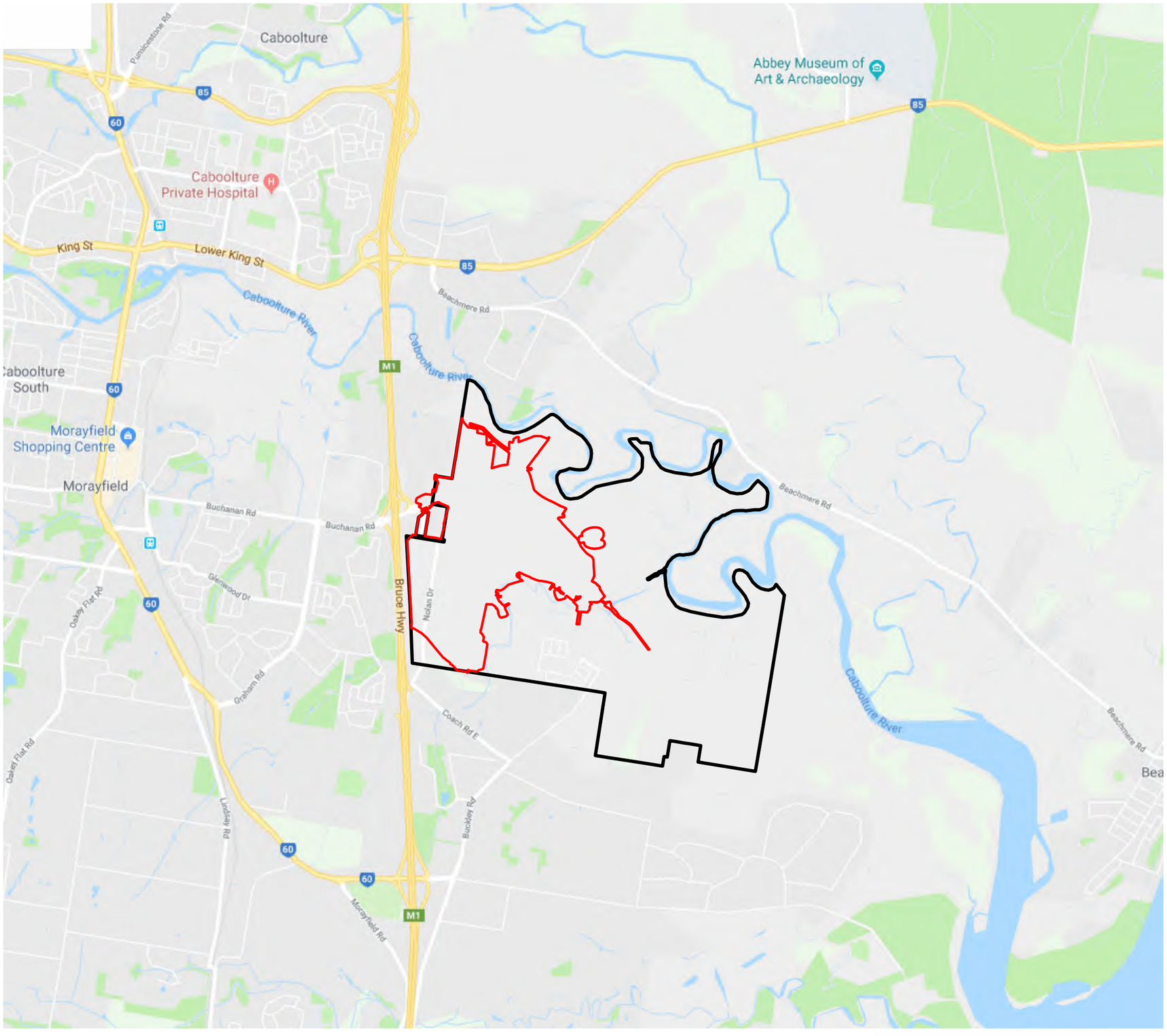
The site is located at Nolan Drive, Morayfield and is formally described as part of Lot 1 on SP266287, Lot 11 on SP130251, Lot 15 on RP902073 and part of Lot 2000 on SP320584 (**FIGURE 1**). The site is approximately 392 ha. An aerial photograph of the site is shown in **FIGURE 2**.

The majority of the site is highly disturbed and has been the subject of previous land clearing, livestock grazing and plantation forestry activities. Earthworks associated with the MIBA have recently been undertaken over the majority of the site. The remaining areas are currently used for cattle grazing. Prior to being used for grazing, the site was used for plantation forestry of *Pinus elliottii* (Slash pine).

The Caboolture River forms the northern boundary where some mature vegetation is existing along the banks of the river. This vegetation has been planted by NEBP as part of the rehabilitation of the Caboolture River. Small, isolated pockets of vegetation are scattered throughout the remainder of the site.

1.3 The Approved Development

The proposed development is for bulk earthworks associated with the MIBA area, works within Raff Creek necessary to remove an existing pipe culvert (and allow for the future



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary

Scale 1:40 000

0 400m 800m 1200m 1600m 2000m

SOURCE: Google Maps

SCALE: 1 : 40 000 @ A3

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Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 1

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FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

LOCALITY PLAN



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: Metro Maps Aerial dated 18/06/23

SCALE: 1 : 12 500 @ A3

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FIGURE 2

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FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

AERIAL PHOTOGRAPH

extension of Moreton Bay Boulevard) and widen the creek to improve future flood conveyance, and the construction of stormwater treatment wetlands.

As discussed above, the proposed bulk earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works has recently been revised based on updated flood modelling for the NEBP site.

The extent of bulk earthworks is shown in **FIGURE 3**. It should be noted that works associated with the MIBA commenced in April 2021 and have significantly progressed, with the majority of the earthworks now completed.

1.4 Approval Conditions

This VMP addresses Conditions 24 and 28 - 32 of the approval conditions issued by Moreton Bay Regional Council on the 27th February 2020. These conditions are as follows:

24. Amended Document Required

A. Submit an amended Vegetation Management Plan which clearly demonstrates the following, unless otherwise approved by Council:

a) The protection of trees by being greater than 15m (radius) from the centre of the stem at ground level, outside of the Tree Protection Zone (TPZ) or as calculated by a suitably qualified, AQF Level 5, arborist for vegetation within:

i. Lot 2 SP169551 – the extent shown as Category B;

ii. Proximity of the proposed haul road alignment;

iii. Adjoining properties and road reserves which do not form part of this application.

b) That provides justification where the extent of earthworks requires the removal of any native vegetation, habitat trees and koala habitat trees within:

i. Lot 17 RP902072;

ii. Lot 1 SP266287;

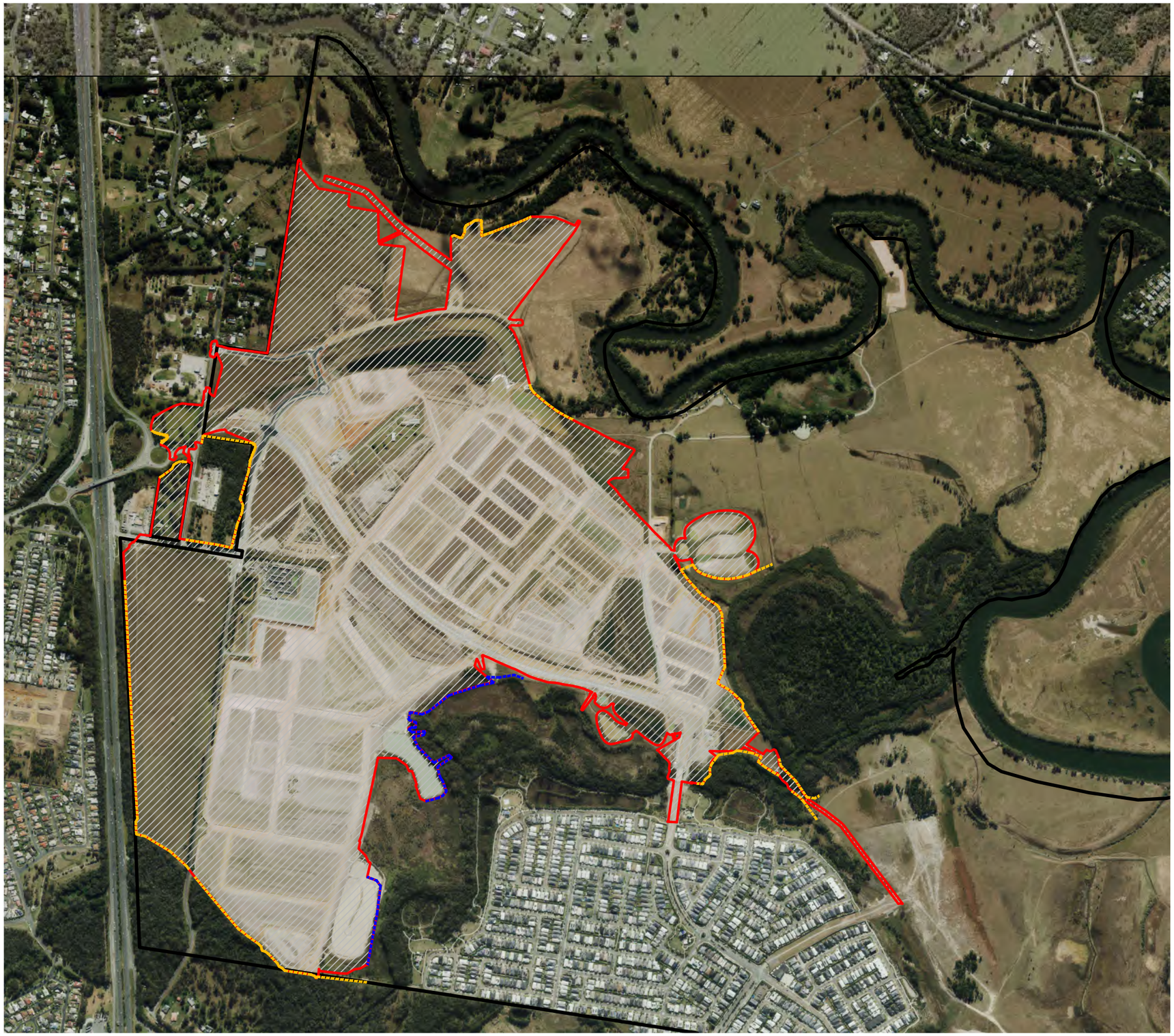
iii. Lot 15 RP902073

B. Obtain approval from Council for the amended plans in accordance with (A) above.

C. Implement the requirements and recommendations of the approved report(s). The approved amended plan(s) will form part of the approval.

28. Removal of Noxious Weeds

Carry out removal and maintain the area free from Biosecurity Matter declared under Biosecurity Act 2014 and Regulation(s), and any infestations of undesirable species as listed in Planning Scheme Policy – Integrated design Appendix D – Landscaping. Works must be undertaken by an approved person or company licensed under the Agricultural Chemicals Distribution Act (1970-1996).



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works
- Tree Protection Fencing
- Tree Protection Fencing - exact location to be determined onsite

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: KN Group (Ref: FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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FIGURE 3

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DATE: 27 November 2023
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TITLE
MIBA
BULK EARTHWORKS
EXTENT & TREE
PROTECTION FENCING

30. Extent of Vegetation Clearing

Clearing of native vegetation must be limited to that which is identified in the approved Vegetation Management Plan.

31. Disposal of Cleared Vegetation

Chip, shred or tub grind cleared native vegetation and spread as mulch or dispose of at an authorised waste facility.

32. Stockpiles of Construction and Landscaping Material

Locate any stockpiles of construction and landscaping materials and other site debris clear of environmental areas, tree protection zones, drainage lines and clear of any position from which it could be washed onto any footpath,

1.5 Format of this Management Plan

The plan is structured as follows:

- Vegetation Management Objectives;
- Vegetation Management Strategies; and
- Monitoring and Reporting.

2 Vegetation Management Objectives

1. Tree clearing shall commence as soon as possible after Operational Works approval for the subject site has been granted by Council, and the site has been properly prepared for clearing operations.
2. Tree clearing shall be carried out in accordance with approved documents and Council conditions.
3. Implementation of vegetation clearance, stockpiling, recycling or disposal practices that maximise the re-use of native vegetation and minimises the potential for spreading weed species.
4. If individual trees or other specific vegetation that require protection are identified in land adjacent to a clearance zone, such protection shall be provided.
5. The mulching of weed species will not occur on site. Weed species shall be removed for disposal off-site to minimise the risk of propagation.
6. Prior to the mulching of cleared vegetation stockpiled on site, the stockpile shall be checked for weed species and Myrtle rust and, where fertile weed material or Myrtle rust exists, the material shall be removed for disposal off-site to minimise the risk of spread or propagation.
7. Tree clearing operations shall be completed in a manner that provides maximum protection of the health and livelihood of native fauna. Appropriate fauna management strategies to be employed during clearing operations are addressed in the Fauna Management Plan (JWA 2024)**.**
8. Disposal of cleared vegetation will be managed in an environmentally responsible manner as outlined in **SECTION 3.4**.
9. The retention of mature trees in the proposed development area will be maximised by considering their location during the planning process. Trees planted as part of the developments landscaping will include the same species as the trees that have been removed.

3 Vegetation Management Strategies

3.1 Introduction

This section identifies vegetation to be retained and removed and contains specific management strategies for mitigating and/or minimising the potential impacts on vegetation to be retained on the subject site.

3.2 Identification of Retained/Removed Vegetation

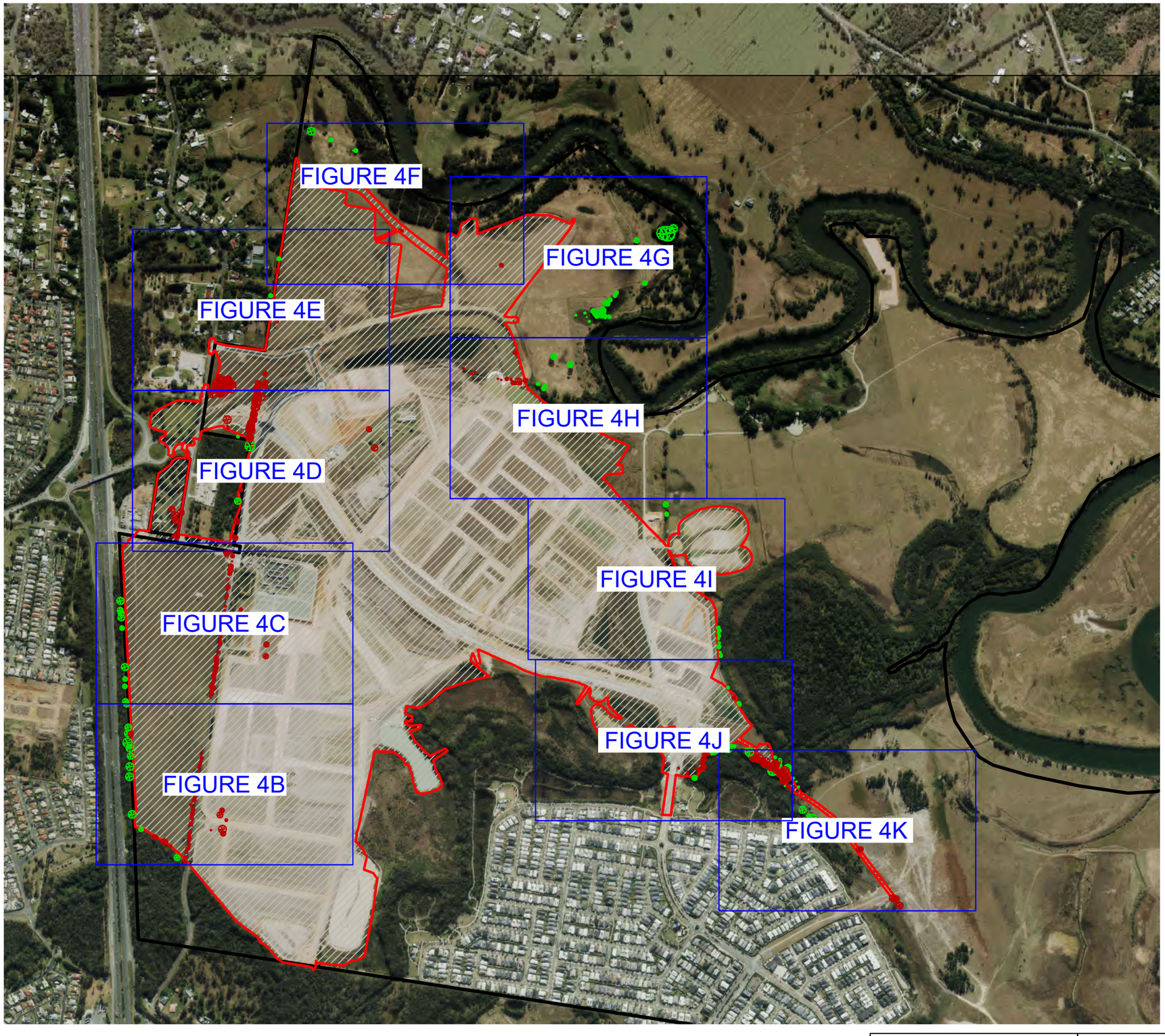
In order to develop the MIBA within the North Harbour development, the land is required to achieve the finished levels anticipated by the approved MIBA Flood Management Plan. The extents of earthworks need to deliver the necessary finished levels has been detailed by KN Group and approved by Council. The earthworks will significantly alter the current levels of the land and will necessitate the removal of existing vegetation. Within the earthworks extent a total of 531 trees will be removed however the majority are either juvenile or sub-adult. This is due to the site being previously cleared to allow the land to be used for forestry purposes.

A basic tree survey of trees over 100 mm diameter at breast height (DBH), was completed on the 20th and 28th July 2020 by two (2) JWA ecologists within the paddock areas of the MIBA, as well as a sample of trees within the retained adjoining vegetation. A further tree survey was completed on the 8th April 2021 by two (2) JWA ecologists within areas adjacent to Raff Creek. An additional tree survey was completed on the 22nd July 2021 by two (2) JWA ecologists within the Nolan Drive Road Reserve. Information collected for each tree included GPS coordinates, species, DBH), height, canopy spread and habitat features. Tree Protection Zones (TPZ) have been calculated for all surveyed trees in accordance with Australian Standard AS 4970-2009 (Protection of Trees on Development Sites). Tree details are provided in **APPENDIX 1** and locations of trees and TPZs are shown on **FIGURE 4**.

All trees within the extent of works are to be removed (**FIGURE 4**). For trees adjacent to the works area, where the proposed works will result in greater than 10% encroachment on the TPZ of a tree, the tree has been designated for removal.

It should be noted that where denser retained vegetation areas adjoined the proposed earthworks extent, only trees within the maximum TPZ range in accordance with the Australian Standard AS 4970-2009 (Protection of Trees on Development Sites), and as such potentially impacted by the works, were surveyed.

Areas of retained vegetation and individual trees will be identified and demarcated prior to the commencement of site preparation works. All retained trees that have the potential to be impacted by development works will be fenced prior to construction works. Tree protection fences shall be installed in accordance with the Australian Standard AS 4970-2009 (Protection of trees on development sites) (**FIGURE 5**) at the locations shown in **FIGURE 3**. Tree protection fences should be installed under the supervision of a qualified ecologist or arborist, prior to the tree clearing phase.



N

LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works
- Surveyed Native Trees to be Retained
- Surveyed Native Trees to be Removed

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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FIGURE 4A

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DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20210802.dwg

TITLE

MIBA
TREE SURVEY



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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FIGURE 4B

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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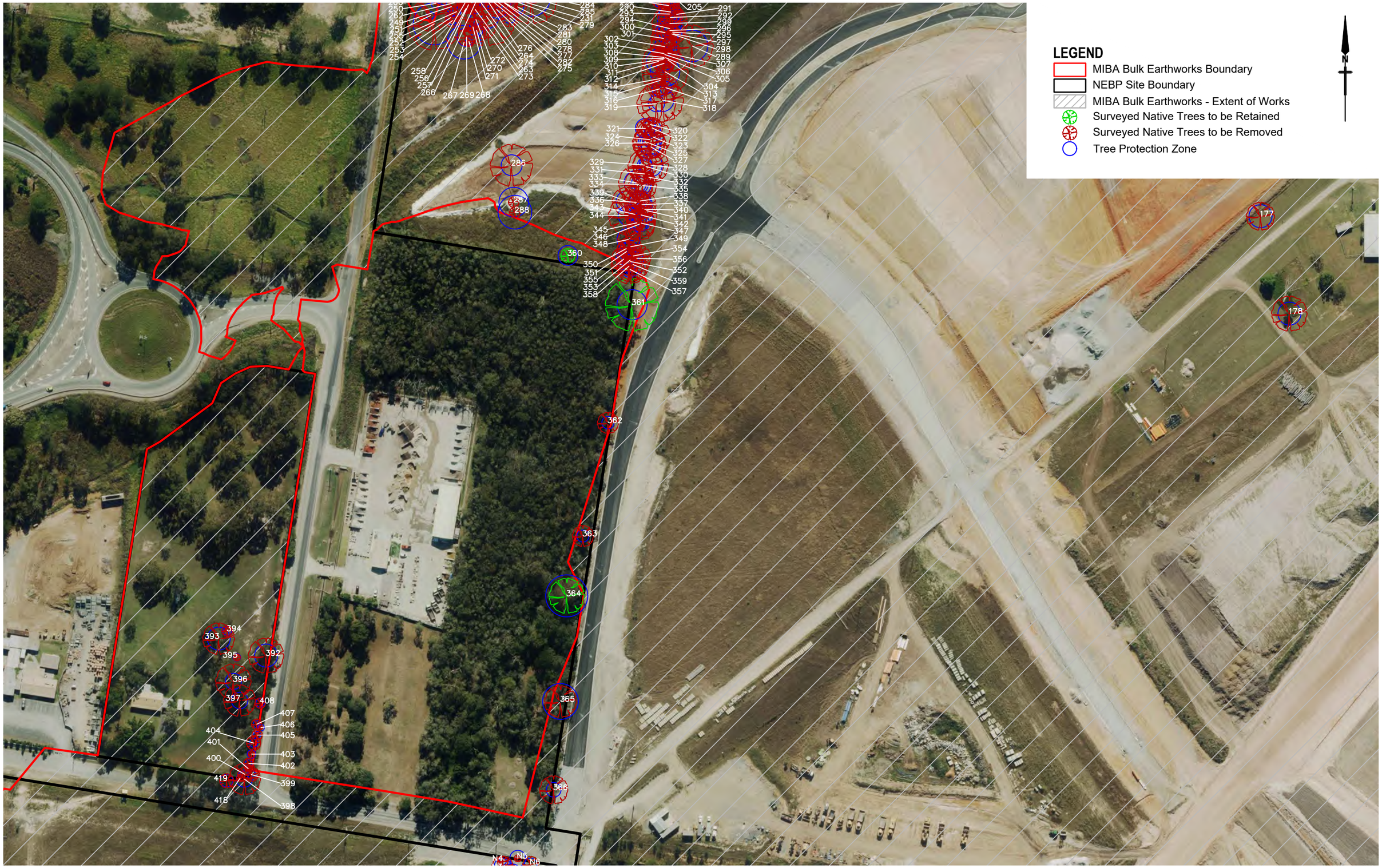
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Vegetation Management Plan
NEBP MIBA Bulk Earthworks
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FIGURE 4C

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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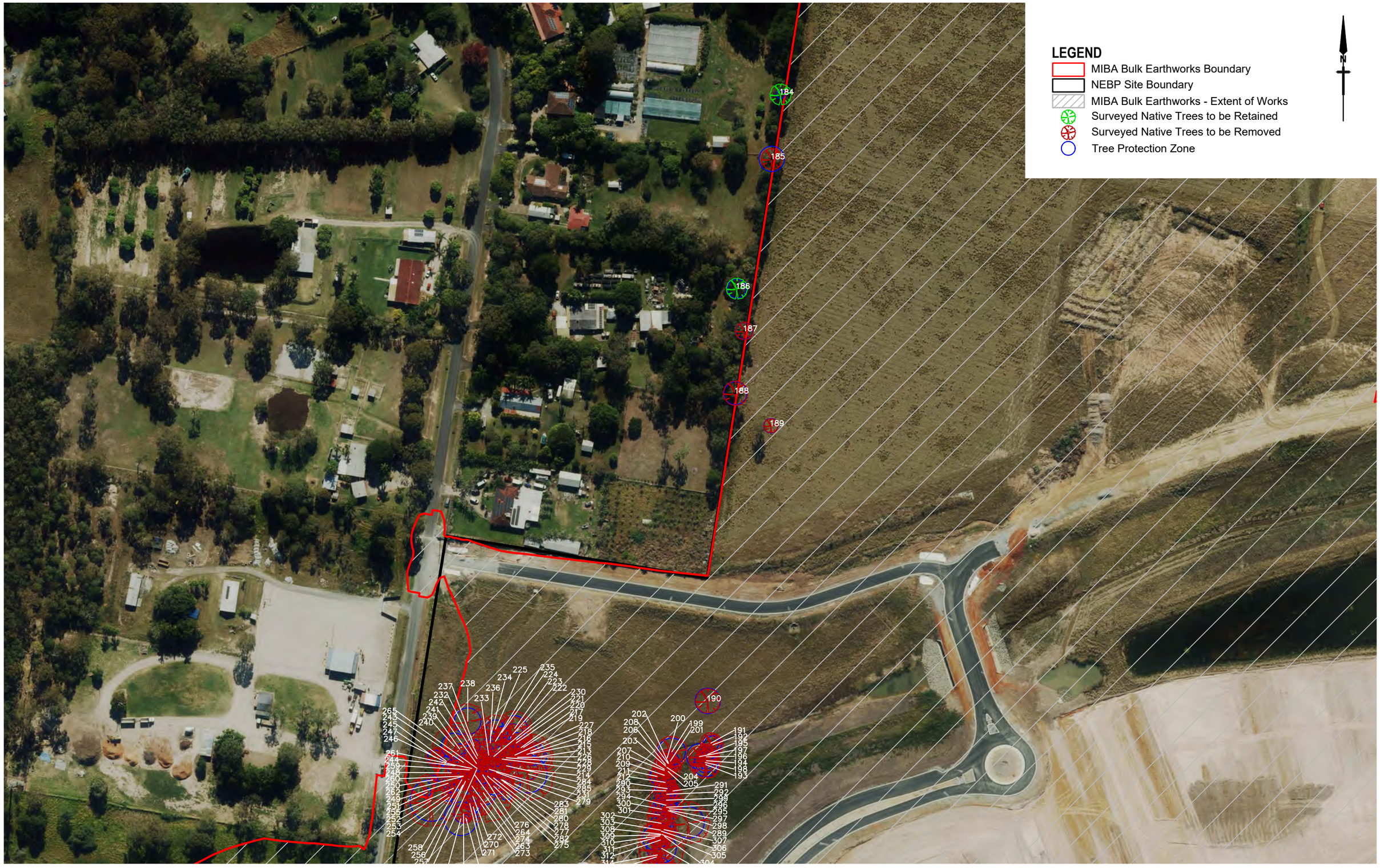
PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4D

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4E

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works
- Surveyed Native Trees to be Retained
- Surveyed Native Trees to be Removed
- Tree Protection Zone

N

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

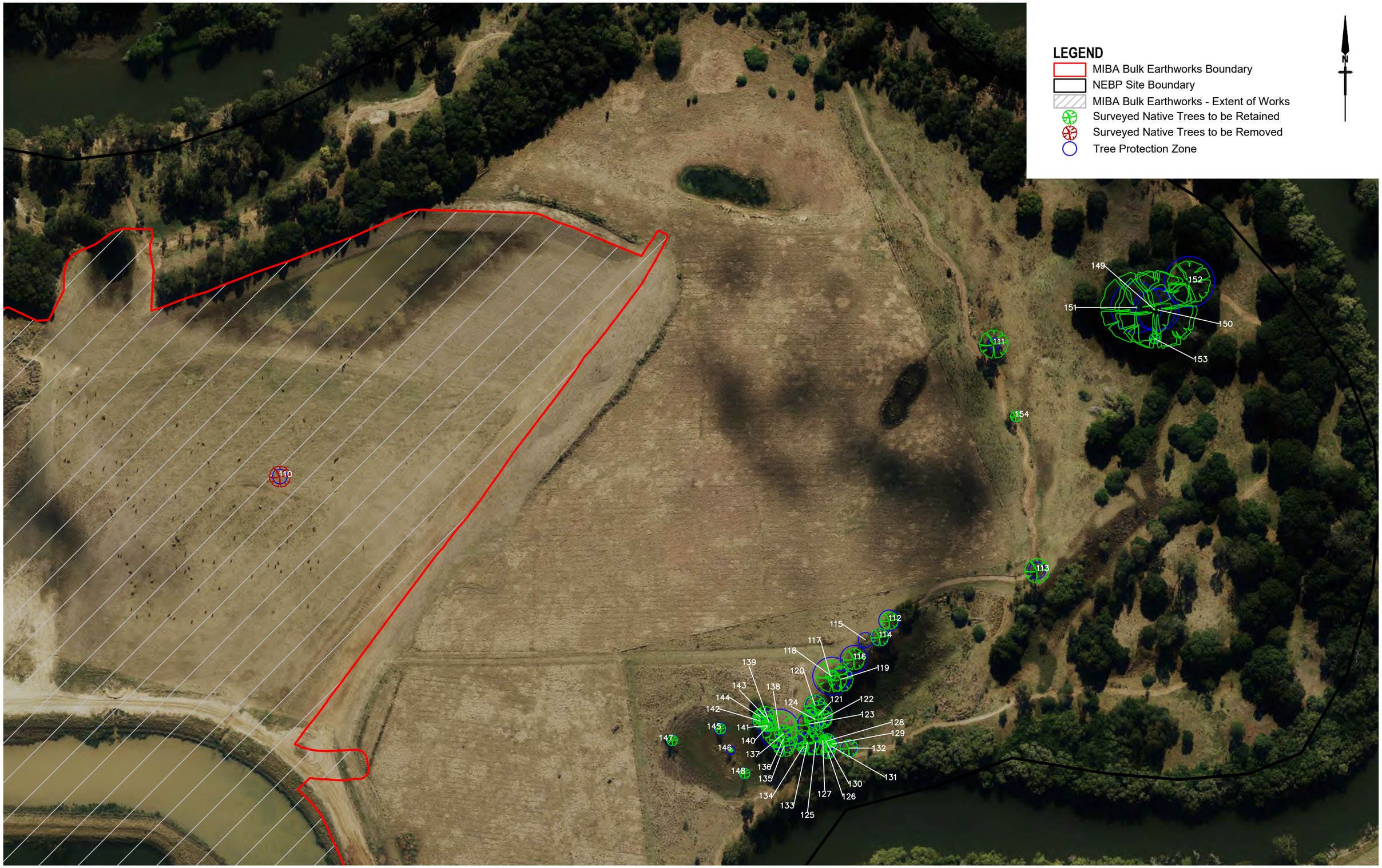
PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4F

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

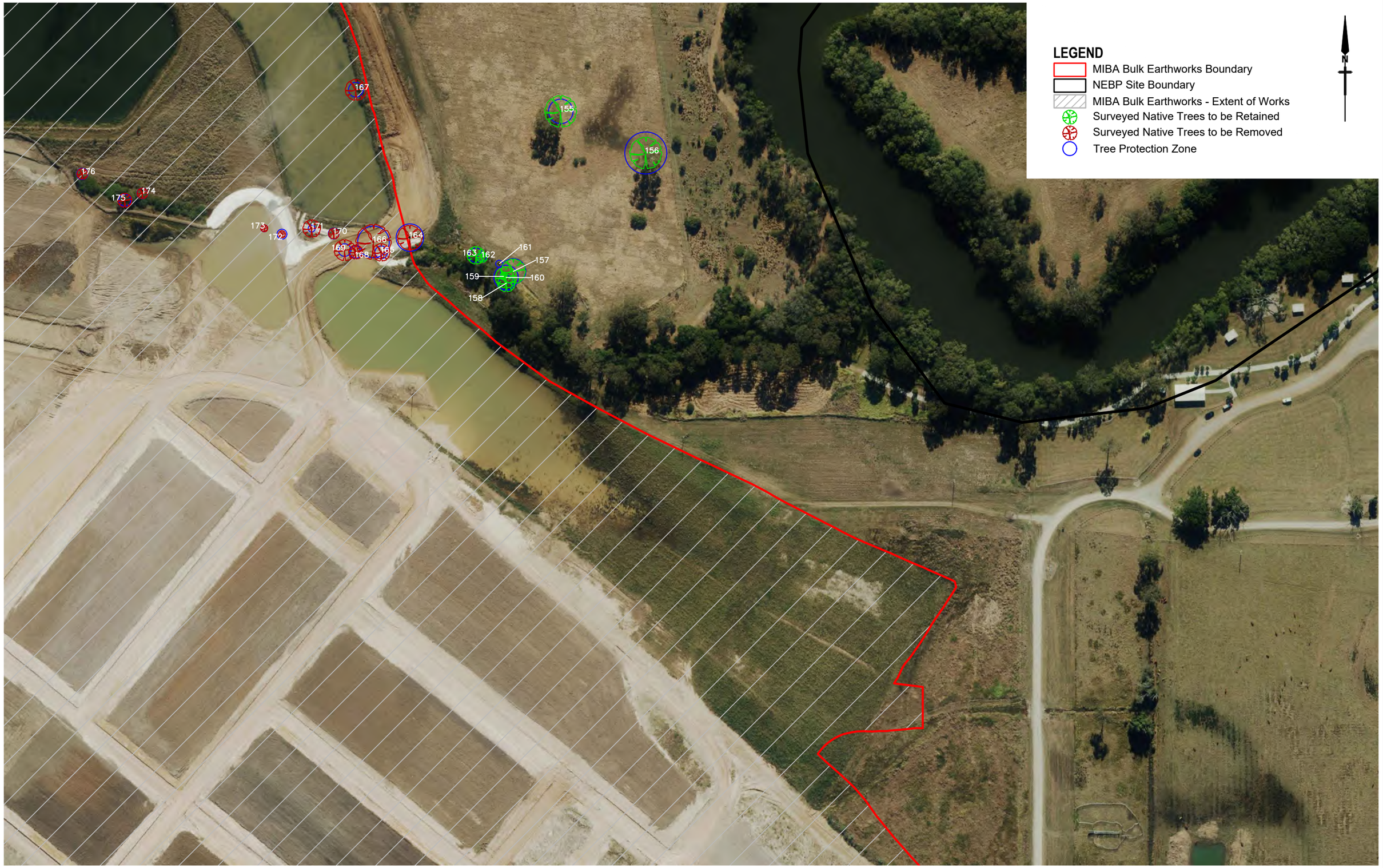
PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4G

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

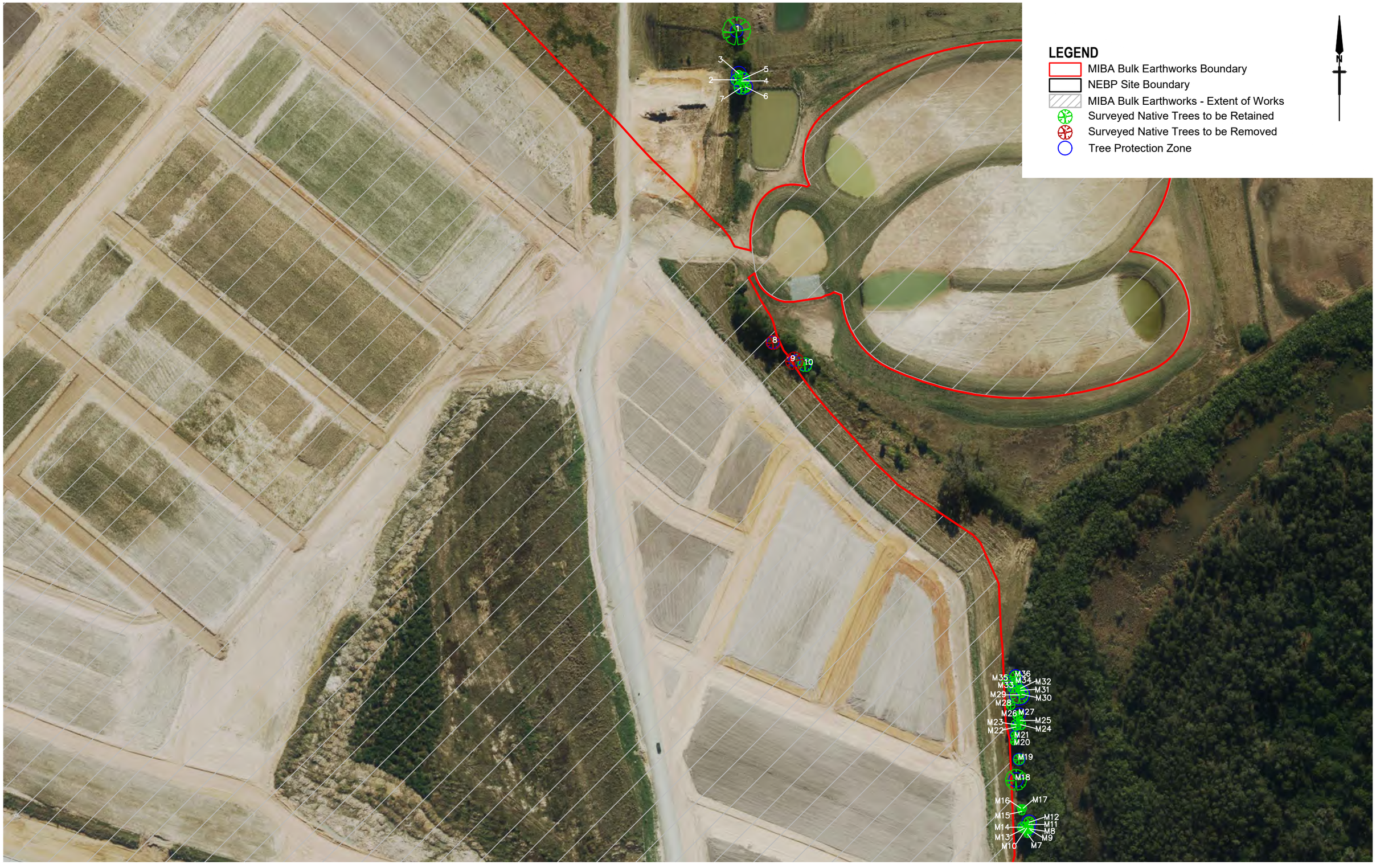
PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4H

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4I

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY

LEGEND

- MIBA Bulk Earthworks Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works
- Surveyed Native Trees to be Retained
- Surveyed Native Trees to be Removed
- Tree Protection Zone

N

Scale 1 : 2000

0 20m 40m 60m 80m 100m

SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

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PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4J

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



SOURCE: JWA Site Investigations 2020-2021; KN Group (FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 2000 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

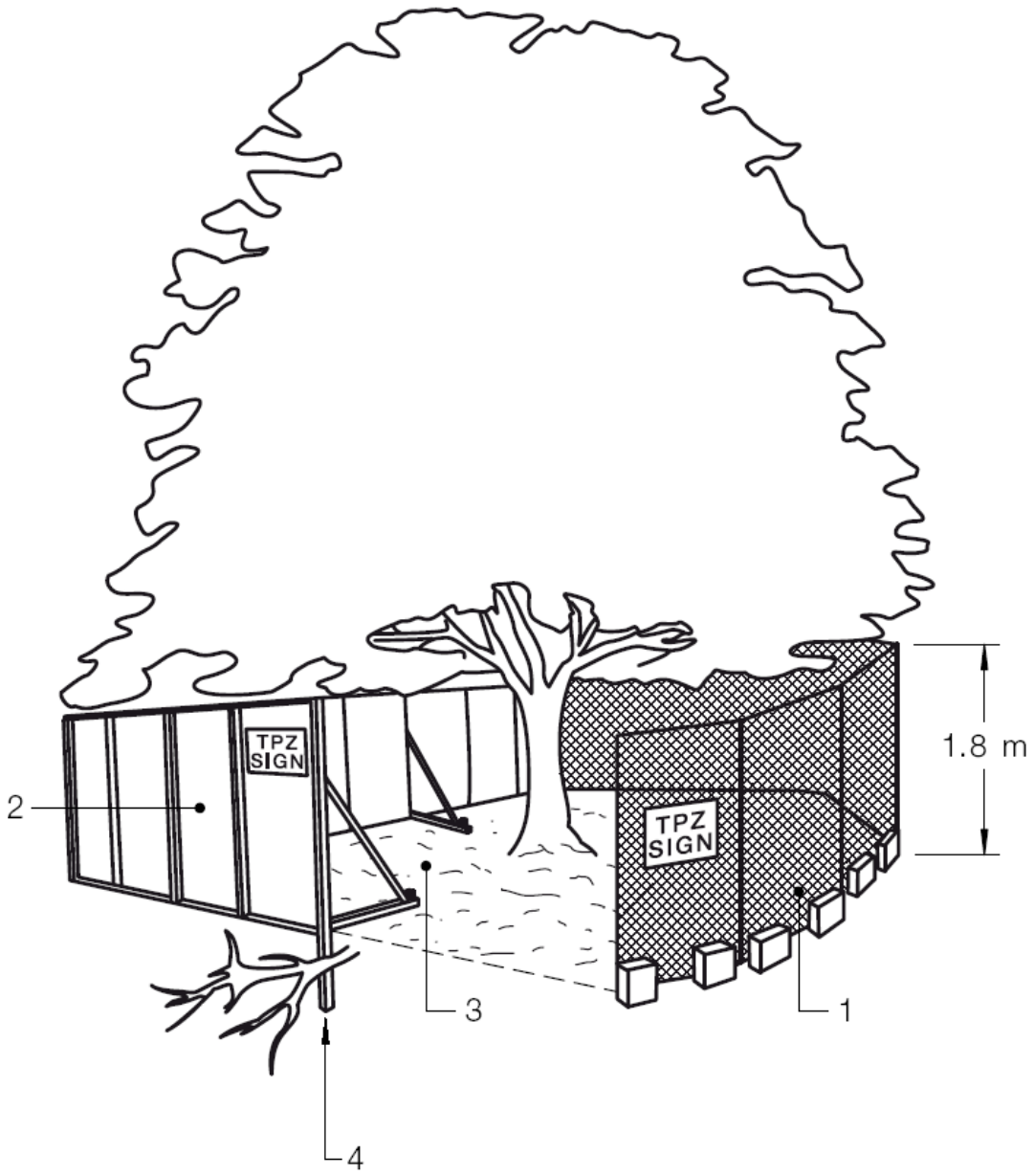
PROJECT
Vegetation Management Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 4K

PREPARED: BW
DATE: 27 November 2023
FILE: Q15003_MIBA VFMP_20231114.dwg

TITLE

MIBA
TREE SURVEY



LEGEND:

1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooded paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface or TPZ (at the discretion of the project aborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

SOURCE: AS 4970-2009 Protection of Trees on Development Sites SCALE: Not to Scale JWA PTY LTD Ecological Consultants	CLIENT North East Business Park Pty Ltd PROJECT Vegetation Management Plan NEBP MIBA Bulk Earthworks Nolan Drive, Morayfield QLD Moreton Bay Regional Council LGA	**FIGURE 5** PREPARED: BW DATE: 03 August 2020 FILE: Q15003_Tree Protection.cdr	TITLE **TREE PROTECTION**

It should be noted that works associated with the MIBA commenced in April 2021 and have significantly progressed, with the majority of the earthworks and tree clearing now completed. The proposed changes to the bulk earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works will not result in the removal of any additional trees and will allow for the retention of two (2) trees previously allocated for removal.

3.3 Vegetation Protection Guidelines

All retained vegetation likely to be impacted by construction works will be managed in accordance with the following tree protection guidelines. These procedures will ensure that retained trees adjacent to development areas will survive construction works and will remain in a healthy condition. The procedures will also ensure that any activity taking place within the drip line of any retained tree will not significantly impact on the survival of the tree.

In order to protect retained vegetation, the following procedures are to be followed:

1. *Identifying a Tree Protection Zone*: All retained trees likely to be impacted upon by development works will be marked prior to construction works. The size and shape of a particular protection zone will vary according to individual tree species. The zone will be determined prior to commencing the project and will remain in place until project completion.
2. *Pruning*: Prior to establishing a tree protection zone, trees to be protected will be pruned focusing on removal of dead or broken branches. The purpose of this activity is primarily safety, but it serves as a monitor for any damage that may occur during construction. Any pruning works are to be carried out by a qualified arboriculturist (minimum AQF Level 5 Diploma in Arboriculture). All works will adhere to the Australian Standards (AS) 4373 – 1996 (Pruning of Amenity Trees).
3. *Establishing the Tree Protection Zone*: The following measures will be taken to protect the tree in the long term:
    - Fencing – Temporary fencing consisting of high visibility webbing and star pickets will be installed at the edge of works line prior to construction works. Temporary fencing will remain in place until all tree clearing and earthworks within or immediately adjacent to the retained vegetation have been completed. Silt fencing will be placed at the bottom of any batters within the waterway as appropriate.
    - Trunk protection – 1.8m high palings strapped to the trunk.
    - Mulching – 100 mm of composted mulch cover over the ground within the tree protection zone in order to retain soil moisture and encourage microbial activity.
    - Irrigation – natural moisture levels should be maintained.
    - Drainage – the natural drainage patterns around the root zone should not be altered.

- Signage – as follows:
    - Tree Protection zone
    - No vehicle movement
    - No storage of building materials
    - No washing of equipment
    - Contact name and number for enquires.

4. *Pre-start meeting:* Prior to commencement of clearing works, the applicant will arrange a pre-start meeting with Moreton Bay Regional Council Development Assessment Officers. Prior to the pre-start meeting, the applicant (or appointed contractor) should ensure that the relevant fencing along the boundary of the retained vegetation is installed.

5. *Activities within the Tree Protection Zone:* No activities will be undertaken with the tree protection zones (TPZs) without the supervision of a suitably qualified arborist. Council is to be notified if any activity is likely to adversely impact on the health of retained trees. Within the retained vegetation the following activities shall not be permitted:
    - storage and mixing of materials;
    - vehicle parking;
    - liquid disposal;
    - machinery repairs and/or refuelling;
    - construction site office or shed;
    - combustion of any material;
    - stockpiling of soil, rubble or debris;
    - any filling or excavation including trench line, topsoil skimming and/or surface excavation, unless otherwise approved by a suitably qualified arborist; and
    - unauthorised pesticide, herbicide or chemical applications.

6. *Trenching and Excavation*: When trenching or excavation is to be undertaken within the root zone of any tree, roots will be severed cleanly rather than torn with a backhoe or other excavation equipment. All roots are to be exposed first and then cut cleanly with a sharp saw or loppers. Exposed roots are to be kept moist and covered with hessian for the duration of the exposure. Where roots with a diameter larger than 50mm are encountered excavation should be undertaken by hand or small implements.

7. *Activities Adjacent to Retained Trees*: All activities in an area adjacent to any retained tree or area are to be carried out in such a manner as to minimise any damage to trees. Trees to be removed will be felled in a direction away from trees to be retained. Where an individual tree to be retained may be impacted by the removal of another tree located at close proximity, the roots of the tree

to be disturbed (and the tree to be retained, where required) are to be severed cleanly by a suitably qualified arborist. All roots are to be exposed first and then cut cleanly with a sharp saw or loppers.

8. *Clearing Works*: Site works shall occur in the following sequence; cutting, shearing of felled vegetation and tub grinding. Where vegetation is cleared or removed, vegetation waste shall be mulched and retained on site for re-use in landscape works. Each area is to be mulched immediately upon completion of clearing and grubbing works. Any vegetation not suitable for mulching (i.e. fertile material from weed species) will not be mulch and will be transported to an appropriate facility.

   Hollow logs shall not be mulched until inspected by a qualified Ecologist. If any hollow logs are located on site they will be relocated to areas proposed for landscaping.

9. *Disposal of Debris*: Clearing and disposal of vegetation to be in accordance with Council requirements and conditions. Vegetation will be mulched and reused on site, where possible. Prior to the commencement of operational works all rubbish and foreign matter from the area is to be removed and appropriately disposed of off-site.

10. *Monitoring and Reporting:* Monthly site inspections will be completed to ensure that protection measures are being implemented. Inspections are to be coordinated with the construction supervisor to ensure that where practical supervision for works within TPZ's is combined with the general assessment of protection measures. Inspections will be undertaken and documented by a suitably qualified arborist. Records of all inspections are to be provided to the applicant.

3.4 Disposal of Debris

Prior to the commencement of operational works all rubbish and foreign matter is to be removed and appropriately disposed of off-site.

Where vegetation is cleared or removed, vegetation waste shall be mulched and retained on site for re-use in landscape and rehabilitation works. Any vegetation not suitable for mulching i.e. fertile weed specimens will be transported to an appropriate facility.

Clearing and disposal of vegetation is to be in accordance with Council requirements and conditions. Pit burning of cleared vegetation is strictly prohibited as is the burning of other refuse/waste on site.

3.5 Stockpile Locations

Cleared vegetation and site mulch will be stockpiled/stored on site within the development area. Storage or stockpiling must not occur within tree protection zones.

3.6 Weed Species Management

3.6.1 Introduction

The focus for weed management is the removal of existing weeds and prevention of further infestations. Weeding is to commence during or immediately following site preparation works.

3.6.2 Weeds on Site

A number of weeds have been recorded on the site. The following are some of the major weed species identified:

- Broad-leaf pepper tree (*Schinus terebinthifolius*) - – Category 3 declared weed under the QLD *Biosecurity Act;*
- Camphor laurel (*Cinnamomum camphora*) -– Category 3 declared weed under the QLD *Biosecurity Act 2014;*
- Groundsel bush (*Baccharis halimifolia*) – Category 3 declared weed under the QLD *Biosecurity Act 2014*;
- Lantana (*Lantana camara*) - – Category 3 declared weed under the QLD *Biosecurity Act 2014*, Weed of National Significance (WoNS);
- Singapore Daisy (*Sphagneticola trilobata*) – Category 3 declared weed under the QLD *Biosecurity Act 2014;* and
- Slash pine (*Pinus elliottii*).

3.6.3 Weed Species Management Protocols

The weed species management protocols are as follows:

1. No soil disturbance is to occur within areas of retained vegetation. Soil disturbance within retained vegetation and any areas to be landscaped shall be kept to a minimum to avoid weed recruitment.
2. All nursery stock for landscaping purposes shall be weed, pest and disease free and certified as such by the supplier where feasible. The certificates are to be obtained prior to the commencement of any regeneration/revegetation works on site.
3. All mulch produced on site (by mulching cleared vegetation and trees) shall specifically exclude fertile material from weed species (where a risk of proposition exists) and be stored outside of the retained vegetation. Vegetation mulching will be suitably controlled to avoid contamination. Any fertile weed material will be transported from the site to an approved disposal facility.
4. Weed or potential weed species shall not be planted during landscaping operations.
5. Weeds on the subject site will be managed using suitable control measures (i.e. chemical and/or physical control).

6. Clearing operations are to ensure that propagative material from cleared weeds does not spread across the site. The earthworks machinery must not introduce weed material to the site or spread such material throughout the site.

4 Monitoring and Reporting

4.1 Introduction

This section provides details of the performance indicators, controls and corrective actions, and the monitoring and reporting requirements under this VMP. Success of the VMP will be monitored and assessed against the performance indicators.

4.2 Performance Indicators

The following performance indicators will be used to assess the effectiveness of the VMP:

1. All contractors are to be fully aware of responsibilities under this VMP and other relevant management plans.
2. Tree protection fencing erected in accordance with the Vegetation Protection Guidelines (**SECTION 3.3**).
3. No retained trees will be damaged of removed during construction or rehabilitation activities.
4. No unauthorised activities to be undertaken within tree protection zones as listed in **SECTION 3.3**.

4.3 Controls and Corrective Actions

The following controls and corrective actions will be implemented:

1. All contractors will be supervised by an onsite representative from the Applicant.
2. Relevant provisions of Local, State and Commonwealth Government Legislation/Policies to be adhered to by the Contractor.
3. A copy of the approved Vegetation Management Plan, approved documents and Council's conditions shall be retained on site at all times.
4. Contractors undertaking site works, including tree removal are to be instructed directly of all Council's relevant conditions prior to works commencing.
5. The boundary of the retained vegetation will be clearly defined by fencing. Taping (red colour) may also be utilised during the construction phase to ensure the boundary fencing is highly visible.
6. The Contractor shall provide fences and/or trunk girdles to prevent unintended physical damage to the root system, trunk or canopy of native vegetation identified for retention, which may be impacted upon by clearing works. All vegetation protection fencing must remain on site until all operational works are completed.
7. All works carried out on either foliage or root systems of trees to be retained are to be in consultation with a qualified arborist or horticulturist. All works must adhere to the *Australian Standards (AS) 4373 – 1996 (Pruning of amenity trees)*. The subject trees are not to be topped nor lopped. Spur climbing of any tree to be pruned should also be avoided.

8. Any area disturbed by construction ancillary to the approval must be restored and rehabilitated to the satisfaction of the MBRC Assessment Manager.
9. All vegetation management works shall be carried out so as not to offend any conditions of the approved sediment and erosion control plan for the site.

4.4 Monitoring and Reporting Requirements

The Applicant shall appoint suitable Contractor(s) to undertake the clearing operations. The contractor shall monitor vegetation clearance and earthworks components of the proposed works on a continual basis to confirm that specific controls have been implemented and appropriate work practices are being adopted to achieve the Vegetation Management Objectives specified in **SECTION 2**.

The Applicant shall be responsible for periodic condition monitoring of all retained vegetation. Monitoring will address the health and vigour of all retained vegetation. Inspections will be undertaken and documented by a suitably qualified Ecologist. Monitoring visits should also be completed following any flood events to check for impacts to plants, sediment control, fencing and mulch distribution. Issues should be rectified as soon as practicable.

Records of all inspections are to be provided to the Applicant.

The Contractor shall formally report to the Applicant on a weekly basis. The report will discuss the following:

1. Works undertaken;
2. Progress against stated objectives;
3. Compliance with Performance Indicators;
4. Significant problems encountered;
5. Success or failures of measures implemented to rectify previously identified problems; and
6. Measures to be taken to rectify new problems.

5 Summary and Conclusion

JWA Pty Ltd has been engaged by North Harbour Holdings Pty Ltd to complete a Vegetation Management Plan (VMP) for the Mixed Industry and Business Area (MIBA) at the North East Business Park (NEBP) site. The subject site has a current preliminary approval for development allowing mixed industry, business area precincts, open space and related purposes (Court Order No. 911 of 2015, Council Ref. MCU-2002-1079). An operational works application has been submitted with Moreton Bay Regional Council (MBRC) (Council Ref: DA/39447/2019/V4D) to allow for proposed bulk earthworks and vegetation clearing over the MIBA.

This VMP provides specific measures for mitigating and/or minimising the potential impacts on vegetation as a result of development activities on the subject site. The VMP also aims to ensure the long-term health and safety of trees to be retained on site.

Specific actions include:

- Identification and demarcation of retained and removed vegetation;
- The use of fencing to protect retained vegetation;
- The management of weeds on the site; and
- Monitoring and reporting against performance indicators.

The implementation of this VMP will result in the minimisation of impacts on retained vegetation due to development activities on the subject site.

APPENDIX 1: Tree Details

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
001	Muttonwood	*Rapanea variabilis*	30	9	8		Retain		Double stem
002	Swamp oak	*Casuarina glauca*	28	7	3		Retain		
003	Swamp oak	*Casuarina glauca*	35	15	2		Retain		
004	Swamp oak	*Casuarina glauca*	30	8	1		Retain		
005	Swamp oak	*Casuarina glauca*	40	15	4		Retain		
006	Swamp oak	*Casuarina glauca*	24	8	3		Retain		
007	Swamp oak	*Casuarina glauca*	35	12	4		Retain		
008	Muttonwood	*Rapanea variabilis*	28	8	4		Remove		
009	Acacia	*Acacia sp.*	27	7	5		Remove		Two stems
010	Acacia	*Acacia sp.*	28	6	4		Retain		Several stems
011	Grey ironbark	*Eucalyptus siderophloia*	42	19	10		Remove		
012	Grey ironbark	*Eucalyptus siderophloia*	20	10	3		Retain		
013	Swamp oak	*Casuarina glauca*	19	15	1		Retain		
014	Swamp oak	*Casuarina glauca*	19	17	2		Remove		
015	Swamp oak	*Casuarina glauca*	25	17	2		Remove		
016	Swamp oak	*Casuarina glauca*	17	15	3		Retain		
017	Swamp oak	*Casuarina glauca*	15	14	4		Retain		
018	Swamp oak	*Casuarina glauca*	20	18	3		Retain		
019	Swamp oak	*Casuarina glauca*	19	16	2		Retain		
020	Swamp oak	*Casuarina glauca*	23	16	2		Retain		
021	Swamp oak	*Casuarina glauca*	21	15	4		Retain		
022	Grey ironbark	*Eucalyptus siderophloia*	23	16	4		Retain		
023	Swamp oak	*Casuarina glauca*	26	19	3		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
024	Swamp oak	*Casuarina glauca*	34	18	4		Retain		
025	Swamp oak	*Casuarina glauca*	15	11	2		Retain		
026	Swamp oak	*Casuarina glauca*	17	13	3		Retain		
027	Swamp oak	*Casuarina glauca*	19	13	3		Remove		
028	Swamp oak	*Casuarina glauca*	17	14	4		Remove		
029	Swamp oak	*Casuarina glauca*	27	15	5		Remove		
030	Swamp oak	*Casuarina glauca*	28	16	3		Remove		
031	Swamp oak	*Casuarina glauca*	15	10	1		Remove		
032	Swamp oak	*Casuarina glauca*	26	18	4		Remove		
033	Swamp oak	*Casuarina glauca*	16	14	2		Remove		
034	Swamp oak	*Casuarina glauca*	15	15	1		Remove		
035	Swamp oak	*Casuarina glauca*	16	15	2		Remove		
036	Grey mangrove	*Avicennia marina*	35	11	8		Remove		
037	Grey mangrove	*Avicennia marina*	16	11	3		Remove		
038	Grey mangrove	*Avicennia marina*	16	6	7		Remove		
039	Swamp oak	*Casuarina glauca*	15	12	5		Remove		
040	Grey mangrove	*Avicennia marina*	30	7	5		Remove		
041	Swamp oak	*Casuarina glauca*	29	10	5		Remove		
042	Grey mangrove	*Avicennia marina*	50	8	10		Remove		
043	Swamp oak	*Casuarina glauca*	15	17	3		Remove		
044	Swamp oak	*Casuarina glauca*	21	15	4		Remove		
045	Swamp oak	*Casuarina glauca*	16	16	3		Remove		
046	Grey mangrove	*Avicennia marina*	30	15	10		Remove		
047	Grey mangrove	*Avicennia marina*	60	15	13		Remove		
048	Grey mangrove	*Avicennia marina*	50	15	13		Remove		2 stems
049	Grey mangrove	*Avicennia marina*	45	14	12		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
050	Grey mangrove	*Avicennia marina*	20	13	10		Retain		
051	Grey mangrove	*Avicennia marina*	30	14	9		Retain		
052	Swamp oak	*Casuarina glauca*	23	15	3		Remove		
053	Swamp oak	*Casuarina glauca*	15	15	3		Remove		
054	Swamp oak	*Casuarina glauca*	16	16	2		Remove		
055	Swamp oak	*Casuarina glauca*	17	17	2		Remove		
056	Swamp oak	*Casuarina glauca*	15	17	3		Remove		
057	Swamp oak	*Casuarina glauca*	15	14	5		Remove		
058	Swamp oak	*Casuarina glauca*	15	14	3		Remove		
059	Swamp oak	*Casuarina glauca*	20+16+22	13	5		Remove		
060	Swamp oak	*Casuarina glauca*	19+9	16	3		Remove		
061	Swamp oak	*Casuarina glauca*	17	15	3		Remove		
062	Swamp oak	*Casuarina glauca*	16	15	2		Remove		
063	Swamp oak	*Casuarina glauca*	19	15	2		Remove		
064	Swamp oak	*Casuarina glauca*	17	13	4		Remove		
065	Swamp oak	*Casuarina glauca*	18	15	2		Remove		
066	Swamp oak	*Casuarina glauca*	23	18	3		Remove		
067	Swamp oak	*Casuarina glauca*	19	17	2		Remove		
068	Swamp oak	*Casuarina glauca*	26	17	4		Remove		
069	Swamp oak	*Casuarina glauca*	20	16	3		Remove		
070	Grey mangrove	*Avicennia marina*	35+40	12	12		Retain		
071	Grey mangrove	*Avicennia marina*	30	8	14		Retain		
072	Grey ironbark	*Eucalyptus siderophloia*	30	18	6		Remove		
073	Grey ironbark	*Eucalyptus siderophloia*	29	18	8		Remove		
074	Grey ironbark	*Eucalyptus siderophloia*	29	19	8		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
075	Grey ironbark	*Eucalyptus siderophloia*	15	17	4		Remove		
076	Grey ironbark	*Eucalyptus siderophloia*	30	17	4		Remove		
077	Grey ironbark	*Eucalyptus siderophloia*	22	15	4		Remove		
078	Grey ironbark	*Eucalyptus siderophloia*	16	14	3		Remove		
079	Grey ironbark	*Eucalyptus siderophloia*	60	23	10		Remove		
080	Grey ironbark	*Eucalyptus siderophloia*	34	19	7		Remove		
081	Grey ironbark	*Eucalyptus siderophloia*	28	23	3		Remove		
082	Grey ironbark	*Eucalyptus siderophloia*	29	23	10		Remove		
083	Grey mangrove	*Avicennia marina*	31+26	12	10		Remove		
084	Grey ironbark	*Eucalyptus siderophloia*	65	23	14		Remove		
085	Swamp oak	*Casuarina glauca*	20	11	3		Retain		
086	Grey mangrove	*Avicennia marina*	25	8	5		Remove		
087	Swamp oak	*Casuarina glauca*	28	10	4		Remove		
088	Swamp oak	*Casuarina glauca*	25	5	4		Remove		
089	Grey mangrove	*Avicennia marina*	29	8	9		Remove		2 stems
090	Swamp oak	*Casuarina glauca*	27	15	6		Remove		
091	Grey mangrove	*Avicennia marina*	27	10	6		Remove		
092	Grey mangrove	*Avicennia marina*	18	10	9		Remove		Multiple stems
093	Grey mangrove	*Avicennia marina*	32	10	9		Remove		
094	Swamp oak	*Casuarina glauca*	16	11	2		Retain		
095	Swamp oak	*Casuarina glauca*	18	12	3		Remove		
096	Swamp oak	*Casuarina glauca*	21	9	3		Remove		
097	Grey mangrove	*Avicennia marina*	55	9	7		Remove		Multi stems
098	Swamp oak	*Casuarina glauca*	18	11	3		Retain		
099	Swamp oak	*Casuarina glauca*	22	14	2		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
100	Swamp oak	*Casuarina glauca*	15	11	3		Retain		
101	Grey ironbark	*Eucalyptus siderophloia*	60	20	11		Retain		
102	Blue gum	*Eucalyptus tereticornis*	55	24	7		Remove		
103	Blue gum	*Eucalyptus tereticornis*	60	24	8		Remove		
104	Blue gum	*Eucalyptus tereticornis*	40	23	10		Remove		
105	Blue gum	*Eucalyptus tereticornis*	70	26	9		Remove		
106	Blue gum	*Eucalyptus tereticornis*	95	25	10		Remove		
107	Blue gum	*Eucalyptus tereticornis*	70	26	10		Remove		
108	Blue gum	*Eucalyptus tereticornis*	80	27	12		Retain		
109	Blue gum	*Eucalyptus tereticornis*	32	16	7		Retain		
110	Blue gum	*Eucalyptus tereticornis*	35	20	6		Remove		
111	Blue gum	*Eucalyptus tereticornis*	28	17	8		Retain		
112	Blue gum	*Eucalyptus tereticornis*	50	19	5		Retain		
113	Blue gum	*Eucalyptus tereticornis*	40	21	7		Retain		
114	Blue gum	*Eucalyptus tereticornis*	38	14	5		Retain		
115	Blue gum	*Eucalyptus tereticornis*	36	16			Retain		
116	Blue gum	*Eucalyptus tereticornis*	65	18	6		Retain		
117	Blue gum	*Eucalyptus tereticornis*	25	13	3		Retain		
118	Blue gum	*Eucalyptus tereticornis*	90	21	9		Retain		
119	Blue gum	*Eucalyptus tereticornis*	42	13	7		Retain		
120	Blue gum	*Eucalyptus tereticornis*	45	21	6		Retain		
121	Blue gum	*Eucalyptus tereticornis*	58	18	8		Retain		
122	Moreton Bay fig	*Ficus macrophylla*	30	10	5		Retain		
123	Blue gum	*Eucalyptus tereticornis*	55	22	8		Retain		
124	Blue gum	*Eucalyptus tereticornis*	38	18	6		Retain		
125	Blue gum	*Eucalyptus tereticornis*	60	19	7		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
126	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	13	4		Retain		
127	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	10	2		Retain		
128	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	10	4		Retain		
129	Broad-leaved paperbark	*Melaleuca quinquenervia*	26	10	2		Retain		
130	Broad-leaved paperbark	*Melaleuca quinquenervia*	24	10	3		Retain		2 stems
131	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	9	4		Retain		
132	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	10	5		Retain		
133	Blue gum	*Eucalyptus tereticornis*	45	18	7		Retain		
134	Swamp oak	*Casuarina glauca*	28	10	3		Retain		
135	Blue gum	*Eucalyptus tereticornis*	35	15	6		Retain		
136	Blue gum	*Eucalyptus tereticornis*	35	19	8		Retain		
137	Swamp oak	*Casuarina glauca*	26+16+28+25	16	5		Retain		
138	Blue gum	*Eucalyptus tereticornis*	95	20	10		Retain		
139	Swamp oak	*Casuarina glauca*	14	13	4		Retain		
140	Swamp oak	*Casuarina glauca*	28	13	3		Retain		
141	Swamp oak	*Casuarina glauca*	16	11	3		Retain		
142	Blue gum	*Eucalyptus tereticornis*	35	18	4		Retain		
143	Swamp oak	*Casuarina glauca*	35	19	6		Retain		
144	Swamp oak	*Casuarina glauca*	18	10	4		Retain		
145	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	8	3		Retain		
146	Broad-leaved paperbark	*Melaleuca quinquenervia*	20+15+10	8	1		Retain		
147	Swamp oak	*Casuarina glauca*	27	8	3		Retain		
148	Blue gum	*Eucalyptus tereticornis*	27	10	3		Retain		
149	Moreton Bay fig	*Ficus macrophylla*	100	22	22		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
150	Moreton Bay fig	*Ficus macrophylla*	100	22	22		Retain		
151	Moreton Bay fig	*Ficus macrophylla*	120	22	20		Retain		
152	Moreton Bay fig	*Ficus macrophylla*	120	21	12		Retain		
153	Kamala	*Mallotus philippensis*	20	8	3		Retain		
154	Grey ironbark	*Eucalyptus siderophloia*	25	10	3		Retain		
155	Blue gum	*Eucalyptus tereticornis*	58	15	9		Retain		
156	Blue gum	*Eucalyptus tereticornis*	100	17	9		Retain		
157	Blue gum	*Eucalyptus tereticornis*	60	18	7		Retain		
158	Blue gum	*Eucalyptus tereticornis*	36	18	5		Retain		
159	Tuckeroo	*Cupaniopsis anacardioides*	17	6	2		Retain		
160	Blue gum	*Eucalyptus tereticornis*	58	18	6		Retain		
161	Swamp oak	*Casuarina glauca*	16	9			Retain		
162	Swamp oak	*Casuarina glauca*	21	9	3		Retain		
163	Blue gum	*Eucalyptus tereticornis*	34	14	5		Retain		
164	Blue gum	*Eucalyptus tereticornis*	65	18	7		Remove		
165	Blue gum	*Eucalyptus tereticornis*	30	14	5		Remove		
166	Blue gum	*Eucalyptus tereticornis*	75	19	10		Remove		
167	Blue gum	*Eucalyptus tereticornis*	35	17	6		Remove		
168	Blue gum	*Eucalyptus tereticornis*	29	14	4		Remove		
169	Blue gum	*Eucalyptus tereticornis*	30	15	6		Remove		
170	Red ash	*Alphitonia excelsa*	26	8	3		Remove		
171	Red ash	*Alphitonia excelsa*	17	5	5		Remove		
172	Blue gum	*Eucalyptus tereticornis*	23	7	2		Remove		
173	Acacia	*Acacia sp.*	17	6	2		Remove		
174	Tuckeroo	*Cupaniopsis anacardioides*	25	5	3		Remove		
175	Acacia	*Acacia sp.*	28	5	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
176	Tuckeroo	*Cupaniopsis anacardioides*	27	5	3		Remove		
177	Grey ironbark	*Eucalyptus siderophloia*	55	21	8		Remove		
178	Blue gum	*Eucalyptus tereticornis*	55	21	10		Remove		
179	Blue gum	*Eucalyptus tereticornis*	35	18	4		Remove		
180	Rough-leaved elm	*Aphananthe philippinensis*	40	10	6		Retain		
181	Dead	*Dead*	80	8	0	Yes	Retain	Hollows. Very rotten	
182	Blue gum	*Eucalyptus tereticornis*	50	17	6		Retain		
183	Blue gum	*Eucalyptus tereticornis*	60	25	12		Retain		
184	Broad-leaved paperbark	*Melaleuca quinquenervia*	30+29++28+	11	6		Retain		
185	Broad-leaved paperbark	*Melaleuca quinquenervia*	60	12	6		Remove		
186	Grey ironbark	*Eucalyptus siderophloia*	45	25	6		Retain		
187	Grey ironbark	*Eucalyptus siderophloia*	40	19	5		Remove		
188	Grey ironbark	*Eucalyptus siderophloia*	55	23	7		Remove		
189	Blue gum	*Eucalyptus tereticornis*	34	14	4		Remove		
190	Blue gum	*Eucalyptus tereticornis*	60	16	7		Remove		
191	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	15	6		Remove		
192	Broad-leaved paperbark	*Melaleuca quinquenervia*	42	15	6		Remove		
193	Broad-leaved paperbark	*Melaleuca quinquenervia*	58	18	8		Remove		
194	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	15	6		Remove		
195	Broad-leaved paperbark	*Melaleuca quinquenervia*	39	16	6		Remove		
196	Broad-leaved paperbark	*Melaleuca quinquenervia*	34	16	5		Remove		
197	Broad-leaved paperbark	*Melaleuca quinquenervia*	60	16	6		Remove		
198	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	14	9		Remove		
199	Broad-leaved paperbark	*Melaleuca quinquenervia*	65	15	9		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
200	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	13	5		Remove		
201	Broad-leaved paperbark	*Melaleuca quinquenervia*	42	16	7		Remove		
202	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	16	6		Remove		
203	Broad-leaved paperbark	*Melaleuca quinquenervia*	21	12	4		Remove		
204	Broad-leaved paperbark	*Melaleuca quinquenervia*	34	16	8		Remove		
205	Broad-leaved paperbark	*Melaleuca quinquenervia*	18	14	4		Remove		
206	Blue gum	*Eucalyptus tereticornis*	48	22	6		Remove		
207	Broad-leaved paperbark	*Melaleuca quinquenervia*	12		1		Remove		
208	Broad-leaved paperbark	*Melaleuca quinquenervia*	16	14	6		Remove		
209	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	16	7		Remove		
210	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	16	4		Remove		
211	Broad-leaved paperbark	*Melaleuca quinquenervia*	36	20	5		Remove		
212	Broad-leaved paperbark	*Melaleuca quinquenervia*	50	21	6		Remove		
213	Pink bloodwood	*Corymbia intermedia*	35	19	8		Remove		
214	Swamp box	*Lophostemon suaveolens*	48	12	6		Remove		
215	Grey ironbark	*Eucalyptus siderophloia*	58	24	11		Remove		
216	Pink bloodwood	*Corymbia intermedia*	22	15	6		Remove		
217	Pink bloodwood	*Corymbia intermedia*	22	22	7		Remove		
218	Swamp box	*Lophostemon suaveolens*	33	17	6		Remove		
219	Swamp box	*Lophostemon suaveolens*	30	17	4		Remove		
220	Swamp box	*Lophostemon suaveolens*	29	10	9		Remove		
221	Pink bloodwood	*Corymbia intermedia*	35	23	9		Remove		
222	Pink bloodwood	*Corymbia intermedia*	50	27	10		Remove		
223	Grey ironbark	*Eucalyptus siderophloia*	64	28	10		Remove		
224	Dead	*Dead*	28	12	0		Remove		
225	Pink bloodwood	*Corymbia intermedia*	43	28	8		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
226	Swamp box	*Lophostemon suaveolens*	21	11	5		Remove		
227	Rusty gum	*Angophora leiocarpa*	48	26	9		Remove		
228	Swamp box	*Lophostemon suaveolens*	24	14	6		Remove		
229	Pink bloodwood	*Corymbia intermedia*	13	10	4		Remove		
230	Swamp box	*Lophostemon suaveolens*	20	13	4		Remove		
231	Swamp box	*Lophostemon suaveolens*	19	15	4		Remove		
232	Swamp box	*Lophostemon suaveolens*	24	14	5		Remove		
233	Swamp box	*Lophostemon suaveolens*	19	16	3		Remove		
234	Pink bloodwood	*Corymbia intermedia*	27	20	7		Remove		
235	Broad-leaved white mahogany	*Eucalyptus carnea*	31	15	7		Remove		
236	Grey ironbark	*Eucalyptus siderophloia*	31	22	10		Remove		
237	Swamp box	*Lophostemon suaveolens*	30	12	3	Yes	Remove		Hollow
238	Pink bloodwood	*Corymbia intermedia*	63	22	10	Yes	Remove	Termite mound and potential hollows	
239	Swamp box	*Lophostemon suaveolens*	25	12	7		Remove		
240	Grey ironbark	*Eucalyptus siderophloia*	62	27	12		Remove		
241	Swamp box	*Lophostemon suaveolens*	20	17	6		Remove		
242	Swamp box	*Lophostemon suaveolens*	38	16	6		Remove		
243	Pink bloodwood	*Corymbia intermedia*	30	20	8		Remove		
244	Grey ironbark	*Eucalyptus siderophloia*	40	24	12		Remove		
245	Dead	*Dead*	26	5	0	Yes	Remove		
246	Pink bloodwood	*Corymbia intermedia*	26+27	14	8		Remove		
247	Swamp box	*Lophostemon suaveolens*	35+12	12	5		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
248	Swamp box	*Lophostemon suaveolens*	23	5	3		Remove		
249	Swamp box	*Lophostemon suaveolens*	30	14	4		Remove		
250	Dead	*Dead*	23	10	0	Yes	Remove		
251	Pink bloodwood	*Corymbia intermedia*	18+17+17	14	9		Remove		
252	Blue gum	*Eucalyptus tereticornis*	100	26	15	Yes	Remove		
253	Swamp box	*Lophostemon suaveolens*	21	12	3		Remove		
254	Swamp box	*Lophostemon suaveolens*	21	11	4		Remove		
255	Swamp box	*Lophostemon suaveolens*	20	12	4		Remove		
256	Swamp box	*Lophostemon suaveolens*	24	15	3		Remove		
257	Swamp box	*Lophostemon suaveolens*	23	15	5		Remove		
258	Swamp box	*Lophostemon suaveolens*	18	15	3		Remove		
259	Swamp box	*Lophostemon suaveolens*	10	8	2		Remove		
260	Swamp box	*Lophostemon suaveolens*	20	16	6		Remove		
261	Pink bloodwood	*Corymbia intermedia*	27	16	7		Remove		
262	Swamp box	*Lophostemon suaveolens*	19	17	5		Remove		
263	Swamp box	*Lophostemon suaveolens*	17	9	2		Remove		
264	Pink bloodwood	*Corymbia intermedia*	28	23	10		Remove		
265	Swamp box	*Lophostemon suaveolens*	18	14	7		Remove		
266	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	20	10		Remove		
267	Dead	*Dead*	80	20	0	Yes	Remove		
268	Blue gum	*Eucalyptus tereticornis*	13	12	3		Remove		
269	Broad-leaved paperbark	*Melaleuca quinquenervia*	45	19	5		Remove		
270	Pink bloodwood	*Corymbia intermedia*	31+28+19	23	7		Remove		
271	Swamp box	*Lophostemon suaveolens*	18	17	4		Remove		
272	Swamp box	*Lophostemon suaveolens*	29	16	6		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
273	Swamp box	*Lophostemon suaveolens*	19	18	7		Remove		
274	Grey ironbark	*Eucalyptus siderophloia*	60	32	17		Remove		
275	Swamp box	*Lophostemon suaveolens*	42	6	4	Yes	Remove	Hollow	
276	Pink bloodwood	*Corymbia intermedia*	43	22	6		Remove		
277	Grey ironbark	*Eucalyptus siderophloia*	48	29	13	Yes	Remove	Hollow	
278	Dead	*Dead*	15	9	3		Remove		
279	Pink bloodwood	*Corymbia intermedia*	30	23	11		Remove		
280	Dead	*Dead*	36	15	4	Yes	Remove	Hollows	
281	Pink bloodwood	*Corymbia intermedia*	26	18	7		Remove		
282	Swamp box	*Lophostemon suaveolens*	26	14	5		Remove		
283	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	15	5		Remove		
284	Swamp box	*Lophostemon suaveolens*	28	9	4		Remove		
285	Blue gum	*Eucalyptus tereticornis*	90	30	15	Yes	Remove	Potential hollows	
286	Grey ironbark	*Eucalyptus siderophloia*	50	20	12		Remove		
287	Dead	*Dead*	70	16	3	Yes	Remove		
288	Dead	*Dead*	80	20	3	Yes	Remove	Hollows	
289	Blue gum	*Eucalyptus tereticornis*	75	26	12		Remove		
290	Broad-leaved paperbark	*Melaleuca quinquenervia*	16+17	14	4		Remove		
291	Broad-leaved paperbark	*Melaleuca quinquenervia*	23	17	4		Remove		
292	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	20	6		Remove		
293	Broad-leaved paperbark	*Melaleuca quinquenervia*	50+33	20	7		Remove		
294	Dead	*Dead*	40	17	0	Yes	Remove	Hollows	
295	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	19	7		Remove		
296	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	19	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
297	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	17	4		Remove		
298	Broad-leaved paperbark	*Melaleuca quinquenervia*	29	17	3		Remove		
299	Broad-leaved paperbark	*Melaleuca quinquenervia*	59	18	10	Yes	Remove	Potential hollows	
300	Broad-leaved paperbark	*Melaleuca quinquenervia*	46	21	7		Remove		
301	Swamp box	*Lophostemon suaveolens*	22	16	7		Remove		
302	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	17	8		Remove		
303	Broad-leaved paperbark	*Melaleuca quinquenervia*	27	19	5		Remove		
304	Swamp box	*Lophostemon suaveolens*	19	20	5		Remove		
305	Broad-leaved paperbark	*Melaleuca quinquenervia*	19	18	5		Remove		
306	Broad-leaved paperbark	*Melaleuca quinquenervia*	18+14	15	5		Remove		
307	Broad-leaved paperbark	*Melaleuca quinquenervia*	28+22	17	7		Remove		
308	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	19	5		Remove		
309	Broad-leaved paperbark	*Melaleuca quinquenervia*	26	17	6		Remove		
310	Broad-leaved paperbark	*Melaleuca quinquenervia*	27	16	7		Remove		
311	Broad-leaved paperbark	*Melaleuca quinquenervia*	58	18	9		Remove		
312	Pink bloodwood	*Corymbia intermedia*	38	19	6	Yes	Remove	Nest	
313	Blue gum	*Eucalyptus tereticornis*	70	27	13	Yes	Remove	Potential hollows	
314	Swamp box	*Lophostemon suaveolens*	40	18	5		Remove		
315	Swamp box	*Lophostemon suaveolens*	23	16	3		Remove		
316	Broad-leaved paperbark	*Melaleuca quinquenervia*	36	14	5		Remove		
317	Swamp box	*Lophostemon suaveolens*	29	16	7		Remove		
318	Broad-leaved paperbark	*Melaleuca quinquenervia*	55+50	19	12		Remove		
319	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	19	11		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
320	Swamp box	*Lophostemon suaveolens*	25	18	4		Remove		
321	Broad-leaved paperbark	*Melaleuca quinquenervia*	47	21	5		Remove		
322	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	22	6		Remove		
323	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	19	10		Remove		
324	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	14	4		Remove		
325	Blue gum	*Eucalyptus tereticornis*	55	24	9		Remove		
326	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	15	9		Remove		
327	Broad-leaved paperbark	*Melaleuca quinquenervia*	45+30	18	9		Remove		
328	Broad-leaved paperbark	*Melaleuca quinquenervia*	55	18	10		Remove		
329	Blue gum	*Eucalyptus tereticornis*	35+35	21	7		Remove		
330	Broad-leaved paperbark	*Melaleuca quinquenervia*	31	12	10		Remove		
331	Broad-leaved paperbark	*Melaleuca quinquenervia*	42	18	5		Remove		
332	Swamp box	*Lophostemon suaveolens*	20	14	3		Remove		
333	Blue gum	*Eucalyptus tereticornis*	58	25	10		Remove		
334	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	14	8		Remove		
335	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	14	8		Remove		
336	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	18	7		Remove		
337	Broad-leaved paperbark	*Melaleuca quinquenervia*	50	17	8		Remove		
338	Broad-leaved paperbark	*Melaleuca quinquenervia*	48	19	5		Remove		
339	Blue gum	*Eucalyptus tereticornis*	49	22	8		Remove		
340	Grey ironbark	*Eucalyptus siderophloia*	27	22	4		Remove		
341	Pink bloodwood	*Corymbia intermedia*	26	15	4		Remove		
342	Broad-leaved paperbark	*Melaleuca quinquenervia*	55	17	9		Remove		
343	Broad-leaved paperbark	*Melaleuca quinquenervia*	35	17	5		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
344	Blue gum	*Eucalyptus tereticornis*	47	25	11	Yes	Remove	Potential hollows	
345	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	12	4		Remove		
346	Broad-leaved paperbark	*Melaleuca quinquenervia*	37	12	9		Remove		
347	Grey ironbark	*Eucalyptus siderophloia*	39	22	8		Remove		
348	Grey ironbark	*Eucalyptus siderophloia*	54	22	6	Yes	Remove	Potential hollows	
349	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	6	6		Remove		
350	Broad-leaved paperbark	*Melaleuca quinquenervia*	28	13	5		Remove		
351	Broad-leaved paperbark	*Melaleuca quinquenervia*	40	13	6		Remove		
352	Pink bloodwood	*Corymbia intermedia*	28	13	8		Remove		
353	Rusty gum	*Angophora leiocarpa*	19	12	4		Remove		
354	Pink bloodwood	*Corymbia intermedia*	29	17	6		Remove		
355	Broad-leaved paperbark	*Melaleuca quinquenervia*	36	17	7		Remove		
356	Pink bloodwood	*Corymbia intermedia*	28	20	8		Remove		
357	Broad-leaved paperbark	*Melaleuca quinquenervia*	38	22	7		Remove		
358	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	9	10		Remove		
359	Grey ironbark	*Eucalyptus siderophloia*	52	20	9		Remove		
360	Swamp box	*Lophostemon suaveolens*	47	18	4		Retain		
361	Grey ironbark	*Eucalyptus siderophloia*	72	30	15		Retain		
362	Pink bloodwood	*Corymbia intermedia*	29	22	6		Remove		
363	Pink bloodwood	*Corymbia intermedia*	28	20	6		Remove		
364	Scribbly gum	*Eucalyptus racemosa*	100	29	10	Yes	Retain	Hollows	
365	Scribbly gum	*Eucalyptus racemosa*	85	25	9	Yes	Remove	Hollows	
366	Pink bloodwood	*Corymbia intermedia*	35	23	8		Remove		
367	Blue gum	*Eucalyptus tereticornis*	85	26	11	Yes	Retain	Hollows	
368	Blue gum	*Eucalyptus tereticornis*	55	25	9	Yes	Retain	Hollows	

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
369	Blue gum	*Eucalyptus tereticornis*	70	25	10	Yes	Retain	Hollows	
370	Blue gum	*Eucalyptus tereticornis*	50	24	9	Yes	Retain		
371	Pink bloodwood	*Corymbia intermedia*	45	24	7		Retain		
372	Blue gum	*Eucalyptus tereticornis*	40	21	11		Retain		
373	Blue gum	*Eucalyptus tereticornis*	35	20	7		Retain		
374	Blue gum	*Eucalyptus tereticornis*	60	19	7		Retain		
375	Blue gum	*Eucalyptus tereticornis*	75	22	9	Yes	Retain	Hollows	
376	Blue gum	*Eucalyptus tereticornis*	60	22	9	Yes	Retain	Hollows	
377	Pink bloodwood	*Corymbia intermedia*	50	24	10		Retain		
378	Pink bloodwood	*Corymbia intermedia*	40	23	8	Yes	Remove	Termite mound	
379	Grey ironbark	*Eucalyptus siderophloia*	50	28	10		Retain		
380	Blue gum	*Eucalyptus tereticornis*	90	30	14	Yes	Retain	Hollows - lots	
381	Scribbly gum	*Eucalyptus racemosa*	55	20	6	Yes	Retain	Potential hollows	
382	Pink bloodwood	*Corymbia intermedia*	45	23	12		Retain		
383	Pink bloodwood	*Corymbia intermedia*	40	22	10	Yes	Retain	Nest box	
384	Scribbly gum	*Eucalyptus racemosa*	45	21	12		Retain		
385	Pink bloodwood	*Corymbia intermedia*	45	30	12	Yes	Retain	Hollows	
386	Blue gum	*Eucalyptus tereticornis*	40	24	12		Retain		
387	Blue gum	*Eucalyptus tereticornis*	30	20	7		Retain		
388	Scribbly gum	*Eucalyptus racemosa*	65	22	8	Yes	Remove	Hollows	
389	Grey ironbark	*Eucalyptus siderophloia*	40	27	10		Remove		
390	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	24	5		Remove		
391	Scribbly gum	*Eucalyptus racemosa*	70	22	9	Yes	Retain	Hollows	

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
392	Blue gum	*Eucalyptus tereticornis*	40+55	20	10		Remove		
393	Blue gum	*Eucalyptus tereticornis*	55	24	9		Remove		
394	Blue gum	*Eucalyptus tereticornis*	22	10	3		Remove		
395	Blue gum	*Eucalyptus tereticornis*	18	10	2		Remove		
396	Blue gum	*Eucalyptus tereticornis*	38+28	23	10	Yes	Remove	Hollow	
397	Blue gum	*Eucalyptus tereticornis*	39	21	9		Remove		
398	Blue gum	*Eucalyptus tereticornis*	38	16	9		Remove		
399	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	14	4		Remove		
400	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	14	4		Remove		
401	Blue gum	*Eucalyptus tereticornis*	16	9	2		Remove		
402	Broad-leaved paperbark	*Melaleuca quinquenervia*	15*8 stems	9	3		Remove		
403	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	9	2		Remove		
404	Broad-leaved paperbark	*Melaleuca quinquenervia*	20*5 stem	10	4		Remove		
405	Broad-leaved paperbark	*Melaleuca quinquenervia*	16*4 stem	6	3		Remove		
406	Swamp box	*Lophostemon suaveolens*	10	4	1		Remove		
407	Broad-leaved paperbark	*Melaleuca quinquenervia*	15*8 stem	6	3		Remove		
408	Broad-leaved paperbark	*Melaleuca quinquenervia*	20*3 stem	9	3		Remove		
409	Blue gum	*Eucalyptus tereticornis*	48	20	7		Remove		
410	Blue gum	*Eucalyptus tereticornis*	50	25	9		Remove		
411	Blue gum	*Eucalyptus tereticornis*	45	14	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
412	Blue gum	*Eucalyptus tereticornis*	58	25	12		Remove		
413	Pink bloodwood	*Corymbia intermedia*	45	25	8		Remove		
414	Blue gum	*Eucalyptus tereticornis*	42	10	2		Remove		
415	Blue gum	*Eucalyptus tereticornis*	20	17	5		Remove		
416	Grey ironbark	*Eucalyptus siderophloia*	30	20	8		Remove		
417	Grey ironbark	*Eucalyptus siderophloia*	30	20	8		Remove		
418	Blue gum	*Eucalyptus tereticornis*	16	10	2		Remove		
419	Broad-leaved paperbark	*Melaleuca quinquenervia*	30	10	4		Remove		
M1	Acacia	*Acacia sp.*	13	5	3		Remove		
M2	Red ash	*Alphitonia excelsa*	12	6	3		Remove		
M3	Acacia	*Acacia sp.*	25	8	3		Remove		
M4	Acacia	*Acacia sp.*	26	8	4		Remove		
M5	Grey mangrove	*Avicennia marina*	25	8	2		Remove		Not tagged (under water). Half dead
M6	Cheese tree	*Glochidion ferdinandi*	28	8	4		Retain		
M7	Swamp oak	*Casuarina glauca*	25 + 26	11	2		Retain		
M8	Swamp oak	*Casuarina glauca*	11	6	2.5		Retain		
M9	Swamp oak	*Casuarina glauca*	23	12	2		Retain		
M10	Swamp oak	*Casuarina glauca*	13	8	2		Retain		
M11	Swamp oak	*Casuarina glauca*	16	13	2		Retain		
M12	Swamp oak	*Casuarina glauca*	34	16	3		Retain		
M13	Swamp oak	*Casuarina glauca*	13	5	3		Retain		
M14	Swamp oak	*Casuarina glauca*	19	6	3		Retain		
M15	Swamp oak	*Casuarina glauca*	11	12	2		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M16	Swamp oak	*Casuarina glauca*	11	11	2		Retain		
M17	Swamp oak	*Casuarina glauca*	15	11	2		Retain		
M18	Acacia	*Acacia sp.*	34	5	6		Retain		
M19	Swamp oak	*Casuarina glauca*	28	11	3		Retain		Not tagged (under water)
M20	Swamp oak	*Casuarina glauca*	15	11	2		Retain		
M21	Swamp oak	*Casuarina glauca*	20	11	2		Retain		
M22	Swamp oak	*Casuarina glauca*	19	11	2		Retain		
M23	Swamp oak	*Casuarina glauca*	13	9	3		Retain		
M24	Swamp oak	*Casuarina glauca*	23	9	3		Retain		
M25	Swamp oak	*Casuarina glauca*	13	9	2		Retain		
M26	Swamp oak	*Casuarina glauca*	14	12	2		Retain		
M27	Swamp oak	*Casuarina glauca*	30	10	2		Retain		
M28	Acacia	*Acacia sp.*	21	7	2.5		Retain		
M29	Blue gum	*Eucalyptus tereticornis*	48	20	5		Retain		
M30	Swamp oak	*Casuarina glauca*	23	8	2		Retain		
M31	Swamp oak	*Casuarina glauca*	22 + 20	8	2		Retain		
M32	Swamp oak	*Casuarina glauca*	21	8	2		Retain		
M33	Acacia	*Acacia sp.*	21	6	3		Retain		
M34	Acacia	*Acacia sp.*	20	6	3		Retain		
M35	Acacia	*Acacia sp.*	12	4	3		Retain		
M36	Swamp oak	*Casuarina glauca*	32	12	3		Retain		
M37	Acacia	*Acacia sp.*	32	6	5		Retain		
M38	Acacia	*Acacia sp.*	29	6	4		Retain		
M39	Acacia	*Acacia sp.*	22	6	5		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M40	Grey ironbark	*Eucalyptus siderophloia*	13	9	2		Remove		
M41	Grey ironbark	*Eucalyptus siderophloia*	44	23	10		Remove		
M42	Grey ironbark	*Eucalyptus siderophloia*	31	15	4		Remove		
M43	Swamp oak	*Casuarina glauca*	15	15	3		Remove		
M44	Grey mangrove	*Avicennia marina*	30 + 31 + 38	11	10		Remove		Not tagged (under water)
M45	Grey ironbark	*Eucalyptus siderophloia*	40	24	9		Remove		
M46	Swamp oak	*Casuarina glauca*	20	10	2		Remove		
M47	Acacia	*Acacia sp.*	35	9	4		Remove		
M48	Grey ironbark	*Eucalyptus siderophloia*	64	27	12		Remove		
M49	Grey ironbark	*Eucalyptus siderophloia*	44 + 37	21	11		Remove		
M50	Grey ironbark	*Eucalyptus siderophloia*	40	19	10		Remove		
M51	Grey ironbark	*Eucalyptus siderophloia*	21	11	5		Remove		
M52	Pink bloodwood	*Corymbia intermedia*	65	25	12		Remove		
M53	Grey ironbark	*Eucalyptus siderophloia*	74 + 40	28	13		Remove		
M54	Grey ironbark	*Eucalyptus siderophloia*	42	26	11		Remove		
M55	Grey ironbark	*Eucalyptus siderophloia*	44	26	8		Remove		
M56	Grey mangrove	*Avicennia marina*	40	15	7		Retain		
M57	Grey ironbark	*Eucalyptus siderophloia*	88 + 70	28	13		Retain		
M58	Swamp oak	*Casuarina glauca*	30	15	5		Retain		
M59	Swamp oak	*Casuarina glauca*	31	15	3		Retain		
M60	Swamp oak	*Casuarina glauca*	30	15	3.5		Retain		
M61	Swamp oak	*Casuarina glauca*	29	15	3.5		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M62	Swamp oak	*Casuarina glauca*	29	15	3.5		Retain		
M63	Grey mangrove	*Avicennia marina*	25 + 25 + 25	9	12		Retain		Not tagged
M64	Swamp oak	*Casuarina glauca*	26	15	3		Remove		
M65	Swamp oak	*Casuarina glauca*	21	16	3		Remove		
M66	Swamp oak	*Casuarina glauca*	31	18	4		Remove		
M67	Swamp oak	*Casuarina glauca*	32	17	4		Remove		
M68	Grey mangrove	*Avicennia marina*	27	9	5		Retain		
M69	Swamp oak	*Casuarina glauca*	25	10	3		Retain		
M70	Swamp oak	*Casuarina glauca*	32	17	2		Retain		
M71	Swamp oak	*Casuarina glauca*	27	16	4		Retain		
M72	Swamp oak	*Casuarina glauca*	21	16	2		Retain		
M73	Acacia	*Acacia sp.*	16	5	3		Retain		
M74	Blue gum	*Eucalyptus tereticornis*	38	20	10		Retain		
M75	Swamp oak	*Casuarina glauca*	15	15	1		Retain		
M76	Blue gum	*Eucalyptus tereticornis*	22	10	4		Retain		
M77	Swamp oak	*Casuarina glauca*	28 + 26	18	2		Retain		
M78	Swamp oak	*Casuarina glauca*	28	17	2		Retain		
M79	Swamp oak	*Casuarina glauca*	28	18	3		Retain		
M80	Swamp oak	*Casuarina glauca*	30	18	3		Retain		
M81	Swamp oak	*Casuarina glauca*	28	15	2		Retain		
M82	Swamp oak	*Casuarina glauca*	25 + 22 + 19	14	2		Retain		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M83	Blue gum	*Eucalyptus tereticornis*	46	19	12		Remove		Not tagged (under water)
M84	Blue gum	*Eucalyptus tereticornis*	60 + 35	20	10		Remove		
M85	Swamp oak	*Casuarina glauca*	27	16	3		Remove		
M86	Grey mangrove	*Avicennia marina*	17	10	5		Remove		
M87	Grey mangrove	*Avicennia marina*	45 + 55	10	5		Remove		
M88	Swamp oak	*Casuarina glauca*	12	15	2		Remove		
M89	Swamp oak	*Casuarina glauca*	36	18	5		Remove		
M90	Swamp oak	*Casuarina glauca*	14	13	3		Remove		
M91	Swamp oak	*Casuarina glauca*	37	20	6		Remove		
M92	Swamp oak	*Casuarina glauca*	22	19	3.5		Remove		
M94	Swamp oak	*Casuarina glauca*	29	19	2		Remove		
M95	Swamp oak	*Casuarina glauca*	17	19	3		Remove		
M96	Grey mangrove	*Avicennia marina*	30 - 50	11	8		Remove		6 mangroves over 100
M97	Swamp oak	*Casuarina glauca*	24	17	3		Remove		
M98	Grey mangrove	*Avicennia marina*	20	11	6		Remove		12 mangroves over 10
M99	Swamp oak	*Casuarina glauca*	15 - 20	15	2		Remove		Patch of 37 casuarina
M100	Grey mangrove	*Avicennia marina*	25	7	8		Retain		8 mangroves
M101	Swamp oak	*Casuarina glauca*	20 - 25	15	2		Retain		21 casuarina

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
M102	Swamp oak	*Casuarina glauca*	25	15	3		Remove		16 casuarina
M103	Grey mangrove	*Avicennia marina*	15	12	2		Remove		13 mangroves
M104	Swamp oak	*Casuarina glauca*	15	15	3		Remove		3 casuarina
N1	Broad-leaved paperbark	*Melaleuca quinquenervia*	45	18	5		Remove		
N2	Broad-leaved paperbark	*Melaleuca quinquenervia*	55	15	6		Remove		
N3	Blue gum	*Eucalyptus tereticornis*	40	18	6		Remove		
N4	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N5	Coast banksia	*Banksia integrifolia*	38	4	2		Remove		
N6	Coast banksia	*Banksia integrifolia*	30	4	4.5		Remove		
N7	Broad-leaved paperbark	*Melaleuca quinquenervia*	85 (3 stem)	12	6		Remove		
N8	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	5	2		Remove		
N9	Acacia	*Acacia sp.*	75 (3 stem)	8	7		Remove		
N10	Pink bloodwood	*Corymbia intermedia*	20	10	3		Remove		
N11	Acacia	*Acacia sp.*	70 (2 stem)	8	8		Remove		
N12	Acacia	*Acacia sp.*	50 (2 stem)	8	6		Remove		
N13	Blue gum	*Eucalyptus tereticornis*	30	8	3		Remove		
N14	Acacia	*Acacia sp.*	45 (2 stem)	6	6		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N15	Acacia	*Acacia sp.*	15	6	4		Remove		
N16	Regrowth Eucalypt Species	*Eucalyptus sp.*	20 (2 stem)	6	2		Remove		
N17	Blue gum	*Eucalyptus tereticornis*	25	8	3		Remove		
N18	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	6	3		Remove		
N19	Rusty gum	*Angophora leiocarpa*	32	18	3		Remove		
N20	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N21	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	4	1		Remove		
N22	Regrowth Eucalypt Species	*Eucalyptus sp.*	20 (2 stem)	6	3		Remove		
N23	Cadaghi	Corymbia torelliana	30 (3 stem)	4	3		Remove		
N24	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N25	Blue gum	*Eucalyptus tereticornis*	20	8	3		Remove		
N26	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	6	3		Remove		
N27	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N28	Broad-leaved paperbark	*Melaleuca quinquenervia*	25 (2 stem)	8	3		Remove		
N29	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	2		Remove		
N30	Regrowth Eucalypt Species	*Eucalyptus sp.*	25 (2 stem)	6	3		Remove		
N31	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	6	1		Remove		
N32	Blue gum	*Eucalyptus tereticornis*	25	8	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N33	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	3		Remove		
N34	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	3		Remove		
N35	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	8	3		Remove		
N36	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	8	3		Remove		
N37	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	8	3		Remove		
N38	Blue gum	*Eucalyptus tereticornis*	25	10	4		Remove		
N39	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	6	4		Remove		
N40	Broad-leaved paperbark	*Melaleuca quinquenervia*	25	7	4	yes	Remove	Bird Nest	
N41	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	2		Remove		
N42	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	2		Remove		
N43	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	8	2		Remove		
N44	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N45	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N46	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N47	Pink bloodwood	*Corymbia intermedia*	15	10	3		Remove		
N48	Acacia	*Acacia sp.*	10	8	4		Remove		
N49	Broad-leaved paperbark	*Melaleuca quinquenervia*	35	8	4		Remove		
N50	Broad-leaved paperbark	*Melaleuca quinquenervia*	35 (2 stem)	8	3		Remove		
N51	Pink bloodwood	*Corymbia intermedia*	15	8	3		Remove		
N52	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N53	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N54	Acacia	*Acacia sp.*	10	5	4		Remove		
N55	Broad-leaved paperbark	*Melaleuca quinquenervia*	30 (2 stem)	7	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N56	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N57	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N58	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N59	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N60	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	3		Remove		
N61	Regrowth Eucalypt Species	*Eucalyptus sp.*	15	10	3		Remove		
N62	Acacia	*Acacia sp.*	15	8	5		Remove		
N63	Regrowth Eucalypt Species	*Eucalyptus sp.*	20	12	4		Remove		
N64	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	2		Remove		
N65	Broad-leaved paperbark	*Melaleuca quinquenervia*	15	7	3		Remove		
N66	Broad-leaved paperbark	*Melaleuca quinquenervia*	20	8	4		Remove		
N67	Acacia	*Acacia sp.*	35 (4 stem)	5	3		Remove		
N68	Acacia	*Acacia sp.*	15	6	3		Remove		
N69	Acacia	*Acacia sp.*	15	6	3		Remove		
N70	Fringed wattle	Acacia fimbriata	12	4	3		Remove		
N71	Fringed wattle	Acacia fimbriata	12	6	5		Remove		
N72	Acacia	*Acacia sp.*	25	8	6		Remove		
N73	Fringed wattle	Acacia fimbriata	10	6	4		Remove		
N74	Acacia	*Acacia sp.*	25	7	5		Remove		
N75	Grey ironbark	*Eucalyptus siderophloia*	20	10	4		Remove		
N76	Acacia	*Acacia sp.*	30 (2 stem)	6	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N77	Acacia	*Acacia sp.*	25 (2 stem)	6	4		Remove		
N78	Pink bloodwood	*Corymbia intermedia*	12	6	2		Remove		
N79	Acacia	*Acacia sp.*	25	6	5		Remove		
N80	Acacia	*Acacia sp.*	40 (3 stem)	7	5		Remove		
N81	Acacia	*Acacia sp.*	12	7	3		Remove		
N82	Acacia	*Acacia sp.*	10	7	3		Remove		
N83	Acacia	*Acacia sp.*	42 (3 stem)	7	4		Remove		
N84	Acacia	*Acacia sp.*	45	8	6		Remove		
N85	Acacia	*Acacia sp.*	20	8	5		Remove		
N86	Acacia	*Acacia sp.*	22	8	5		Remove		
N87	Acacia	*Acacia sp.*	30 (2stem)	3	2		Remove		
N88	Acacia	*Acacia sp.*	15	5	3		Remove		
N89	Swamp box	*Lophostemon suaveolens*	10	5	1		Remove		
N90	Acacia	*Acacia sp.*	60 (2stem)	8	6		Remove		
N91	Acacia	*Acacia sp.*	15 (2 stem)	7	4		Remove		
N92	Fringed wattle	Acacia fimbriata	12	4	3		Remove		
N93	Swamp oak	*Casuarina glauca*	20	8	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N94	Grey ironbark	*Eucalyptus siderophloia*	15	8	3		Remove		
N95	Grey ironbark	*Eucalyptus siderophloia*	22	8	4		Remove		
N96	Acacia	*Acacia sp.*	55 (2 stem)	7	5		Remove		
N97	Grey ironbark	*Eucalyptus siderophloia*	15	7	3		Remove		
N98	Acacia	*Acacia sp.*	18	7	4		Remove		
N99	Grey ironbark	*Eucalyptus siderophloia*	20	10	4		Remove		
N100	Pink bloodwood	*Corymbia intermedia*	18	8	3		Remove		
N101	Grey ironbark	*Eucalyptus siderophloia*	13	9	2		Remove		
N102	Acacia	*Acacia sp.*	10	5	4		Remove		
N103	Grey ironbark	*Eucalyptus siderophloia*	10	7	2		Remove		
N104			12 (2 stem)	6	2		Remove		
N105	Swamp oak	*Casuarina glauca*	10	4	1		Remove		
N106	Acacia	*Acacia sp.*	15	6	4		Remove		
N107	Swamp oak	*Casuarina glauca*	23	8	2		Remove		
N108	Grey ironbark	*Eucalyptus siderophloia*	10	6	2		Remove		
N109	Swamp oak	*Casuarina glauca*	18	6	4		Remove		
N110	Rusty gum	*Angophora leiocarpa*	23 (2 stem)	7	4		Remove		
N111	Acacia	*Acacia sp.*	15	7	6		Remove		
N112	Pink bloodwood	*Corymbia intermedia*	12	8	2		Remove		
N113	Rusty gum	*Angophora leiocarpa*	13	8	2		Remove		
N114	Swamp oak	*Casuarina glauca*	15	7	3		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N115	Grey ironbark	*Eucalyptus siderophloia*	25	12	4		Remove		
N116	Acacia	*Acacia sp.*	20	7	6		Remove		
N117	Acacia	*Acacia sp.*	15	10	4		Remove		
N118	Grey ironbark	*Eucalyptus siderophloia*	15	10	3		Remove		
N119	Rusty gum	*Angophora leiocarpa*	18	12	4		Remove		
N120	Acacia	*Acacia sp.*	17	8	5		Remove		
N121	Acacia	*Acacia sp.*	13	5	4		Remove		
N122	Acacia	*Acacia sp.*	18	5	5		Remove		
N123	Blue gum	*Eucalyptus tereticornis*	25 (2 stem)	8	3		Remove		
N124	Rusty gum	*Angophora leiocarpa*	18 (2 stem)	10	2		Remove		
N125	Pink bloodwood	*Corymbia intermedia*	10	6	2		Remove		
N126	Swamp box	*Lophostemon suaveolens*	10	5	1		Remove		
N127	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	7	1		Remove		
N128	Swamp box	*Lophostemon suaveolens*	10	5	2		Remove		
N129	Grey ironbark	*Eucalyptus siderophloia*	11	10	4		Remove		
N130	Pink bloodwood	*Corymbia intermedia*	16	12	3		Remove		
N131	Pink bloodwood	*Corymbia intermedia*	10	8	3		Remove		
N132	Acacia	*Acacia sp.*	10	5	4		Remove		
N133	Grey ironbark	*Eucalyptus siderophloia*	20	12	2		Remove		
N134	Grey ironbark	*Eucalyptus siderophloia*	15	7	2		Remove		
N135	Acacia	*Acacia sp.*	12	5	3		Remove		
N136	Grey ironbark	*Eucalyptus siderophloia*	23	14	3		Remove		
N137	Pink bloodwood	*Corymbia intermedia*	100	7	2		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N138	Acacia	*Acacia sp.*	11	7	4		Remove		
N139	Acacia	*Acacia sp.*	10	6	3		Remove		
N140	Acacia	*Acacia sp.*	10	6	3		Remove		
N141	Acacia	*Acacia sp.*	20	7	4		Remove		
N142	Rusty gum	*Angophora leiocarpa*	15	7	2		Remove		
N143	Acacia	*Acacia sp.*	25 (2 stem)	4	4		Remove		
N144	Acacia	*Acacia sp.*	11	6	4		Remove		
N145	Rusty gum	*Angophora leiocarpa*	10	7	2		Remove		
N146	Rusty gum	*Angophora leiocarpa*	10	7	2		Remove		
N147	Rusty gum	*Angophora leiocarpa*	15	7	2		Remove		
N148	Acacia	*Acacia sp.*	35 (3 stem)	5	6		Remove		
N149	Acacia	*Acacia sp.*	15	7	4		Remove		
N150	Grey ironbark	*Eucalyptus siderophloia*	10	6	1		Remove		
N151	Acacia	*Acacia sp.*	15 (2 stem)	6	5		Remove		
N152	Acacia	*Acacia sp.*	12	7	6		Remove		
N153	Acacia	*Acacia sp.*	15	5	5		Remove		
N154	Blue gum	*Eucalyptus tereticornis*	20	12	4		Remove		
N155	Acacia	*Acacia sp.*	13	6	5		Remove		
N156	Pink bloodwood	*Corymbia intermedia*	25	10	4		Remove		
N157	Blue gum	*Eucalyptus tereticornis*	25 (2 stem)	7	3		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N158	Scribbly gum	*Eucalyptus racemosa*	10	8	3		Remove		
N159	Swamp box	*Lophostemon suaveolens*	13	8	3		Remove		
N160	Pink bloodwood	*Corymbia intermedia*	13	8	2		Remove		
N161	Regrowth Eucalypt Species	*Eucalyptus sp.*	13	8	2		Remove		
N162	Pink bloodwood	*Corymbia intermedia*	10	5	1		Remove		
N163	Regrowth Eucalypt Species	*Eucalyptus sp.*	25 (2 stem)	7	3		Remove		
N164	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	7	2		Remove		
N165	Acacia	*Acacia sp.*	10	6	2		Remove		
N166	Regrowth Eucalypt Species	*Eucalyptus sp.*	10	7	2		Remove		
N167	Pink bloodwood	*Corymbia intermedia*	17	12	3		Remove		
N168	Regrowth Eucalypt Species	*Eucalyptus sp.*	12	8	2		Remove		
N169	Acacia	*Acacia sp.*	32 (3 stem)	8	5		Remove		
N170	Acacia	*Acacia sp.*	12	8	3		Remove		
N171	Pink bloodwood	*Corymbia intermedia*	10	6	3		Remove		
N172	Pink bloodwood	*Corymbia intermedia*	15	8	3		Remove		
N173	Pink bloodwood	*Corymbia intermedia*	22	12	3		Remove		
N174	Pink bloodwood	*Corymbia intermedia*	18	12	3		Remove		
N175	Acacia	*Acacia sp.*	32 (2 stem)	8	4		Remove		
N176	Swamp box	*Lophostemon suaveolens*	10	8	3		Remove		
N177	Broad-leaved paperbark	*Melaleuca quinquenervia*	10	7	2		Remove		
N178	Acacia	*Acacia sp.*	10	8	4		Remove		

Tree ID	Common Name	Tree Species	DBH (cm)	Height (m)	Canopy Spread (m)	Habitat Tree	Remove/ Retain	Habitat Features	Notes
N179	Pink bloodwood	*Corymbia intermedia*	38 (3 stem)	12	4		Remove		
N180	Regrowth Eucalypt Species	*Eucalyptus sp.*	20	8	3		Remove		
N181	Pink bloodwood	*Corymbia intermedia*	13	7	3		Remove		
N182	Regrowth Eucalypt Species	*Eucalyptus sp.*	11	8	3		Remove		
N183	Acacia	*Acacia sp.*	10	7	4		Remove		
N184	Acacia	*Acacia sp.*	10	6	3		Remove		
N185	Swamp box	*Lophostemon suaveolens*	12	6	3		Remove		

APPENDIX 5 – REVISED PEST AND INVASIVE SPECIES PLAN (JWA 2024C)

JWA PTY LTD
Ecological Consultants
ABN 56 066 448 879

REVISED PEST AND INVASIVE SPECIES PLAN

North East Business Park
MIBA Bulk Earthworks

A Report Prepared for
North Harbour Holdings Pty Ltd

JANUARY 2024

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DOCUMENT CONTROL

Document

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Client	North Harbour Holdings Pty Ltd

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Client Issue

Version	Date	Author		Approved by	
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1 INTRODUCTION

1.1 Background

JWA Pty Ltd were previously engaged by North Harbour Holdings Pty Ltd (formerly North East Business Park Pty Ltd) to prepare a Pest and Invasive Species Plan (PISP). The PISP forms part of the Land-based Environmental Management Plan (LBEMP) Sub-Plan 06 developed for bulk earthworks associated with Mixed Industry and Business Area (MIBA) and Raff Creek Crossing within the North East Business Park (NEBP) development. The North East Business Park – LBEMP Sub-Plan 06 (JWA 2020) was approved by the Commonwealth Minister for the Environment on 4th January 2021 and the works commenced in April 2021. These works have significantly progressed, with the majority of the earthworks now completed. Recently, the proposed bulk earthworks design for the north-western corner of the MIBA associated with proposed sports fields and drainage works has been revised based on updated flood modelling for the NEBP site. This Revised PISP has been prepared to reflect the updated bulk earthworks design.

This PISP provides details regarding the processes involved with works and management of pests and invasive species during the bulk earthworks phase. It should be noted that management of weeds and pests following this stage will be covered by other management plans e.g. Site Rehabilitation Plan, Biting Insect Management Plan.

1.2 The Subject Site

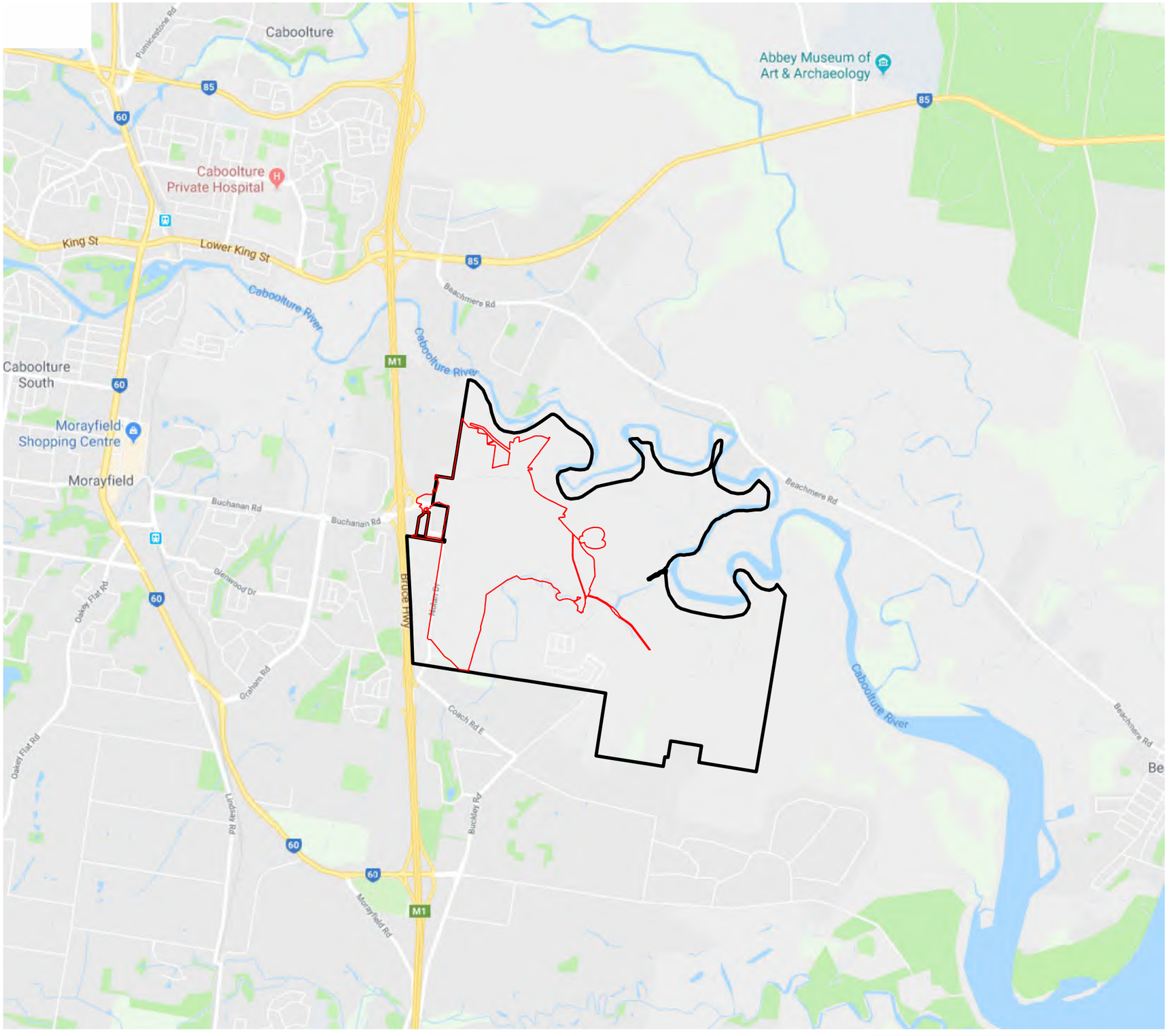
The subject site is approximately 392 ha is size and is located at Nolan Drive, Morayfield (formally described as part of Lot 1 on SP266287, Lot 11 on SP130251, Lot 15 on RP902073 and part of Lot 2000 on SP320584) (**FIGURE 1**). An aerial photograph of the subject site and surrounding landscape is shown in **FIGURE 2**.

1.3 The MIBA Development

The proposed works covered by the LBEMP Sub-Plan 06 involves the following:

- Bulk earthworks associated with the MIBA area;
- Construction of a new haul road for the purposes of the next stage of bulk earthworks including a temporary creek crossing (7 m wide bridge and 10 m haul road plus batters) across Raff Creek;
- Works within Raff Creek necessary to remove the existing pipe culvert (and allow for the future extension of Moreton Bay Boulevard) and widen the creek to improve future flood conveyance; and
- Construction of stormwater treatment wetlands.

The works area covers a total area of approximately 203 ha. The extent of the MIBA bulk earthworks area is shown in **FIGURE 3**. The design of the temporary creek crossing across Raff Creek is shown in **FIGURE 4**.



N

LEGEND

- LBEMP Sub-plan 06 Site Boundary
- NEBP Site Boundary

Scale 1:40 000

0 400m 800m 1200m 1600m 2000m

SOURCE: Google Maps

SCALE: 1 : 40 000 @ A3

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PROJECT
Pest and Invasive Species Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 1

PREPARED: BW
DATE: 24 November 2023
FILE: Q15003_MIBA PISP_20231114.dwg

TITLE

LOCALITY PLAN



LEGEND

- LBEMP Sub-plan 06 Site Boundary
- NEBP Site Boundary

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: Metro Maps Aerial dated 18/06/23

SCALE: 1 : 12 500 @ A3

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FIGURE 2

PREPARED: BW
DATE: 24 November 2023
FILE: Q15003_MIBA PISP_20231114.dwg

TITLE

AERIAL PHOTOGRAPH



LEGEND

- LBEMP Sub-plan 06 Site Boundary
- NEBP Site Boundary
- MIBA Bulk Earthworks - Extent of Works

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: KN Group (Ref: FLOOD DEM SLR 231110.dwg); Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

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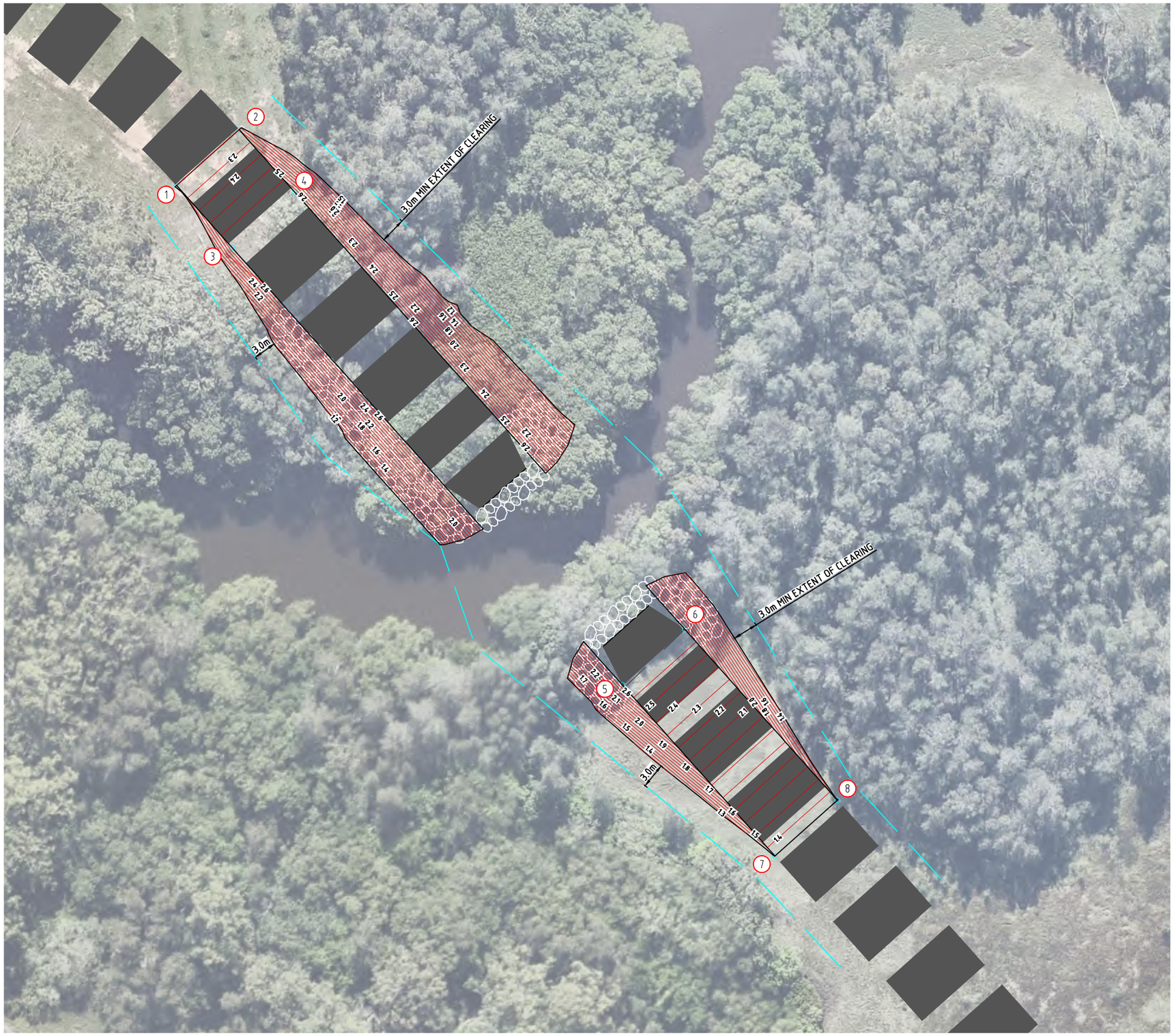
PROJECT
Pest and Invasive Species Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 3

PREPARED: BW
DATE: 24 November 2023
FILE: Q15003_MIBA PISP_20231114.dwg

TITLE

MIBA
BULK EARTHWORKS
EXTENT



Scale 1:500 - Lengths in metres

5 0 5 10 15 20 25

SOURCE: KN Group - Layout Plan & Section Rev A (Ref: 18-192-03-DETALS.dwg); Near Map Aerial dated 16/04/2018
SCALE: 1 : 500 @ A3

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FIGURE 4

PREPARED: BW
DATE: 27 November 2020
FILE: Q15003_Crossing 20201127.dwg

TITLE

RAFF CREEK CROSSING WORKS

1.4 Objectives

The PISP is intended to assist North Harbour Holdings Pty Ltd in managing the impacts of pest and invasive species (flora and fauna) before, during, and after construction.

The aim of the PISP is to develop a comprehensive and integrated approach to guide the short- and long-term management of pests and invasive species within open space areas of the MIBA site.

Specific objectives of the PISP are to:

- Identify pests and invasive species (flora and fauna) that have been, or are likely to be, recorded on the subject site;
- Prioritise management based on species;
- Develop methods to examine, control, and/or eradication 'high priority' weeds and invasive species; and
- Recommend long-term control methods, including monitoring and reporting.

1.5 Format of the PISP

The PISP is structured as follows:

1. Introduction;
2. Existing Environment;
3. Weed Management;
4. Pest Control; and
5. Monitoring and Reporting.

2 EXISTING ENVIRONMENT

The MIBA area is predominantly flat, with a tributary of the Caboolture River (i.e. Raff Creek) occurring in the south-eastern portion of the subject site.

Landform and drainage patterns have been subjected to some modification due to use of the land for agricultural, forestry and grazing purposes. Most of the land is now cleared; however, remnant vegetation occurs along the Caboolture River, Raff Creek, and in other limited patches around the subject site. This vegetation represents a variety of vegetation types including mangrove forest, riparian forest, and open dry sclerophyll forest. Additional scattered landscape plantings and weeds (e.g. pines) are present in some areas, particularly around the existing dwelling.

3 WEED MANAGEMENT

3.1 Introduction

The focus for weed management is the removal of existing weeds and prevention of further infestations. Weed control will also occur as part of landscaping and rehabilitation works associated with the development and will be described in a separate management plan.

3.2 Weeds on Site

Several weeds have been recorded on the subject site. The following are some of the major weed species identified:

- Broad-leaf pepper tree (*Schinus terebinthifolius*) - – Category 3 declared weed under the QLD *Biosecurity Act;*
- Camphor laurel (*Cinnamomum camphora*) -– Category 3 declared weed under the QLD *Biosecurity Act 2014;*
- Groundsel bush (*Baccharis halimifolia*) – Category 3 declared weed under the QLD *Biosecurity Act 2014*;
- Lantana (*Lantana camara*) - – Category 3 declared weed under the QLD *Biosecurity Act 2014*, Weed of National Significance (WoNS);
- Singapore Daisy (*Sphagneticola trilobata*) – Category 3 declared weed under the QLD *Biosecurity Act 2014;* and
- Slash pine (*Pinus elliottii*).

3.3 Weed Species Management Protocols

The weed species management protocols are as follows:

1. No soil disturbance is to occur within areas of retained vegetation. Soil disturbance within retained vegetation and any areas to be landscaped shall be kept to a minimum to avoid weed recruitment.
2. All nursery stock for landscaping purposes shall be weed, pest and disease free and certified as such by the supplier where feasible. The certificates are to be obtained prior to the commencement of any regeneration/revegetation works on site.
3. All mulch produced on site (by mulching cleared vegetation and trees) shall specifically exclude fertile material from weed species (where a risk of proposition exists) and be stored outside of the retained vegetation. Vegetation mulching will be suitably controlled to avoid contamination. Any fertile weed material will be transported from the site to an approved disposal facility.
4. Weed or potential weed species shall not be planted during landscaping operations.
5. Weeds on the subject site will be managed using suitable control measures (i.e. chemical and/or physical control) as outlined in **ATTACHMENT 1**.

6. Clearing operations are to ensure that propagative material from cleared weeds does not spread across the site. Vehicles, earthworks machinery, clothing and other equipment must not introduce weed material to the site or spread such material throughout the site. Vehicles and machinery are to be cleaned in accordance with the Vehicle and Machinery Cleandown Procedures (QLD Department of Agriculture and Fisheries, 2019).
7. Weed monitoring will occur monthly as per **SECTION 5.2.**

Specific weed control methodology is contained within **ATTACHMENT 1**.

4 PEST CONTROL

4.1 Introduction

The focus for pest management is the prevention of further pest infestations through implementation of precautions during construction and through development/landscaping design. The following sections provides guidance on the specific measures to be implemented for pests and invasive species likely to occur.

4.2 General

A general induction of all construction personnel will aim to ensure awareness of pest animal, and the related issues, responsibilities and mitigation procedures. An induction should cover include the following (as a minimum):

- Pest species covered by the PISP and relevant / helpful key identification tools;
- Biosecurity procedures to ensure high risk species such as fire ants/yellow crazy ants are not brought onto the site via construction equipment etc.
- Strict adherence to a no domestic dogs policy on the subject site during construction; and
- Requirement to report any direct or indirect evidence of pest animals (sightings, footprints, scats, dead or injured native fauna).

4.3 Dog (*Canus familiaris*) Management

On the subject site, any risks to native fauna mortality or injury are most likely to result from domestic dogs that are introduced by construction personnel, or that may roam from nearby properties. Domestic dogs are particularly of concern for their potential to cause injury or death to koalas in the area. The following measures are recommended:

- Construction personnel are prohibited from bringing dogs onto the site.
- Any sightings of dogs during bulk earthworks are to be immediately reported to the site foreman.
- Moreton Bay Regional Council (MBRC) will be contacted to assist with the containment and/or removal of feral dogs or roaming domestic dogs.

4.4 Cane Toad (*Bufo marina*) Management

Cane toads occur across most of QLD and almost all of Southeast Queensland (SEQ) (Kearney et al. 2008). It is important to maintain or lower cane toad abundance in order to minimise impacts as prey (i.e. due to their high level of toxicity) and as predators / competitors on small native animals such as frogs. The following measures are expected to ensure cane toad numbers on subject site are reduced and/or remain low:

- Construction materials to be brought on site, including soils and landscaping materials, must be inspected for cane toads.

- Development activities must not create areas where water may pool and stagnate, thereby creating habitat for cane toads.
- Any construction or reprofiling of drainage lines should encourage flow and regular flushing, and incorporate dense fringing vegetation to discourage cane toads
- Dense plantings should be incorporated into landscaping around newly created waterways and wetlands (e.g. stormwater detention basins, lakes etc.) to discourage access by cane toads.

4.5 Fire Ants (*Solenopsis invicta*) and Yellow Crazy Ant (*Anoplolepis gracilipes*) Management

Fire ants are considered to be a super pest because of their aggressive and highly adaptive nature (DAF 2019). Nests can also be found next to or under objects on the ground, such as timber, logs, rocks, pavers or bricks, and disturbed ground around pots and buildings (Business Queensland 2019). Fire ant species can cause immense damage to the environment and industries that rely on it. They can also be dangerous to human health due to painful stings and possible allergic reactions.

Yellow crazy ants have been detected in residential, industrial, commercial, agricultural and forest environments in coastal areas of QLD and in some suburbs in SEQ. The species will typically nest in areas with access to water or some moisture e.g. along creek banks, in utility service pits or piles of timber, under logs, debris or leaf litter, and around perimeters of buildings and within retaining walls where moisture is retained (DAF 2020).

The following measures are recommended to minimise the risk of introduction, and to manage any unavoidable infestation:

- Personnel are to receive training prior to commencement of works in general fire/yellow crazy ant identification and biosecurity requirements.
- All materials imported to the site that may contain fire ants, including soil, turf, mulch etc, must be obtained in compliance with the fire ant biosecurity measures contained within the Biosecurity Regulation 2016.
- Development activity should avoid (where practical) the build-up of construction / landscaping materials (e.g. timber, logs, stones) to minimise opportunities for nesting.
- Development activities must not create areas where water may pool and stagnate, thereby increasing the suitability of nesting habitat for yellow crazy ants.
- Biosecurity QLD should be notified within 24 hours of any potential fire ant or yellow crazy ant presence.

4.6 Mosquitofish Management

Mosquitofish occupy shallow, slow moving waterbodies and are predators and/or competitors of small native fish and tadpoles. The following measures are recommended to discourage their presence on the subject site.

- Development activities must not create areas where water may pool and stagnate, thereby creating habitat for mosquito fish.
- Any construction or reprofiling of drainage lines should encourage flow and regular flushing and incorporate dense fringing vegetation to discourage mosquitofish.

4.7 Mosquito and Biting Midge Management

The MIBA and broader locality support habitat resources for a mosquito and biting midge species that have the potential to impact on existing and future residents and users of the locality. The freshwater and saline wetlands and waterbodies within the locality presently provide a range of different habitat types for mosquito species known to be pests and vectors of communicable human viruses within the Moreton Bay Region. These habitats include the following:

- Slightly brackish and freshwater pools in Paperbark wetlands and mangroves provide habitat for *Verrallina funerea* and *Ochlerotatus vigilax*, which are known vectors of Ross River Virus and Barmah Forest fever. Both species are most frequently experienced at pest levels in areas situated within 5 km of breeding grounds.
- Freshwater pools provide habitat for *Culex annulirostris, Oclherotatus notoscriptus, Coquillettidia linealis* and *Culex quinquefasciatus*, which are known vectors of viruses such as Ross River Virus, Barmah Forest Virus, Australian Encephalitis, Japanese Encephalitis, Murray Valley Encephalitis and Kunjin.
- Intertidal and brackish pools provide habitat for *Culex sitiens* and *Aedes alterans*, both known to be vectors of Ross River Virus.

Biting midges breed in environments, ranging from rainforests to coastal foreshores and estuarine systems. Biting midges are not known to transmit disease amongst humans and as such do not possess the same public health management risk as mosquitoes. Nevertheless, biting midge may during periods of high abundance cause discomfort to people in close proximity to midge breeding/larval habitats. It is likely that the NEBP site provides habitat for the several pestiferous species of biting midges, namely *Culicoides subimmaculatus, C. molestus* and *C. longior*. In addition to these species, *C. ornatus*, which appears to be undergoing a range expansion south of the Hervey Bay region, is also likely to be encountered. The main areas of potential breeding habitat for these species are the tidally influenced flats and banks of the Caboolture River and Raff Creek.

Consideration will need to be given during the detailed design and construction phases to ensure that the extent and productivity of potential mosquito and biting midge habitats is minimised whilst still providing the conditions required to maintain viable natural ecosystems. Of particular importance in this respect is the maintenance of a barrier zone

between potential mosquito breeding habitats within open space areas and adjacent developed areas. The barrier zone should be at least 40 m in width and be a sparsely vegetated area that will interrupt the dispersal route of the biting insects from their breeding sites into residential areas, and reduce harbourage areas by removing the protection of vegetation for shelter. Esplanade roadways, daytime recreation areas, parking areas, parklands with small shrubs and flower beds, woodlands of tall trees with light foliage, or broad scale agricultural land can be used to create the barrier zone.

Control methods for mosquitos/midges during the earthworks phase includes the following:

- Pools of standing water, which may provide breeding habitat for some species of biting insect, will not be allowed to form.
- In the event that an increase in biting insects is noted through complaints from adjacent properties, the contractor and proponent will work with relevant MBRC officers to determine the source of the problem and undertake rectification as per current MBRC procedures.

5 MONITORING AND REPORTING

5.1 Introduction

To achieve the objectives of the PISP it will be necessary to monitor populations of weeds and pest species. This section outlines monitoring requirements during construction.

5.2 Weed Monitoring

5.2.1 Introduction

Monitoring is crucial in ensuring the continuing success of the weed control methods. Monitoring of the following areas for appearance of new weeds will be undertaken during earthworks:

- Vehicle washdown areas and adjacent overflows;
- Active construction areas;
- Stockpile/laydown areas;
- Areas of retained vegetation; and
- Other vulnerable areas as identified by the Environmental Manager or ecologist.

5.2.2 Active Construction Zones

The Contractor, specifically their appointed Environmental Manager, is responsible for undertaking monthly inspections of vehicle washdown areas and overflows, stockpile/laydown areas, and the general active construction zone to ensure appropriate weed hygiene measures as outlined in this plan are properly implemented. Spot checks of vehicles, machinery, equipment and materials are also to be undertaken.

5.2.3 Retained Vegetation

5.2.3.1 Introduction

Areas of retained vegetation immediately adjacent to the construction area must be regularly monitored for weeds by the ecologist, to ensure the efficacy of the control methods in this PISP and to detect and manage infestations in a timely manner.

5.2.3.2 Baseline Monitoring

Baseline data will be gathered by the ecologist prior to commencement of works to assist in documenting any changes in weed diversity and numbers due to earthworks activities.

Monitoring locations will be selected based on potential for disturbance and to cover a variety of habitat types. Plot-based surveys (20m x 20m) will be undertaken at each monitoring location and will include an estimate of the percentage (%) cover in the plot of individual weed species and a count of the number of each species. A baseline monitoring proforma is contained in **ATTACHMENT 2**. Indicative monitoring locations are shown in

FIGURE 5. Visual inspection of all other retained vegetation areas will also be completed whilst moving between monitoring sites, and any weed infestations noted for control.

5.2.3.3 Monitoring During Construction

Monitoring will continue as described for the baseline monitoring. Monitoring will be completed six (6) monthly during bulk earthworks, and will continue for a period of six (6) months following completion of bulk earthworks. Depending on the findings during the baseline monitoring (**SECTION 5.2.3.2)** the frequency monitoring during construction may be increased.

5.3 Pest Monitoring

Management of pests on the site will focus on prevention of infestations. Monitoring will therefore focus on ensuring that protocols are adhered to and implemented effectively. The Environmental Manager is responsible for weekly monitoring of the following:

- All soils, mulches, turf, plants and other materials brought on to the site are in compliance with the necessary measures under the Biosecurity Regulation 2016 in terms of Fire ant and Yellow crazy ant control;
- No pools of standing water are allowed to form on the site, that may provide breeding opportunities for Cane toads or biting insects.

Compliance with 'No Dog' policies is to be monitored during bulk earthworks.

5.4 Reporting

The Environmental Manager is to prepare a report on a monthly basis outlining the following, as they pertain to their monitoring duties as per **SECTIONS 5.2.2** and **5.3**:

- Monitoring actions undertaken;
- Problems identified; and
- Actions taken to address identified problems.

Additionally, the ecologist will provide a monthly report outlining the results of weed monitoring in retained vegetation, any identified problems and recommended actions as per **SECTION 5.2.3**.

Reports are to be provided to MBRC, Queensland State Government Departments or the Commonwealth Department of Agriculture, Water and the Environment on request.



LEGEND

- Indicative Weed Monitoring Location
- Extent of Works
- LBEMP Sub-plan 06 Site Boundary
- NEBP Site Boundary

Vegetation Communities

- Community 1: Salt couch grassland
- Community 2: Open Casuarina glauca forest
- Community 3: Mangrove shrubland to low closed forest
- Community 4: Disturbed terrestrial grassland
- Existing roads, tracks and development
- Open Water

N

Scale 1 : 12 500

0 100m 200m 300m 400m 500m

SOURCE: KN Group (Ref: FLOOD DEM SLR 231110.dwg); JWA Site Investigations; Metro Maps Aerial dated 18/06/23
SCALE: 1 : 12 500 @ A3

JWA Pty Ltd
Ecological Consultants

CLIENT
North Harbour Holdings Pty Ltd

PROJECT
Pest and Invasive Species Plan
NEBP MIBA Bulk Earthworks
Nolan Drive, Morayfield QLD
Moreton Bay Regional Council LGA

FIGURE 5

PREPARED: BW
DATE: 24 November 2023
FILE: Q15003_MIBA PISP_20231114.dwg

TITLE

INDICATIVE WEED MONITORING LOCATIONS

REFERENCES

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ATTACHMENT 1 – WEED CONTROL METHODOLOGY

Primary Weeding

Weed eradication will be undertaken on a progressive basis through localised treatment of grass species via mechanical removal (hoe/rake, hand pulling and/or slashing) or with Roundup Biactive©. Woody weed species will be hand pulled or controlled using weed control techniques listed below**.** Weed removal techniques have been provided for all weed species observed on the subject site as well as noxious and environmental weeds that may occur on the subject site over time.

All chemical users will follow directions as per chemical material data sheets for use and installation. Utmost care must be taken when utilizing chemicals to ensure that no drift occurs outside of the treatment area. Spraying should not occur on windy days or within 24 hours of predicted rainfall.

Primary weeding should commence at the start of the active growing period (approximately November), or on an as needed basis.

Preparation before spraying, in the form of manual clearing of weeds from around native plants, must be carried out. Small native plants less than 20 cm in height are to be marked with a stake to indicate retention.

Weed material that does not contain any fertile parts will be mulched and spread on the ground and any weeds that may have fertile parts present will be disposed of at an approved waste disposal facility such as Council landfills or transfer stations.

Secondary Weeding

Secondary weeding involves the eradication of weeds that have been overlooked or re-shoot after primary treatment. Secondary weeding will occur three (3) to four (4) months after primary weeding and no later than six (6) months.

Weed Species and Treatment Methods

Common Name	Scientific Name	Control Method
Balloon cotton bush Crofton weed Blue billygoat weed Annual ragweed Paspalum Kikuyu Paramatta grass Whiskey grass	*Gomphocarpus physocarpus* *Ageratina adenophora* *Ageratum houstonianum* *Ambrosia artemisiifolia* *Paspalum* spp. *Pennisetum clandestinum* *Sporobolus africanus* *Androgogon virginicus*	**Hand Weeding** for all specimens under 10 cm. **Blanket and Spot** spraying with 1 part Roundup Biactive: 100 parts water for larger specimens or areas
Groundsel bush Bitou bush	*Baccharis halimifolia* *Chrysanthemoides monilifera*	**Hand Weeding** for all specimens where the soil is moist. Dispose of removed plants.

Common Name	Scientific Name	Control Method
		Cut stump and apply with 1 part Roundup Biactive: 100 parts water
Singapore daisy Coastal morning glory	*Wedelia trilobata* *Ipomoea cairica*	**Hand Weeding** for all specimens using a knife to loosen soil and leather gloves making sure all plant parts and rhizomes are removed. Dispose of removed plants. **Blanket and Spot** spraying with 1 part Roundup Biactive: 100 parts water
Winter senna	*Senna pendula*	**Hand Weeding** for small specimens, using a knife to loosen soil and leather gloves making sure all plant parts are removed. Larger specimens may need to be removed with a mattock. Dispose of removed plants. **Cut Stump** for large specimens using 1 part Roundup Biactive: 1.5 parts water.
Slash pine Camphor laurel Lantana Wild tobacco Cadaghi Umbrella tree Castor oil plant Broad-leaved pepper tree	*Pinus elliottii* *Cinnamomum camphora* *Lantana camara* *Solanum mauritianum* *Corymbia torreliana* *Schefflera actinophylla* *Ricinus communis* *Schinus terebinthefolius*	**Hand Weeding** for all small specimens under 20 cm. **Cut Stump** for all specimens over 20 cm tall using 1 part Roundup Biactive ©: 1.5 parts water. **Stem injection** for up to 60cm diameter using 2ml Roundup Biactive undiluted
Example of Registered Glyphosate Herbicides: ▪ *Defender Home and Garden ™* ▪ *Roundup Biactive ™ / Roundup ™* ▪ *Zero ™* *Example of Registered Metasulfuron Herbicide:* ▪ *Brush - Off™*		

The following are control techniques that are to be utilised on site:

- **Cut Stump Method** - This method involves cutting plant stems as close to ground level as possible and immediately painting the cut stump with herbicide. This treatment can also be applied as a basal bark application to the first 15-20 cm (entire circumference) of an uncut stem if the adult bark has not yet developed. Chemical use with this application is dependent on the proximity of the weed to naturally ponding water or waterways and whether the chemical is registered for aquatic use.

- **Basal Bark Method** - This method involves applying a herbicide to the lower 35-45 cm bark around the entire stem using a hand-pump backpack sprayer fitted with a

shut-off at the wand tip and an adjustable cone nozzle or a small, ATV (All Terrain Vehicle)-mounted sprayer with a shut-off at the wand tip and an adjustable cone nozzle.

- **Ring Barking -** This method involves removing the lower bark from the stem using a sharp implement to expose the phloem and xylem tissue to the outer environment thereby destroying it.

- **Spray Method** - There are two (2) types of spraying methods that will be employed where appropriate:
    - Selective blanket spraying: The area must initially be checked for the presence of any native species. Any weeds within 2 m of the drip zone of existing native species will be removed by hand. Alternatively, native species will be covered with impermeable material (e.g. a tarpaulin) for protection during spraying;
    - Spot spraying: The spray nozzle will be kept close to ground to avoid any overspray. Individual weeds will be spot-sprayed at the site. This method of spraying will be employed as native species are interspersed throughout the exotic grasses; and
    - Herbicides specific to each target species, where appropriate, will be identified prior to the implementation of any works. Herbicides will be applied in accordance with the manufacturer's specifications and when environmental conditions are most preferred (e.g. wind and rainfall).

- **Stem Injection** - Herbicides may be applied directly to the plant via stem injection. This involves applying a herbicide to the plant directly through drilling a hole into the stem and inserting the chemical. Axe cuts for stem injection can also be used. Cuts can be made at regular intervals around the stem and should leave a "pocket" into which the chemical must be immediately injected. Axe cuts should penetrate the cambium layer, but not the hardwood.

- **Wick Wiping** - This method employs vehicle-mounted (broad acre application) or hand-held equipment (small area/single plant application) to wipe or brush concentrated herbicide onto weeds. The herbicide is applied from permeable rope that is permanently connected to a reservoir containing Glyphosate. For purposes of weed control where accessibility to the infestation is low, a handheld 'wick wipe' will be used. This will also be incorporated for the control of emergent species. This method is particularly safe to use in areas where weed species are interspersed with native plants as there is no spray drift of herbicide.

- **Cutting and Chipping** - Manual weeding may involve cutting and chipping, pulling, digging or slashing and is preferred, depending on the growth stage and situation as detailed:
    - Where native plants are growing within a weed infestation and the use of selective herbicide is not possible;

- Where inadequate foliage is present to allow for successful uptake of herbicide e.g. Mile-a-minute runners typically exhibit this trait; and
- When hand weeding, the stem must be grasped firmly at the base of the plant and pulled. A trowel, mattock or sharp knife may be needed to loosen the soil. Care must be taken not to leave behind stems or other plant pieces that may re-shoot. Hand weeding should also be undertaken at times when weeds are not seeding to reduce dispersal and spread. Hand pulling is not recommended for some weed species as they readily sucker if their roots are disturbed e.g. *Lantana camara*. This method will be employed when removing exotic grass species within retained vegetation.

ATTACHMENT 2 - BASELINE DATA PROFORMA

Work Area Number:	**Date:**
Climatic Condition:	
Vegetation type: ☐ Rainforest ☐ Sclerophyll Forest ☐ Wetland ☐ Woodland ☐ Heath ☐ Riparian Veg	
Native Regeneration Scoring at Time of Assessment: ☐ Negligible ☐ Poor ☐ Moderate ☐ Good ☐ Exceptional	

NATIVE PLANT SPECIES LIST *Details of native plant species present and their abundance within the work area*			
Stratum	**Native Plants**		**Abundance**
	Common Name	**Scientific Name**	
Lower			

Mid			
Upper			

THREATENED PLANT SPECIES/ENDANGERED ECOLOGICAL COMMUNITIES LIST *List of threatened plant species/Endangered Ecological Communities found at the work area*		
Species and Conservation Status	**Number of Plants**	**Management Implications**
Endangered Ecological Community	**Management Implications**	

HABITAT FEATURES	
Fauna observed: *e.g. Turkey mound present on site.*	
Fauna habitat features present on site:	
☐ Hollows in trees	☐ Wet or damp areas (including soaks / springs)
☐ Mature or over-mature trees	☐ Leaf litter
☐ Dead standing trees	☐ Native grasses, rushes and sedges
☐ Rocks and boulders	☐ Fleshy fruited trees and shrubs
☐ Fallen logs	☐ Nectar bearing trees and shrubs
☐ Caves, mineshafts or overhangs	☐ Dense understorey shrubs
☐ Springs	☐ Prickly understorey shrubs
☐ Lagoons	☐ Seasonal cracks in the soil
☐ Pools	☐ Other (please specify):
☐ Watercourses / gullies	
☐ Riparian areas	
Comments:	

ENVIRONMENTAL WEED SPECIES LIST

Details of weed species present and their abundance within the work area

Stratum	Major Environmental Weeds		Percentage Cover %
	Common Name	Scientific Name	
Lower			

Mid			
Upper			

OTHER THREATS OR IMPACTS			
Feral Animal Presence:	**Area of Most Disturbance**	**Impact**	**Management Implications**
EXAMPLE: Cane Toad	*Open disturbed area*	*On native fauna*	*Monitor presence*
Possible Negative Impacts	**Impact**	**Management Implications**	
EXAMPLE: Stock intrusion	*On regenerating native plants*	*Stock intrusion is unlikely, however if evidence of significant negative impact of regenerating native vegetation is detected, then fencing of stock may be required.*	
EXAMPLE: Herbicide drift	*On threatened XXXX plant and on native plants*	*Use of herbicides to control weeds around the threatened plants will have to be done with utmost care and only by experienced bush regenerators. In any case weed control using herbicides must comply with current Best Management Practice*	

ENVIRONMENTAL RESTORATION ISSUES	
Weaknesses	
EXAMPLES: Exposed, no canopy, high light. Copious weed regeneration following disturbance. Sloping site difficult to work in. XXX threatened species present in abundance.	

Strengths	
EXAMPLES: Good seed source for native recruitment. Some native regeneration occurring.	
Restoration Objectives for Work Area	
EXAMPLE: To undertake all enhancement plantings and the first stage weed control program by the release of the subdivision certificate, and to achieve an 80% native species canopy cover in all areas by November 2009.	

APPENDIX 6 - EROSION AND SEDIMENT CONTROL STRATEGY (DESIGN FLOW 2024)

NORTH HARBOUR

EROSION AND SEDIMENT CONTROL STRATEGY

DesignFlow
Prepared for North Harbour Holdings Pty Ltd
July 2024

Document Control Sheet

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1 INTRODUCTION

1.1 SCOPE AND FRAMEWORK

North Harbour is a large greenfield development located east of the Bruce Highway near Caboolture. The site is located at Nolan Drive, adjacent to Caboolture River and Raff Creek. This Erosion and Sediment Control Strategy (ESCS) has been prepared to support a bulk earthworks application over the area known as the Mixed Business and Industry Area (MIBA). The bulk earthworks are documented on KN Group Drawings Set 18-203-01 to 18-203-26 which has been lodged with Moreton Bay Regional Council as Operational Works Application Number DA/39447/2019/V4D.

The ESCS demonstrates how best practice erosion and sediment control will be delivered over the bulk earthworks area. Due to the scale of the bulk earthworks area, and the likelihood of changes to phasing over the life of the work, the ESCS does not attempt to specify detailed ESC measures for the entire works area. The ESCS will be supported by detailed Erosion and Sediment Control Plans (ESCP's) which will be prepared by the Contractor for individual works areas before works commence.

The detailed ESCP's will provide full construction details of ESC measures and demonstrate how the strategy documented in this ESCS will be achieved for that area.

This ESCS therefore documents the following:

- Site characteristics and constraints relevant to ESC management
- Design objectives to be achieved by the ESCS and individual ESCPs
- ESC strategy elements for major site catchments, including:
    - location and size of major sediment controls (i.e. basins),
    - key phasing considerations,
    - strategies for riparian works and
    - approaches to revegetation

1.2 INFORMATION REQUEST RESPONSES

Management of construction runoff and potential impacts on water quality has been raised by both Moreton Bay Regional Council and State Agencies as part of the Information Requests.

Identification of each request item plus a description of how the ESCS addresses the item is provided in Table 1.

Table 1. RFI Responses.

Information Request Item	Response
MBRC Item 3 The applicant is to prepare and provide site Erosion and Sediment Control Management Report prepared by CPESC to support the proposed bulk earthworks and haul road construction	This document has been prepared by Leon Rowlands CPESC 4364 and accords with best practice standards
SARA Item 5 - Water Quality <u>Issue:</u> The proposed development is likely to result in impacts to water quality within Raff Creek through storm water run-off or direct release of contaminants to waters during construction. The application does not address PO11 of State Code 8 of the SDAP or impacts to water quality generally. <u>Action:</u> Provide a detailed response to PO11 of State Code 8 with reference to the development considerations outlined below. Please include details regarding how impacts to water quality will be avoided, mitigated or managed for all aspects of development. The application will need to demonstrate: PO11(1) – That the proposed development is located, designed and managed to avoid impacting the environmental values of the receiving waters as determined by the Environmental Protection (water) Policy 2009. PO11(2) – That the supporting information: - identifies the water quality objectives of the receiving waters as determined by the Environmental Protection (water) Policy 2009, and - incorporates measures as part of the siting and design of the development to maintain or enhance water quality released to tidal waters to achieve the water quality objectives outlined in the Environmental Protection (Water) Policy 2009. PO11(3) - That the proposed development will not release a prescribed water contaminant to tidal waters by: - ensuring all prescribed water contaminants are contained on the site or filtered from the water released from the site through adequate storage or water treatment methods (e.g. stormwater treatment, erosion and sediment controls), and - prepare an Erosion and Sediment Control Plan (ESCP) that demonstrates that the construction phase will be in compliance with the Earthworks - AS3798 (Guidelines on Earthworks) and Erosion & Sediment Control – Best Practice documents as specified by the International Erosion Control Association - monitor all intended releases to ensure they do not contain a prescribed water contaminant and provide operational responses to incidents where the water quality does not meet the required standard as defined by the Environmental Protection (Water) Policy 2009.	This document comprehensively addresses how impacts to water quality will be mitigated during construction of the development and specifically how the construction-phase release criteria specified in the State Planning Policy 2017 will be achieved. The ESC strategy employs a range of approaches which have been tailored to each of the site catchments. A key element is the provision of 9 high-efficiency sediment basins throughout the site. In addition, specific performance criteria and recommendations have been provided for revegetation/stabilisation of general earthworks areas and specific recommendations for the riparian works. Monitoring and auditing recommendations are also provided in Section 5.

2 SITE CHARACTERISTICS

2.1 PROPOSED DEVELOPMENT

The urban development facilitated by this bulk earthwork application consists of approximately 170ha of residential, retirement living and mixed business industry land uses. The ultimate drainage catchments and the stormwater quality treatment system is shown in Figure 1 along with intended land uses.

It can be seen from Figure 1, that six constructed wetlands are proposed as part of the stormwater quality treatment system (DesignFlow, 2023). Wetlands 1-4 receive runoff directly from the proposed development only, while Wetland 5 will receive and treat stormwater from both site catchment 5 and an external catchment comprising approximately 147ha of existing residential.

The footprints provided by Wetlands 1-4 provide an excellent opportunity for locating sediment basins to control water quality during the construction phase of the development and are a crucial part of the ESCS documented in Section 4.0.

Wetland 5 and the site catchments draining to the North-West are more challenging, as the external catchment mixes with site runoff before reaching Wetland 5. It is best practice to maintain external catchment flows as ‘clean’ water and avoid mixing with turbid site runoff wherever possible. Wetland 5 is therefore not well placed to provide treatment of site runoff from catchment 5 during construction and alternative strategies are required to manage this part of the site.

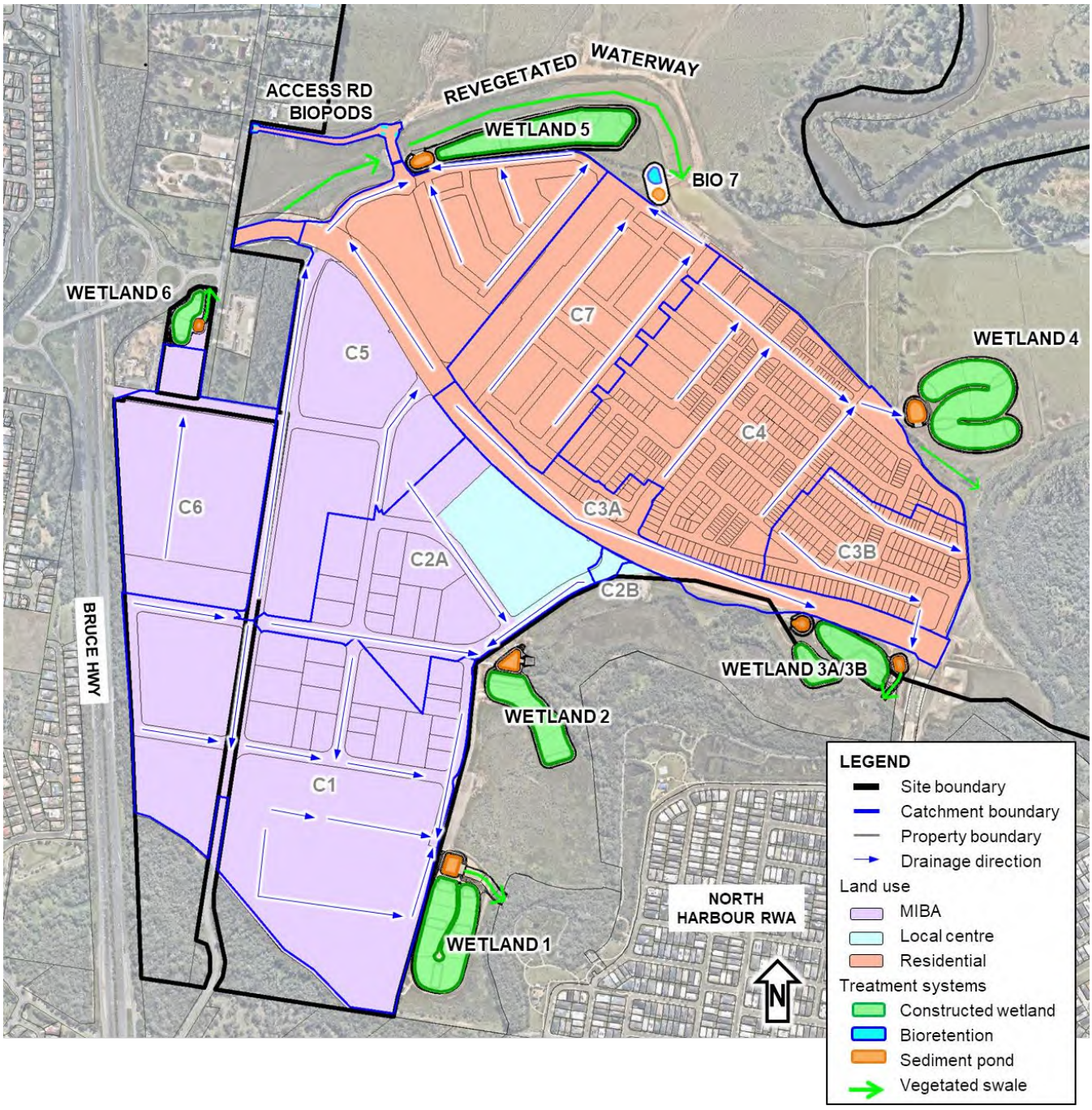


Figure 1. Ultimate stormwater treatment strategy and land use plan (from DesignFlow, 2023).

2.2 TOPOGRAPHY AND DRAINAGE

The bulk earthworks catchments based on final bulk earthworks levels and provided in Figure 2 and closely resemble the ultimate drainage catchments shown in Figure 1. Each sub-catchment is numbered in Figure 2 and this numbering is used to identify specific site areas for the remainder of the document.

Bulk earthworks catchments based on existing site levels are shown in Figure 3. Due to the extent of earthworks proposed at the site, many of these sub-catchments differ

significantly from those based on final levels. Care must therefore be taken when designing both drainage and sediment controls, to either adopt the maximum catchment area based on either existing or final levels, or stage disturbance such that undisturbed (or rehabilitated) areas can be diverted and catchment areas for drainage and sediment controls minimised.

For this ESCS a conservative approach has been adopted and sediment controls have been sized for each sub-catchment based on the largest of either the existing or final sub-catchment areas.

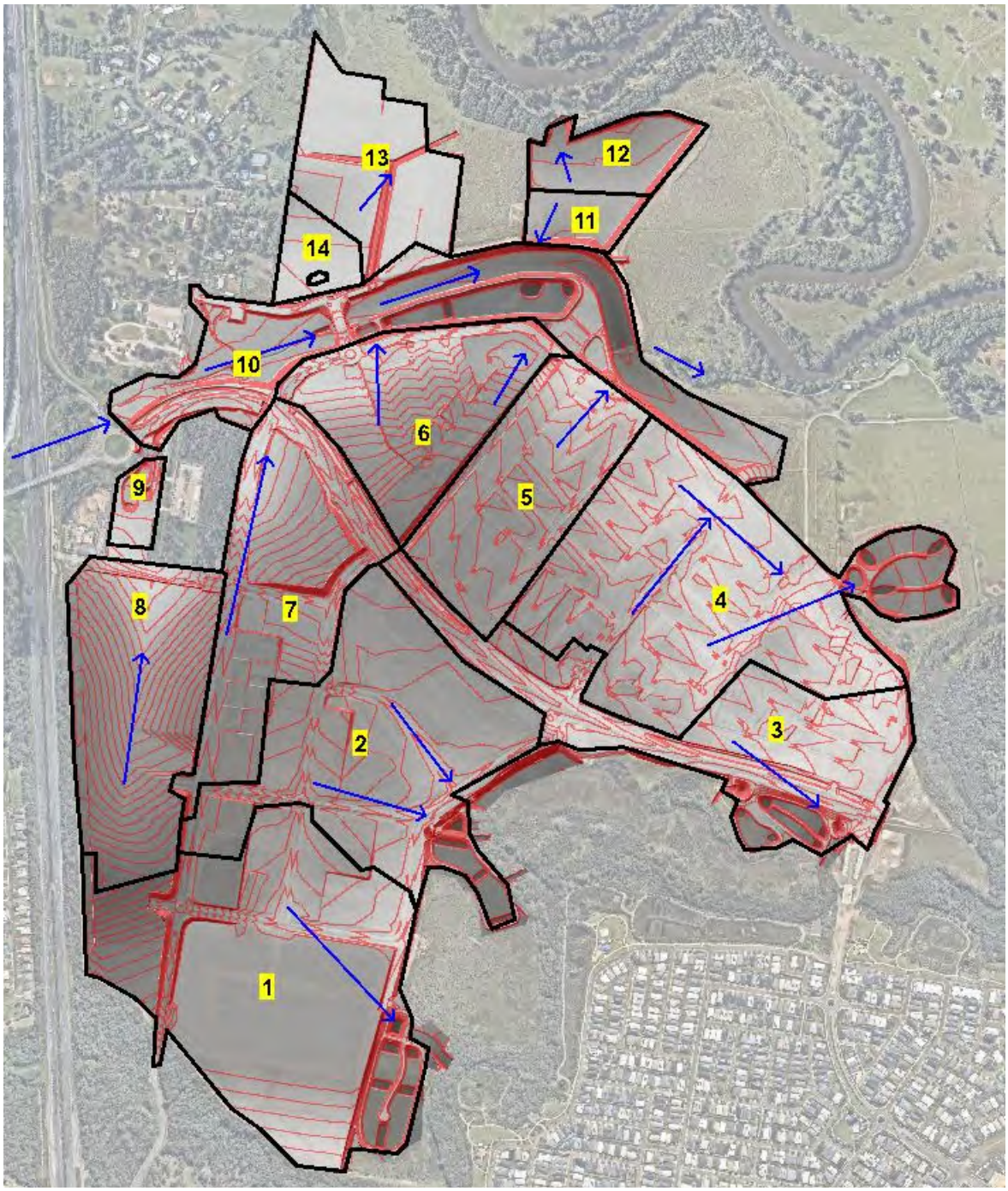


Figure 2. Bulk Earthworks Sub-Catchments Based on Final Levels.

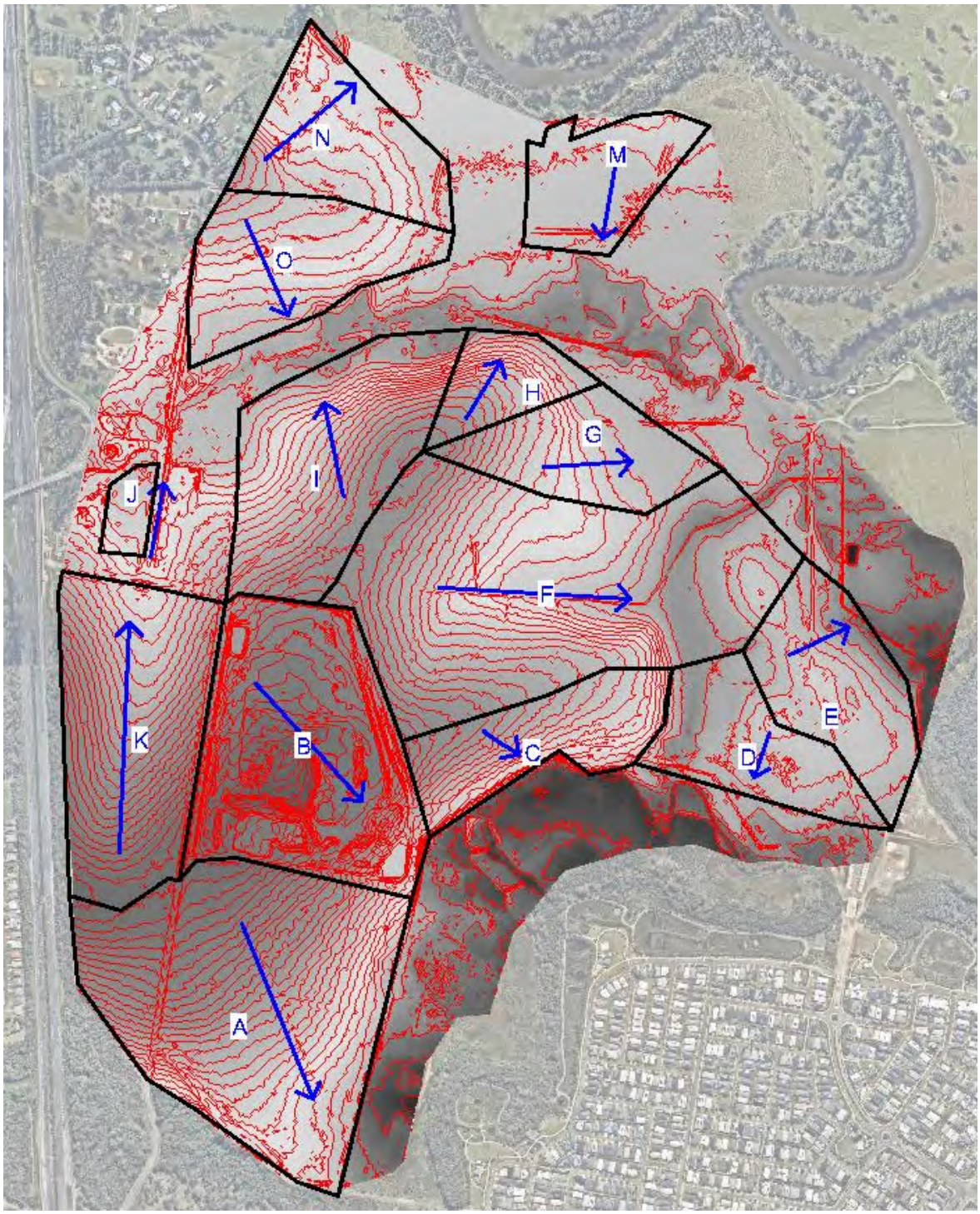


Figure 3. Bulk Earthworks Sub-Catchments Based on 2018 Lidar Levels.

2.3 SOILS

2.3.1 Acid Sulfate Soils

Soil and groundwater investigations have been undertaken by Tectonic (2019) to determine the existence of Acid Sulfate Soils (ASS) at the site.

It has been identified that some excavation and treatment of ASS will be required to occur and strategies have been put in place for bunding of the treatment pads, such that all runoff and leachate from the treatment pad areas is fully contained.

It is recommended that testing and neutralisation of all collected water from the treatment pads is undertaken before water is released to the sediment basins, as low-pH water has the potential to interfere with the effectiveness of aluminium-based flocculants.

Similarly, the ASS Investigation identifies the potential for low-pH groundwater at the site. Groundwater extracted through dewatering should also be neutralised prior to discharge to the sediment basins for the above reasons.

The ASS investigation also makes the following observations regarding groundwater in the boreholes at each of the ultimate wetland locations:

- Wetland 1 – no groundwater observed
- Wetland 2 – groundwater 1m BGL
- Wetland 3 - groundwater 1.0-1.5m BGL
- Wetland 4 – no groundwater observed
- Wetland 5 – groundwater 1.5m BGL at lowest borehole only

Sediment basins located within the ultimate wetland footprints should therefore include provision for clay lining in order to prevent ingress of groundwater if observed when the basins are excavated.

2.3.2 Dispersivity and Suitability for Rehabilitation

No specific sampling and laboratory testing of soils has been undertaken for the ESCS. It is recommended that prior to works commencing in a specific area, the contractor should undertake soil sampling and laboratory analysis to inform the detailed ESCP's. Soil testing should be undertaken in accordance with IECA (2008) Chapter 3 and Appendix C9, and should include as a minimum 2 boreholes for each works area and testing of a representative topsoil and sub-soil sample for the following:

- Topsoil:
    - Soil pH
    - EC
    - Organic carbon
    - TN, nitrate
    - Exchangeable basic and acidic cations (Ca, Mg, K, Na, Al)
    - Plant available phosphorus and potassium
- Subsoil
    - PSD
    - pH and EC

- Emerson Class number
- Dispersion percentage

Topsoil testing is particularly important in order to ensure successful revegetation and the contractor is to apply ameliorants to topsoil as required based on the results of testing.

As part of this ESCS basic field testing and observations have been made regarding soils as follows:

- Aggregate Immersion Test and Field Emerson Aggregate Tests were undertaken on a representative subsoil sample. The tests found that the samples slaked but did not noticeably disperse
- A sample of sub-soil was mixed into 1L of demineralized water and different flocculants were added in order to determine indicative dosage rates and settling times for use in basin calculations. Turbiclear (ACH) was found to only be moderately effective, while Chitosan achieved a clear water column within 15 minutes. This indicates that the aggregating effect provided by the chitosan may be more important than the charge neutralization provided by the ACH (i.e. soils fine-grained rather than significantly dispersive)
- Despite large exposed areas in the MIBA area, there was no visible evidence of tunnel or gully erosion
- Revegetation strategies used in completed stages of North Harbour appeared to be quite successful, especially considering the lack of recent rainfall. Topsoil stockpiles appeared to have revegetated naturally

The above tests and observations indicate that topsoil should be generally suitable for revegetation and may only require minor amendments. This is consistent with the undisturbed areas of the site which comprise well grassed alluvial fields.

The subsoils did not appear to be strongly dispersive. Addition of a chemical which achieves good binding of fine particles (rather than solely charge neutralisation) is likely to be most effective and will be required to achieve the discharge limits for TSS from the sediment basins within the required timeframe.

Photographs of the field tests are provided in Appendix A.

2.4 CLIMATE

Average rainfall data and available 2019 rainfall are plotted in Figure 4. It can be seen that rainfall for most months of 2019, apart from March and August, have been significantly below average long-term rainfall.

The lowest rainfall months based on the long-term average are June – September, and high risk works such as riparian activities should be programmed to occur during this part of the year.

It should however be noted that high rainfall, can occur at any time of year in South-East Queensland and controls are still required for works regardless of the month in which they occur.

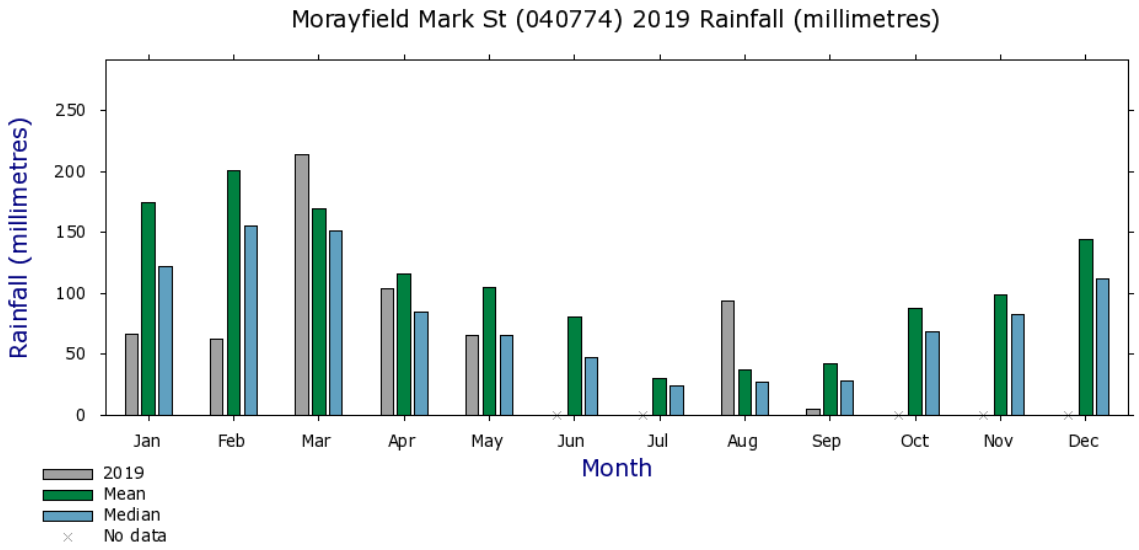


Figure 4. Rainfall Statistics.

2.5 FLOODING

Flooding characteristics at the site have been established by modelling undertaken by Cardno (2019). The 1:2yr ARI and 1:100yr ARI flood event inundation plans from Cardno (2019) are provided in Appendix B, with an extract for the 1:2yr Ari shown below in Figure 5.

It can be seen that the majority of the bulk earthworks areas are outside of the 1:2yr Ari flood extent, however the constructed wetlands as well as the channel works, waterway crossings and the borrow area are all subject to inundation. This makes these areas particularly high risk in terms of sediment export and subject to special considerations as documented in Section 4.6.

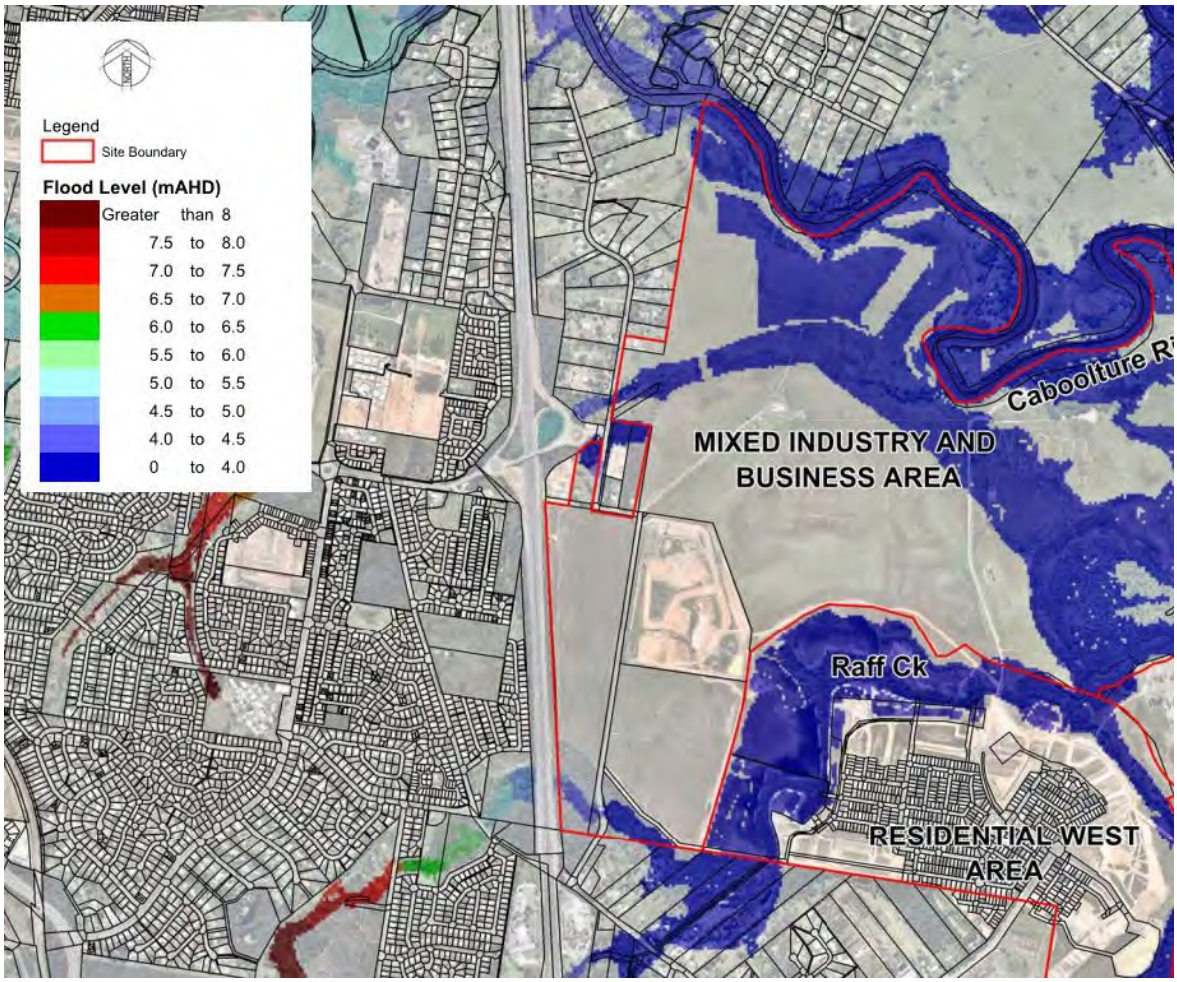


Figure 5. 1:2yr ARI Flood Extent (from Cardno, 2019).

3 DESIGN OBJECTIVES

The design objectives relevant to the construction-phase of development works are specified in Appendix 2 of the State Planning Policy 2017 (SPP2017).
These are reproduced in Tables 1, 2 and 3 below.

Table 1.Construction Phase Stormwater Design Objectives.

Issue	Desired outcomes
Drainage control	1. Manage stormwater flows around or through areas of exposed soil to avoid contamination. 2. Manage sheet flows in order to avoid or minimise the generation of rill or gully erosion. 3. Provide stable concentrated flow paths to achieve the construction phase stormwater management design objectives for temporary drainage works (part 2). 4. Provide emergency spillways for sediment basins to achieve the construction phase stormwater management design objectives for emergency spillways on temporary sediment basins (part 3).
Erosion control	1. Stage clearing and construction works to minimise the area of exposed soil at any one time. 2. Effectively cover or stabilise exposed soils prior to predicted rainfall. 3. Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised[13] using methods which will achieve effective short-term stabilisation.
Sediment control	1. Direct runoff from exposed site soils to sediment controls that are appropriate to the extent of disturbance and level of erosion risk. 2. All exposed areas greater than 2500 metres^2 must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5).
Litter, hydrocarbons and other contaminants	1. Remove gross pollutants and litter. 2. Avoid the release of oil or visible sheen to released waters. 3. Dispose of waste containing contaminants at authorised facilities.
Waterway stability and flood flow management	1. Where measures are required to meet post-construction waterway stability objectives (specified in table B), these are either installed prior to land disturbance and are integrated with erosion and sediment controls, or equivalent alternative measures are implemented during construction. 2. Earthworks and the implementation of erosion and sediment controls are undertaken in ways which ensure flooding characteristics (including stormwater quantity characteristics) external to the development site are not worsened during construction for all events up to and including the 1 in 100 year ARI (1% AEP).

Table 2. Construction Phase Stormwater Design Objectives for temporary drainage works.

Temporary drainage works	Anticipated operation design life and minimum design storm event		
	‹ 12 months	12–24 months	› 24 months
Drainage structure	1 in 2 year ARI/39% AEP	1 in 5 year ARI/18% AEP	1 in 10 year ARI/10% AEP
Where located immediately up-slope of an occupied property that would be adversely affected by the failure or overtopping of the structure	1 in 10 year ARI/10% AEP		
Culvert crossing	1 in 1 year ARI/63% AEP		

Table 3. Construction Phase Stormwater Design Objectives for emergency spillways on temporary sediment basins.

Drainage structure	Anticipated operation design life and minimum design storm event		
	< 3 months	3–12 months	> 12 months
Emergency spillways on temporary sediment basins	1 in 10 year ARI/10% AEP	1 in 20 year ARI/5% AEP	1 in 50 year ARI/2% AEP

The design objectives specified in the SPP2017 generally reflect accepted best practice in Australia, however the Sediment Control (2) objective is a higher standard than required in other states and is reflective of both the pronounced wet season and degree of development activity which occur in Queensland.

Healthy Land and Water (2017) provide a range of strategies for achieving the requirements of the sediment control design objective which are summarised below:

1. **High Efficiency Sediment (HES) Basins:**
Install and operate Type-A or Type-B sediment basins designed in accordance with IECA Appendix B (2019), described as High-Efficiency Sediment (HES) basins. These are sediment basins which have automated dosing of chemicals which assist flocculation/coagulation of fine and dispersive sediment and which operate on a continuous-flow basis. Type-A basins incorporate a floating decant as the primary outlet while Type-B basins can remain full between events and have only a spillway outlet. A conceptual layout for a Type-B HES basin is provided in Figure 6.

2. **Large Batch Basins:**
Batch sediment basins (Type D) designed in accordance with IECA (2008) will not comply with the SPP2017 design objective. Modified batch basin designs may be possible for some sites, however for most sites the batch basins would need to be impractically large or require impractical treatment and dewatering strategies to meet the design objective. If the batch basin is proposed to be treated and emptied within 2 day of rainfall ceasing, then the required basin settling volume is **650m3/ha** for North Harbour. Sediment storage volumes need to be provided in addition to the above volumes, consistent with IECA Appendix B (2019)

3. **Total Capture:**
For flat sites, with no external catchment, perimeter bunding may be appropriate where it can be shown that the bund height is sufficient to capture the anticipated (average) wet season rainfall completely (i.e. total capture). A simple water-balance calculation and earthworks sections showing the bund arrangements and capture volumes will be sufficient to show that this strategy can be implemented. However careful consideration will be required for how this strategy can continue to operate beyond earthworks stage to when civil construction is being undertaken or nearing completion

4. **Alternative Innovative Measures:**
Alternative measures may be implemented where it can be shown through long-term water-balance modelling that the measures will achieve the release criteria of 50mg/L TSS for at least 80% of the average annual runoff volume. This would need to be documented and justified in the ESC Plan

5. **Erosion Control:**
Effective erosion control can be implemented in lieu of requiring sediment control specified above. For small areas, which are unable to drain to a basin, this could be achieved by implementing contingency measures prior to rainfall, such as covering exposed soil with blankets (mulch or synthetic) or spray-on

soil binders. In these circumstances the erosion controls must result in an effectively stabilised surface prior to rainfall to justify the exclusion of sediment controls

Each of the above approaches has been considered and specific recommendations provided for the site catchments in Section 4.1.

Erosion hazard assessments should be undertaken as part of detailed ESC plan preparation for each works area, particularly to identify controls for areas which fall below to 2500m^2 trigger of the SPP2017.

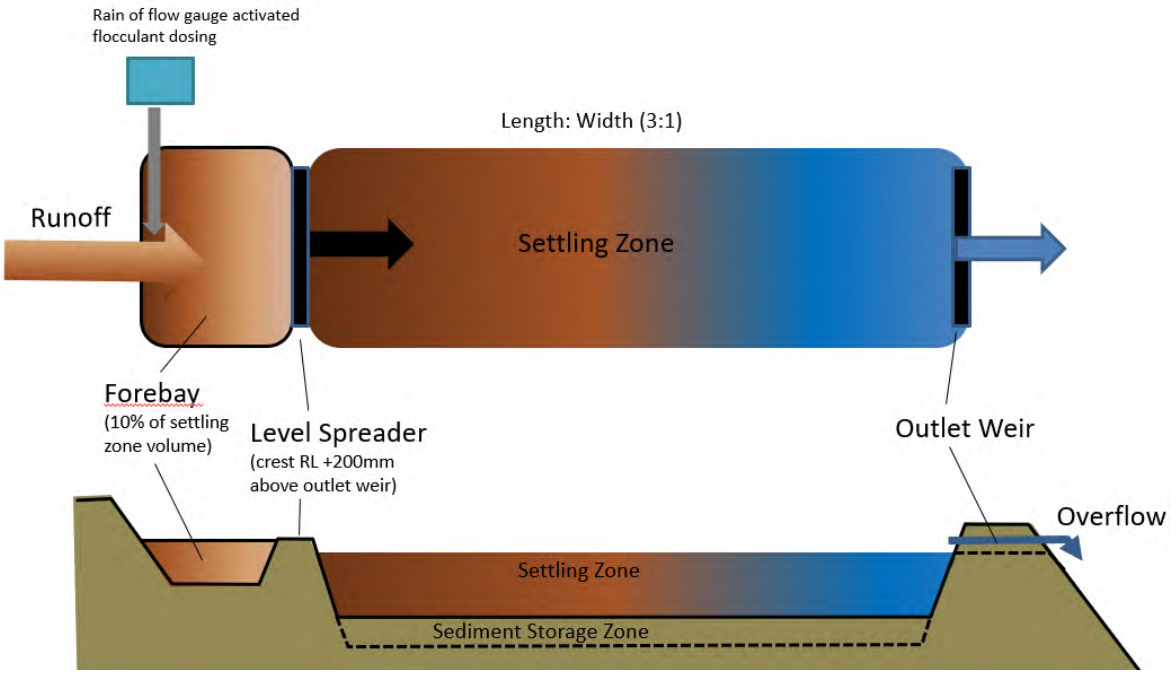


Figure 6. Conceptual High-Efficiency Sediment (HES) Basin Type-B Functional Layout.

4 EROSION AND SEDIMENT CONTROL STRATEGY

4.1 STRATEGIES FOR SPECIFIC SITE SUBCATCHMENTS

The overall strategy for each of the site sub-catchments identified in Figure 2 are discussed below and shown in Figure 7. Considerations for the detailed design of erosion, drainage and sediment controls and riparian works are provided in Sections 4.3 – 4.6.

4.1.1 Sub-catchments 1 – 6 and 9

These sub-catchments drain towards the footprint of proposed constructed stormwater wetlands. The key strategy for these sub-catchments is therefore to position HES basins within the ultimate wetland footprint.

Locating the HES basins within the ultimate wetland footprints provides maximum flexibility for construction within these sub-catchments as the HES basins will not impede construction and can remain in place throughout the bulk earthworks and civil construction stages.

Section 4.5 provides sizing for each of the HES basins based on the maximum disturbed catchment area likely to be experienced by each basin (based on either final or existing levels).

4.1.2 Sub-catchments 7, 8, 13 and 14

The strategy for these sub-catchments is to locate HES basins within the sub-catchments themselves. It is not possible to treat these sub-catchments by a single HES basin within the ultimate wetland footprint as the wetland servicing these areas is Wetland 5 which also receives flows ultimately from the large external catchment.

These HES basins could either be decommissioned at the end of bulk earthworks when surface stabilisation is achieved or could be retained for use with future civil works stages.

4.1.3 Sub-catchment 11 and 12

These sub-catchments comprise the northern portion of the borrow area and involves significant cut. The strategy for this sub-catchment is total capture of runoff within the excavation.

The required storage volume within the area necessary to achieve the SPP2017 sediment control design objective can be derived through a water balance calculation and is provided in Section 4.5. The storage can be initially achieved during topsoil stripping by forming topsoil bunds around the works footprint and these can be replaced by compacted sub-soil bunds and a spillway as excavation of material progresses.

The required storage volumes specified in Section 4.5 are based on treating the captured water in-situ to the discharge standard of 50mg/L TSS and dewatering within 2 days of rainfall ceasing. If greater storage volumes can be achieved within the bunded area then a longer discharge period and greater operational flexibility could be provided.

4.1.4 Sub-catchment 10

This sub-catchment involves a range of works within the floodplain, including:

- Excavation of Wetland 5
- Channel works and waterway crossings

A range of strategies are proposed within his sub-catchment as described below.

Total Capture: This strategy is proposed for the excavation of Wetland 5 and the eastern portion of the channel works. These areas are suited to total capture as they are relatively flat, in areas of cut and have no external catchments. As for sub-catchment 11, the storage can be initially achieved during topsoil stripping by forming topsoil bunds around the works footprint and these can be replaced by compacted sub-soil bunds and a spillway as excavation of material progresses. Required sizing is provided in Section 4.5.

Provision of HES basin: This strategy is proposed for the Wetland 5 area (Basin 5).

Flow Diversions: This strategy is proposed for the riparian areas which actively convey the external catchment located to the west of the Bruce Highway. It is discussed more fully in Section 4.6 and requires that works are phased such that flow diversions are always in place to convey the external catchment through the site as 'clean' water, while areas of active works are bunded to fully contain any runoff generated.

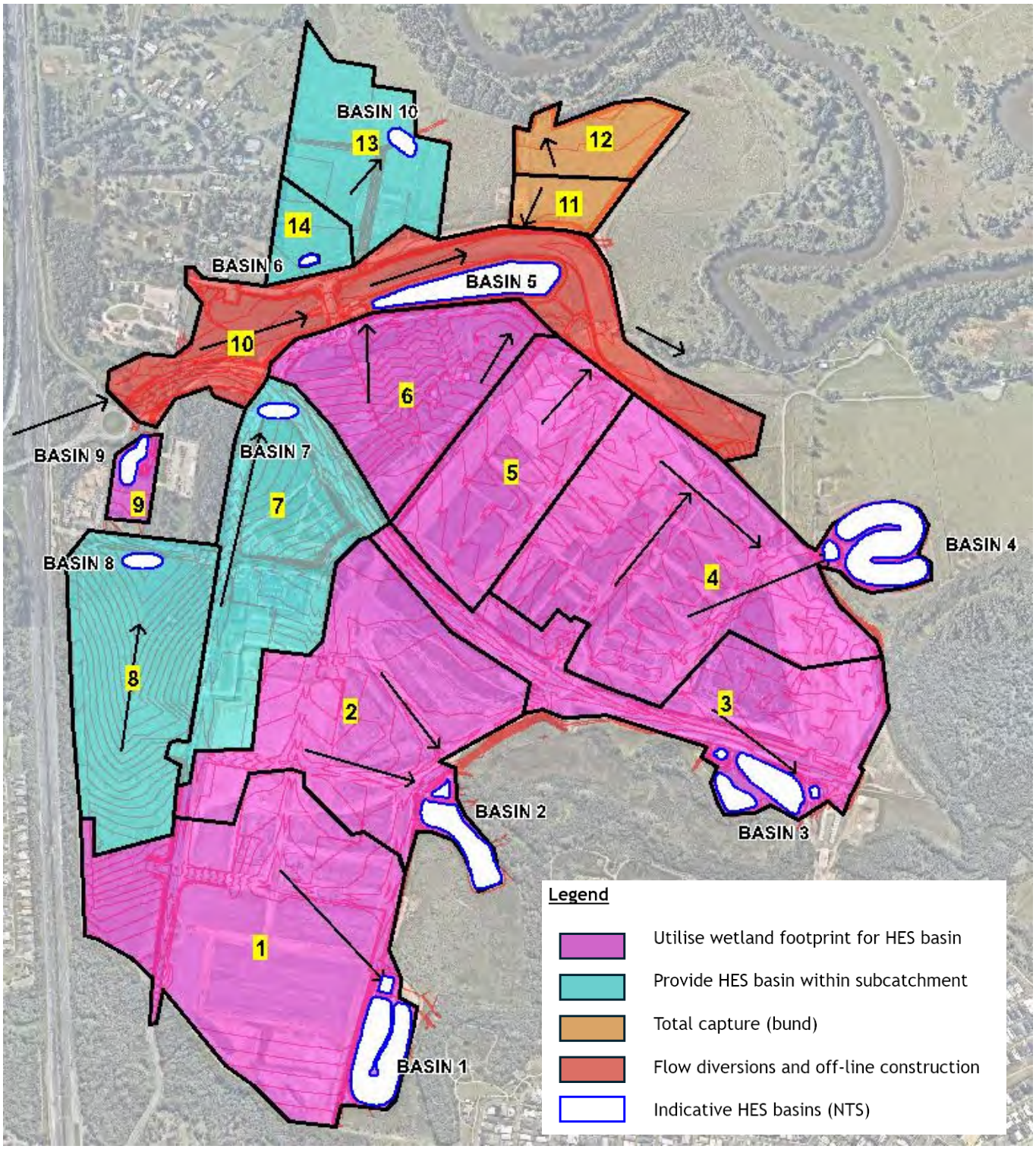


Figure 7. Strategy Elements.

4.2 CONSTRUCTION SEQUENCE AND WSUD INTEGRATION

4.2.1 Construction Sequence

Most of the site sub-catchments are self-contained in terms of the ESC strategy and can occur independently or in combination with works in other sub-catchments. However, the Northern portion of the site contains high-risk riparian works and the sub-catchment strategies are inter-dependent.

The need to actively manage the external catchment through the area of proposed channel works and waterway crossings needs to be given priority and should be scheduled to occur in the driest time of the year (June-September). Works in Sub-catchments 5 and 6 should not commence until the channel works are complete and stabilised so as not to limit the available footprint for flow diversions.

If it becomes necessary for works to commence within Sub-catchment 5 or 6 prior to the riparian works being complete, then an alternate strategy which incorporates individual HES basins within each of these sub-catchments will need to be implemented until such time as space is available for Basin 5.

4.2.2 WSUD Integration

Constructed Wetlands 1-6 should remain as HES basins and should not be planted out until such time as all civil stages draining to each basin are complete and stable.

Further work on this aspect is recommended in order to demonstrate the required timing of delivery of each constructed wetland, however the availability of Wetland 5 provides significant flexibility for the project.

4.3 EROSION CONTROL

The following discussion relates to general earthworks areas. Specific discussion on riparian works are provided in Section 4.6.

IECA (2008) identifies erosion risk based on average monthly rainfall and provides best practice rehabilitation requirements for different times of the year based on this risk. The erosion risk for the subject site for different times of the year is shown in Table 4.

Table 4. Erosion Risk by Time of Year.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	High	High	High	High	Moderate	Very Low	Very Low	Very Low	Moderate	Moderate	High

The requirements for land clearing and rehabilitation vary depending on the time of year (i.e. level of risk). The performance targets, based broadly on IECA (2008) and example methods of achieving those targets are provided in Table 5. The details ESCP's for each works area are to provide specific details on how the performance targets are to be achieved.

Table 5. Erosion Performance Targets and Example Methods.

Erosion Risk	Performance Target	Example Method
Very Low	Land clearing limited to 8 weeks worth of construction work Disturbed areas stabilised with 60% cover within 30 days of finished levels being reached or works delayed for more than 30 days	Future lots stabilised with drill seeding of annual and perennial grass species, with soil amelioration based on soil tests.
Moderate	Land clearing limited to 6 weeks worth of construction work Disturbed areas stabilised with 70% cover within 20 days of finished levels being reached or works delayed for more than 20 days	Future lots stabilised with drill seeding of annual and perennial grass species, with soil amelioration based on soil tests. Soil binder provided for short-term stabilisation over seeded areas. Provided within 20 days of final levels being reached.
High	Land clearing limited to 4 weeks worth of construction work Disturbed areas stabilised with 75% cover within 10 days of finished levels being reached or works delayed for more than 10 days	Future lots stabilised with drill seeding of annual and perennial grass species, with soil amelioration based on soil tests. Soil binder provided for short-term stabilisation over seeded areas. Provided within 30 days of final levels being reached.

Table 5 refers to short-term stabilisation requirements. As the earthworks areas may remain undeveloped for an extended period of time, the sediment controls will need to remain in place and continue to be actively managed until effective long-term erosion control (i.e. vegetative cover) is achieved based on the cover requirements for the highest monthly erosion risk (i.e. 75% cover).

4.4 DRAINAGE CONTROL

Drainage controls are required to limit flow path lengths in order to prevent or minimse rill erosion and to ensure disturbed catchments are directed to appropriate sediment controls such as HES basins.

Tables 2 and 3 provide design standards for drainage controls. Details of drainage controls will be provided with the detailed ESCP's.

4.5 SEDIMENT CONTROL

4.5.1 High Efficiency Sediment Basins

Appendix C contains full calculations for each of the HES basins identified in Figure 7. The HES basins are Type-B, with sizing determined from the procedures documented in IECA (2019). The basin and catchment properties are summarised below in Table 6.

It can be seen from this Table that the HES basins can be readily accommodated within the available ultimate constructed wetland footprints.

The scour velocity checks provided in Appendix C indicate that for some basins the velocity may be an issue. It is recommended that permeable baffles be implemented in all HES basins in order to improve the distribution of velocities across the basin section and minimise the risk of resuspension.

Table 6. Preliminary HES Basin Properties.

Basin ID	Catchment Area (ha)	Existing or Final Contours?	Basin Volume (m3)	Basin Area (m2)	Available Wetland Footprint (m2)	Sufficient Space?
Basin 1	36.1	Final	10,203	6,005	20,000	Yes
Basin 2	26.1	Final	7,806	4,728	12,400	Yes
Basin 3	20.4	Final	5,277	3,355	9,000	Yes
Basin 4	47.3	Existing	10,735	6,287	26,000	Yes
Basin 5	16.3	Final	4,606	2,984	21,000	Yes
Basin 6	11.9	Existing	3,951	2,618	NA	Yes
Basin 7	18.7	Final	4,764	3,072	NA	Yes
Basin 8	17.8	Existing	4,905	3,150	NA	Yes
Basin 9	1.7	Unchanged	648	643	3,000	Yes
Basin 10	10.9	Final	3,529	2,380	NA	Yes

4.5.2 Total Capture

A number of areas are identified in Figure 7 as adopting a strategy of 'total capture'. This means that these areas will capture rainfall and runoff that are generated within that area – either through bunding or by creating a sump through excavation.

In most of these areas there is significant excavation proposed so the available storage will be large and will increase as construction progresses. However in the early phases the storage will need to be created by bunding. This will initially be through topsoil bunds during stripping and then these will be rapidly replaced with compacted subsoil bunds and stabilised spillways for any overflow which occurs.

The SPP2017 sediment control design objective requires that the strategy is able to achieve 80% of annual average runoff from these areas is captured and treated to a TSS level of less than 50mg/L. The minimum required storage volume for each area to achieve this objective can be estimate through water balance modelling.

Water balance modelling has been undertaken based on 32years of rainfall records for Clontarf. It has been assumed in the modelling that the water captured in each area is able to be treated (flocculated) and dewatered within 2 days of rainfall ceasing. This is considered to be feasible using modern flocculants and techniques, through sizing is also provided if a slower rate of 5-days for treatment and dewatering is adopted.

The resulting storage requirements for each area of 'total capture' based on the sub-catchment area is:

- **650m^3 per ha** – based on 2day time for treatment and dewatering
- **1250m^3 per ha** – based on 5day time for treatment and dewatering

4.6 RIPARIAN WORKS

The northern portion of the site contains a number of riparian works, including:

- Temporary crossing of Raff Creek and the unnamed drainage line to provide haul roads to borrow area and existing stages
- Construction of Wetland 5
- Realignment of unnamed tributary
- Construction of permanent crossings of Raff Creek and the unnamed drainage line

Permanent waterway crossings will be the subject of further design and applications.

Works within streams and riparian areas are addressed in Appendix I of IECA (2008). Due to the size of the external catchments of both Raff Creek and the unnamed tributary and the likelihood of permanent baseflows and the risk of stormflows, it is recommended that construction of both the temporary haul road crossings and the permanent crossings are undertaken using isolation barriers and flow diversions. An example methodology is provided in IECA (2008) Figures I32 – I36 and is partly reproduced below in Figure 8.

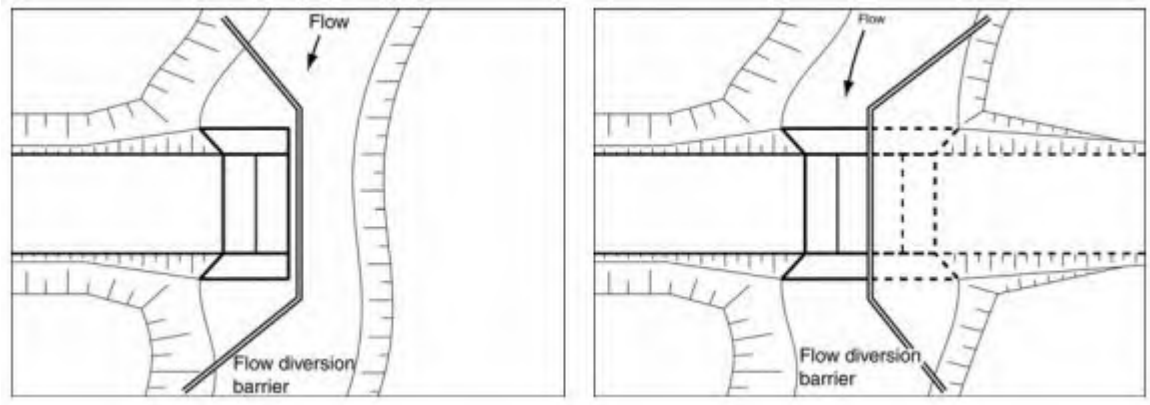


Figure 8. Crossing Methodology Using Isolation Barriers and Flow Diversion (source: IECA, 2008)

IECA (2008) provides minimum requirements for land clearing and rehabilitation associated with riparian works. These requirements provide generous timeframes for rehabilitation which are inconsistent with the significant water quality risk posed by these types of works.

It is proposed that the following land clearing and rehabilitation performance requirements are adopted instead:

1. Waterway works are scheduled to occur during periods of very low erosion risk (July-September), or at other times of the year only where the exposed area which may be exposed to flows can be limited to an area which can be stabilised prior to forecast rainfall
2. Flow diversions are to remain in place until the area of work has been stabilised (90% cover) using methods suitable for the expected velocity

Where possible, stabilisation should utilise the ultimate landscape outcome proposed for the riparian area.

5 MONITORING

Automatic monitoring of water quality (turbidity and pH) should be implemented at the discharge of each HES basin and an automatically operated valve installed to prevent any release if the water quality targets specified in Table 1 are exceeded.

Manual testing of pH and turbidity is required to be undertaken for any water captured within the total capture areas and the water quality targets specified in Table 1 are required to be achieved prior to the captured water being released from site.

It is recommended that monthly audits are undertaken of the works by a CPESC independent of the Principal Contractor. Monthly auditing should be undertaken following the procedures which would be followed should a compliance inspection be undertaken by Department of Environment and Science officers.

These procedures are documented in *Procedural guide - Compliance notes – Land development and construction sites greater than 1000m2* (DEHP, 2016).

6 REFERENCES

Cardno (2019) *Technical Memorandum – Hydraulic Assessment – Works 2*

Department of Environment and Heritage Protection (2016) *Procedural guide - Compliance notes – Land development and construction sites greater than 1000m2*

DesignFlow (2023) *North Harbour (Business Park Change) SQMP MasterPlan V6*

International Erosion Control Association (2008) *Best Practice Erosion and Sediment Control*

International Erosion Control Association (2019) *Appendix B – Sediment Basin Design and Construction*

Tectonic (2019) *Acid Sulfate Soil Investigation and Management Plan – North harbour – Mixed Industry and Business Area*

The State of Queensland (2017) *State Planning Policy*

APPENDIX A – FIELD TESTING RESULTS



Aggregate Immersion Test – T=3mins



Field Emerson Aggregate Test – T=0mins



Field Emerson Aggregate Test – T=3mins

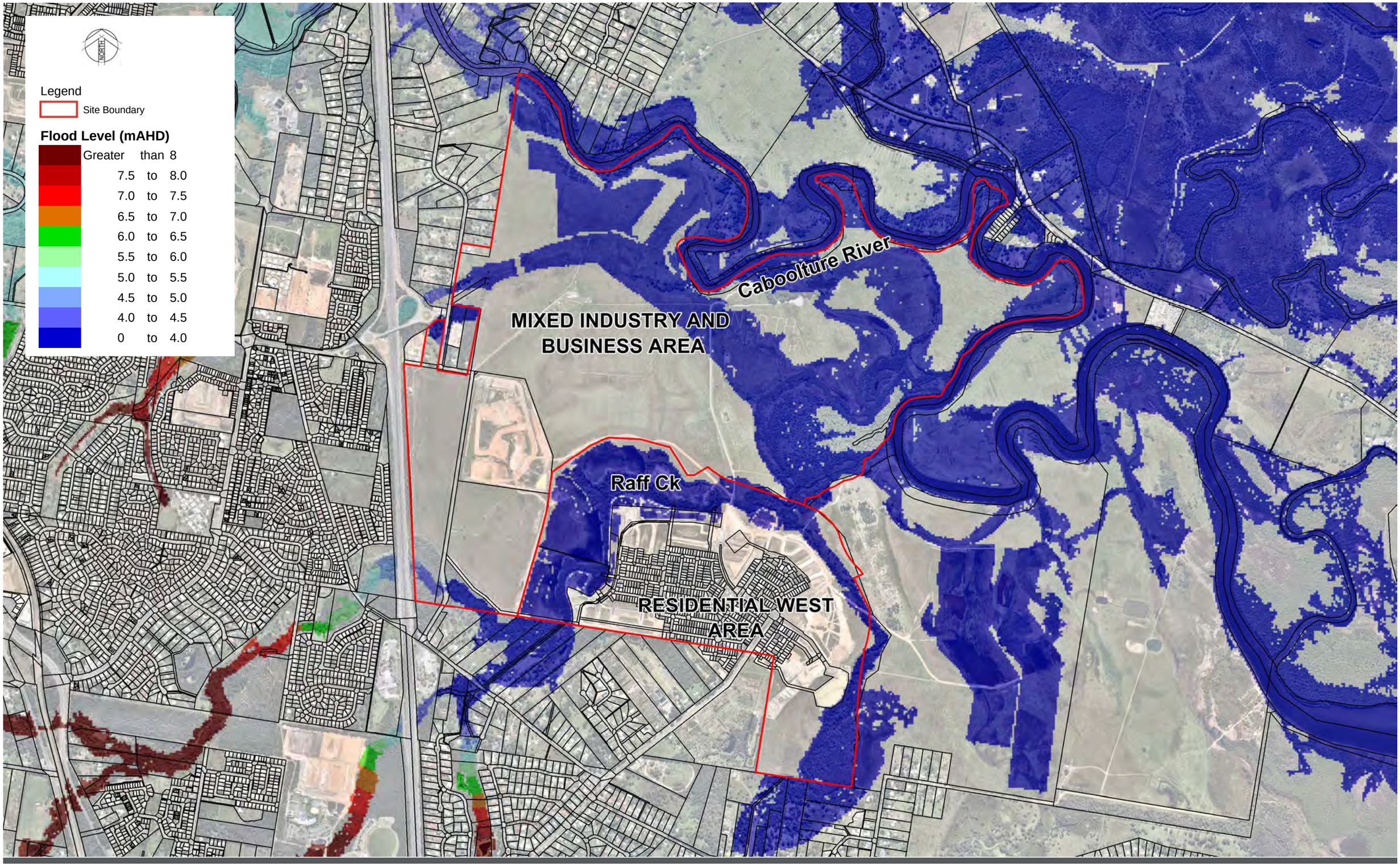


Jar Test – T=0mins



Jar Test – T=15mins after addition of Chitosan

APPENDIX B - FLOOD INUNDATION EXTENT MAPPING



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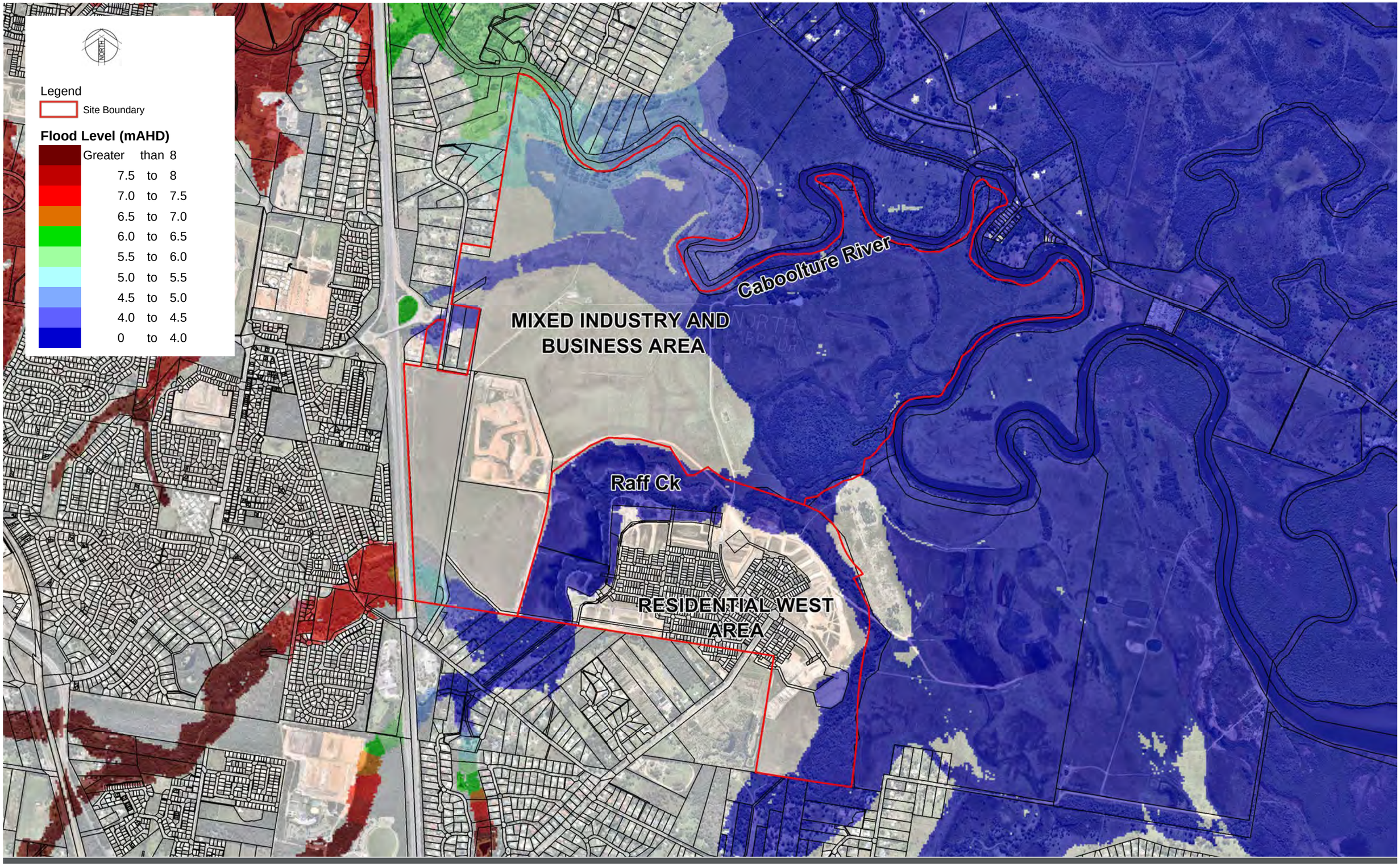
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27 JUNE 2019
Size
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APPENDIX A.1.9
2 YEAR EVENT - PEAK FLOOD LEVEL

HYDRAULIC IMPACT ASSESSMENT

NORTH EAST BUSINESS PARK - WORKS 2



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APPENDIX A.1.5
100 YEAR EVENT - PEAK FLOOD LEVEL

HYDRAULIC IMPACT ASSESSMENT

NORTH EAST BUSINESS PARK - WORKS 2

APPENDIX C – HES BASIN CALCULATIONS

		Q3mth Design Flowrate Calc.						Settling Zone						Forebay		Sediment Storage Zone		
Basin ID	Catchment Area (Ha)	C_{10}	C_1	tc	$I_{1yr,tc}$ (mm/hr)	Q1yr (m^3/s)	Q3mth (m^3/s)	Residence Time (hr)	Settling Zone Depth (m)	Ave. settling zone area (m2)	Settling Volume (m3)	W:L (1:X)	Scour Velocity (m/s)	Forebay Min. Depth (m)	Forebay Vol (m3)	Sed Storage Vol (m3)	Sed Storage depth (approx.) (m)	Batter (1:X)
1	36.1	0.7	0.56	20.3	72.1	4.05	2.02	1	1.5	4859	7288	3	✖ 0.084	1	729	2186	0.5	3
2	26.1	0.7	0.56	18.4	76.3	3.10	1.55	1	1.5	3717	5576	3	✖ 0.073	1	558	1673	0.5	3
3	20.4	0.7	0.56	23.8	66	2.09	1.05	1	1.5	2513	3770	3	✖ 0.060	1	377	1131	0.5	3
4	47.3	0.7	0.56	31.7	57.9	4.26	2.13	1	1.5	5112	7668	3	✖ 0.086	1	767	2300	0.5	3
5	16.3	0.7	0.56	19.6	72.1	1.83	0.91	1	1.5	2194	3291	3	✖ 0.056	1	329	987	0.5	3
6	11.9	0.7	0.56	14.3	84.7	1.57	0.78	1	1.5	1881	2822	3	✖ 0.052	1	282	847	0.5	3
7	18.7	0.7	0.56	24.4	65	1.89	0.95	1	1.5	2269	3403	3	✖ 0.057	1	340	1021	0.5	3
8	17.8	0.7	0.56	21.1	70.3	1.95	0.97	1	1.5	2336	3504	3	✖ 0.058	1	350	1051	0.5	3
9	1.7	0.7	0.56	10.2	97.3	0.26	0.13	1	1.5	309	463	3	✖ 0.021	1	46	139	0.7	3
10	10.9	0.7	0.56	14.7	82.6	1.40	0.70	1	1.5	1681	2521	3	✖ 0.049	1	252	756	0.5	3

APPENDIX 7 – ACID SULPHATE SOIL INVESTIGATION AND MANAGEMENT PLAN (TECTONIC GEOTECHNICAL 2019)

ACID SULFATE SOIL INVESTIGATION & MANAGEMENT PLAN

NORTH HARBOUR MIXED INDUSTRY AND BUSINESS AREA (MIBA)



Report for North Harbour Holdings Pty Ltd
Report 19210-001-Rev0
8 November 2019

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1.0 INTRODUCTION

North Harbour Holdings Pty Ltd (North Harbour) is proposing the development of an integrated industrial and business precinct known as the Mixed Industry and Business Area (MIBA), as the next stage of land development at North Harbour. The proposed MIBA development encompasses several large lots and incorporates a total area of approximately 260 hectares.

This report details the results of an acid sulfate soil (ASS) investigation undertaken to assess the environmental hazard associated with the disturbance of ASS during proposed development and incorporates an overarching ASS Management Plan (ASSMP) to demonstrate how potential environmental risks will be mitigated during development.

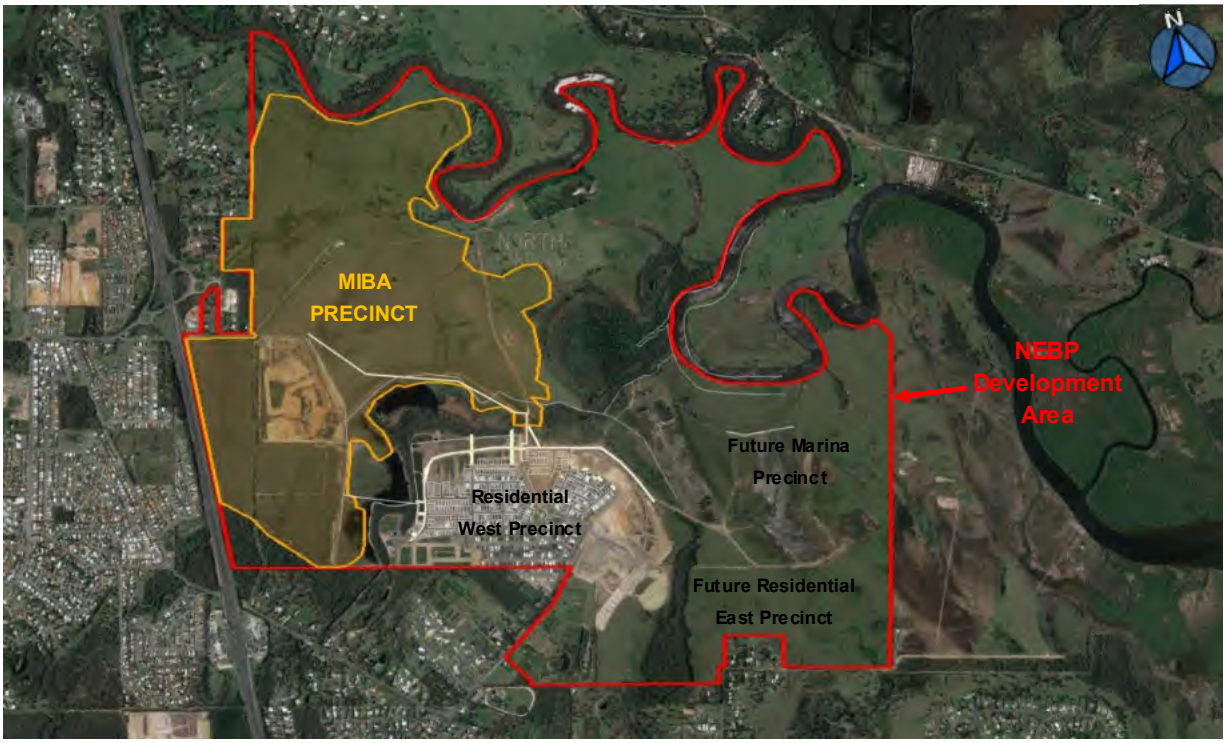
The investigation was completed by Tectonic Geotechnical Pty Ltd (Tectonic) for North Harbour in accordance with proposal P19304-Rev1, dated 4 September 2019.

2.0 PROPOSED DEVELOPMENT

The project holds preliminary approval from the Moreton Bay Regional Council. Because of its former status as a project of state significance, the conditions of approval require this ASSMP to be submitted to the office of the QLD Coordinator General for state government approval. Several previous ASSMP's have been previously submitted and approved for other works elsewhere on the overall project site.

The project area is located adjacent to the Bruce Highway on the southern bank of the Caboolture River near Burpengary, approximately 8 km inland from the coastline. The development area borders tidal waters of the Caboolture River and has relatively low ground surface elevations across the site, ranging from around RL 2.0 m to RL 19 m AHD.

Text Figure 1 illustrates the general NEBP development area and proposed MIBA precinct.



Text Figure 1: General NEBP and MIBA Site Location

The MIBA precinct is expected to facilitate a mix of industry and business use areas, and will consist of the development of low, medium and high density industrial and commercial spaces, associated road and infrastructure networks (including an arterial connection to other NEBP precincts), compensatory cut areas, drainage wetlands and landscaped public space.

2.1 Proposed Site Disturbance Activities

A set of bulk earthworks design plans have been prepared by the KN Group Pty Ltd (Dwg No.: 18-203-01 to 18-203-26, dated March 2019) which indicate the extent of proposed earthworks disturbances to be completed as part of the MIBA site development.

A general layout plan is attached as Figure 1 at the end of this report which illustrates the general development layout and identifies key works which have potential to disturb ASS.

A large proportion of the proposed development site exists at or above an elevation of RL 5 m AHD, on geology which is not associated with the occurrence of ASS and therefore will not have potential to disturb or impact on ASS during development. Works proposed for areas above RL 5 m present negligible risk and may be carried out without need for specific ASS management.

Predicted activities and sources of potential ASS disturbance which are likely to occur below RL 5 m AHD or on geological profiles likely to contain ASS are detailed below.

Proposed Wetlands – Wetland 1 to 5

Required to facilitate urban stormwater management design. Excavation of between 0.5 m to 2.5 m below ground level (BGL) is anticipated across five individual wetlands areas. Proposed wetlands range in size from 1.3 ha to 7.5 ha, with material won from excavation expected to be reused as fill across other parts of the site.

Moreton Bay Boulevard / Urban Arterial Bridge Crossing (Across Raff Creek)

Preliminary earthworks required for construction of the bridge abutment, connecting the existing North Harbour Residential West precinct with the MIBA precinct. Excavations of up to 1.5 m BGL are anticipated for preparatory earthworks across an approximate 1.7 ha area.

It is noted that construction of the bridge may involve more extensive disturbances for bridge foundation works. Such works would be further assessed and individually managed, as part of the bridge design and construction works.

Compensatory Cut – Buchanan Road Drainage Reserve

Required to achieve flood volume offsets and to develop effective drainage pathways. Cut / fill earthworks ranging from + 0.5 m to - 2.0 m from the existing ground surface level are anticipated across an approximately 15 ha area. Material won from excavation is expected to be reused as fill across other parts of the site.

Compensatory Cut – Borrow Area

Required to achieve flood volume offsets and to develop effective drainage pathways. Excavation of between 1.5 m to 2.5 m BGL are anticipated across an approximately 16 ha area. Material won from excavation is expected to be reused as fill across other parts of the site.

General Development Earthworks (Situated below RL 5 m)

Typically consisting of bulk filling for the raising and levelling of urban and industrial allotments and road embankments across approximately 50 ha, typically located below RL 5 m. Anticipated earthworks are expected to be limited to stripping of topsoil (150 to 300 mm BGL) and bulk filling extending up to 3 m above existing ground level. Some disturbance of natural ground may occur during construction of stormwater and civil infrastructure but are expected to be typically limited to within 1 m of the existing ground level.

3.0 INFORMATION ON ACIDIC SOILS

There are two principal forms of acidic soil associated with the proposed development precinct. The first type is acid sulfate soil (ASS) which can be damaging to the environment and built structures. Development involving ASS must comply with the requirements of state and local regulations pertaining to ASS. This includes the State Planning Policy, the Morton Bay Regional Council's Planning Policy and their attendant guidelines.

The second type of acidity present in soil is non-sulfuric acidity, termed Acidic, Non-Sulfuric acidity (ANS). Soils with non-sulfuric acidity are very common in leached landscapes throughout coastal Queensland. These types of soil are mentioned in the Queensland Acid Sulfate Soil Technical Manual, which states that it is unnecessary to regulate these acidic soils as is required for ASS due to their inherent low risk. However, to operate within the requirements of Queensland environmental law, it is prudent to manage the acidity in line with best practice management criteria, if large volumes of ANS soils are going to be disturbed. It is noted that large volumes of ANS soils have been disturbed without management strategies over many years without any reported environmental impact. This type of acidity thus presents significantly less environmental hazard than disturbance of ASS.

3.1 Acid Sulfate Soil

ASS is common in low-lying coastal areas of Queensland, typically in Holocene to Pleistocene (Quaternary) age alluvial sediments, which typically exist below an elevation of RL 5.0 m AHD. Such areas are often characterised by the presence of estuaries, swamps, floodplains, salt marshes and mangroves. The affected soils contain iron sulfides, most frequently pyrite, which, when exposed to air, can oxidise to form sulfuric acid.

When these soils are maintained in their natural setting (generally anaerobic conditions below the groundwater table or sea level), the iron sulfides remain trapped *in situ* and are unable to oxidise, therefore the ASS remains in a stable state. However, where disturbances such as civil construction or development expose ASS to aerobic conditions, the iron sulfides can oxidise and form sulfuric acid, resulting in the disturbed soil becoming acidic. Soils containing iron sulphides are commonly termed *potential ASS (PASS)*. Existing acidity attributed to the past oxidation of ASS may also be present as a result of the previous exposure of PASS material to aerobic conditions. This is commonly termed *actual ASS (AASS).* Also included in the definition of AASS are soils that contain sparingly soluble salts such as jarosite, that can form during the oxidation of sulfides and are capable of generating further acidity as they later dissolve or hydrolyse under acidic conditions. Potential acidity bound up in these salts is referred to as 'retained acidity'.

Sulfuric acidity created by disturbance of ASS presents an environmental risk due to its potential to rapidly alter the pH of soil and water within an environment and increase the mobility of metals which may be naturally present in the soil (i.e. iron and aluminium), thereby producing a leachate contaminated by both high levels of acidity and metals. Associated chemical reactions in highly affected waters can also strip the leachate and the receiving environment of dissolved oxygen. Such leachate, if released into sensitive environments, can have significant adverse effects including degradation of the water quality in receiving areas, fish disease/kills, reduced crop productivity, corrosion of built structures and health related issues. In view of these potential effects, it is critical that any development that occurs within an area likely to contain ASS is planned, managed and monitored appropriately so as to minimise or remove the risk of adverse environmental outcomes.

3.2 Non-sulfuric Acidity

ANS is common in residual and leached landscapes, and generally occurs as a result of hydrolysis reactions associated with leaching of the soils or the breakdown of organics. These forms of acidity are not related to ASS and are not considered as potentially harmful as ASS due to their generally weak nature and low mobility. Where significant volumes of soils with non-sulfuric acidity are expected to be disturbed by the

proposed development, appropriate risk assessment and, if necessary, management controls may be undertaken to ensure potential environmental hazards are appropriately mitigated.

ANS can be identified during an acid based account, through measurement of soluble sulfur (S_{KCl}) following TAA analysis. ANS soils are identified by the following criteria:

- TAA exceeding 18 mol H+/tonne.
- low soluble sulfur (e.g. S_{KCl} < 0.03%)
- no reportable oxidisable sulfur (using S_{CR} or S_{POS} test methods)
- no visual or reportable jarosite, or similar acid-producing iron or aluminium hydroxy-sulfate minerals (using S_{RAS} or S_{NAS} test methods).

Risk assessment for ANS is prudent for soil that exceed the ASS action criteria for management (i.e. existing acidity above 18 mol H+/tonne), however as ANS soils are generally formed as a result of a slow soil weathering process, the acidity is typically well bound to the soil and is not readily mobile, therefore the potential for existing acidity to leach and create environmental issues is relatively low where levels of acidity are generally less than 50 mol H+/tonne.

When large volumes of ANS soils are excavated and placed in locations where they may be subject to readily leached, acidity and metals may be transported out of the soil. For this reason, a series of management strategies have been defined to manage the risk associated with ANS soils. ANS management generally involves neutralisation with agricultural lime, using liming rates guided by quantitative test results.

As the degree of risk posed by ANS is not as potentially hazardous as ASS, neutralisation may typically be undertaken through placement of guard layers, without need for inclusion of safety factors, to intercept and neutralise any leachate. Thorough mixing of treated soil, a fully contained treatment pad or intensive verification testing are not required. The lime guard layers are considered adequate to intercept any potential acidic leachate which may be caused by ANS.

4.0 ASS INVESTIGATION & ASSESSMENT

A site investigation has been undertaken incorporating a review of published geological and ASS risk mapping information and site sampling and analysis, to identify and characterise the presence or absence of ASS across the site, and to quantify potential risks based on the disturbances proposed.

Site investigation has been carried out in general accordance with "*Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland*" (Ahern et al., 1998), and *"Queensland Acid Sulfate Soil Technical Manual: Soil Management Guidelines v4.0"* (Dear et al., 2014), being the applicable guidelines for identification and management of ASS in Queensland.

4.1 Investigation Methodology

QASSIT guidelines suggest two sampling holes per hectare for sites bigger than 4 ha. The subject site measures approximately 260 ha, and as such would require approximately 520 boreholes to provide an assessment to this frequency. A site investigation of this magnitude is considered unnecessary and not technically justified, given the availability of reliable desktop information, generally consistent geological units/topography and an understanding of site conditions provided from previous NEBP site investigations within similar geomorphological conditions (with which Tectonic has been directly involved).

Additionally, an investigation to this level would be expected to provide no significant benefit in terms of reduction of environmental or geotechnical risks associated with the proposed development.

Based on these considerations, a more holistic approach combining an understanding of the site geology, topography, aerial imagery and other supporting data was used to provide a site model. This model has been confirmed via targeted site investigations, soil sampling and laboratory analyses.

From a development perspective, the approach described above allows for distinguishing areas with potentially higher ASS risk from areas with potentially limited ASS risk, from which suitable management

methodology can be developed. This distinction is based on factors such as topographical location, regional geology, soil type, proposed development characteristics and other environmental constraints.

4.2 Desktop Assessment

4.2.1 Regional Geology

A Regional Geology Plan illustrating geology across the proposed MIBA layout is attached as Figure 2 at the end of this report.

Reference to the Geological Survey of Queensland 1:100,000 scale Caboolture and Brisbane maps, indicate that the North Harbour development site has three general geological landforms. These include:

- **Triassic to Jurassic age Landsborough Sandstone (RJl)**
- **Quaternary age Alluvial Sediments – consisting of Estuarine (Qe) and Flood Plain (Qa) Alluvium**
- **Holocene age River Terrace Alluvium (Qha)**

The occurrence of ASS and acidic soil differs significantly between these three formations but is considered relatively consistent within each geological unit. Thus the environmental hazard posed by ASS can be characterised from section to section using local geology supported by quantitative testing completed within each unit.

Geology present in areas above the RL 5 m contour consists mostly of Landsborough Sandstone, with a veneer of flood plain alluvium generally skirting some of the lower valleys. The formation of Landsborough Sandstone is not conducive to the occurrence of ASS and given the elevation of the flood plain alluvium (being underlain by Landsborough Sandstone), no potential exists for Holocene or Pleistocene age ASS materials to exist. The materials located above an elevation of RL 5 m are therefore not considered likely to contain ASS.

Areas located below RL 5 m, comprises of typically alluvial geology, however the alluvium was observed to be quite shallow in some areas, sometimes overlying residual material, particularly near geological boundaries close to RL 5 m. ASS is more likely to be present within younger Quaternary estuarine alluvium and Holocene river terrace deposits which are located close to Raff Creek and the Caboolture River.

4.2.2 Regional ASS Mapping

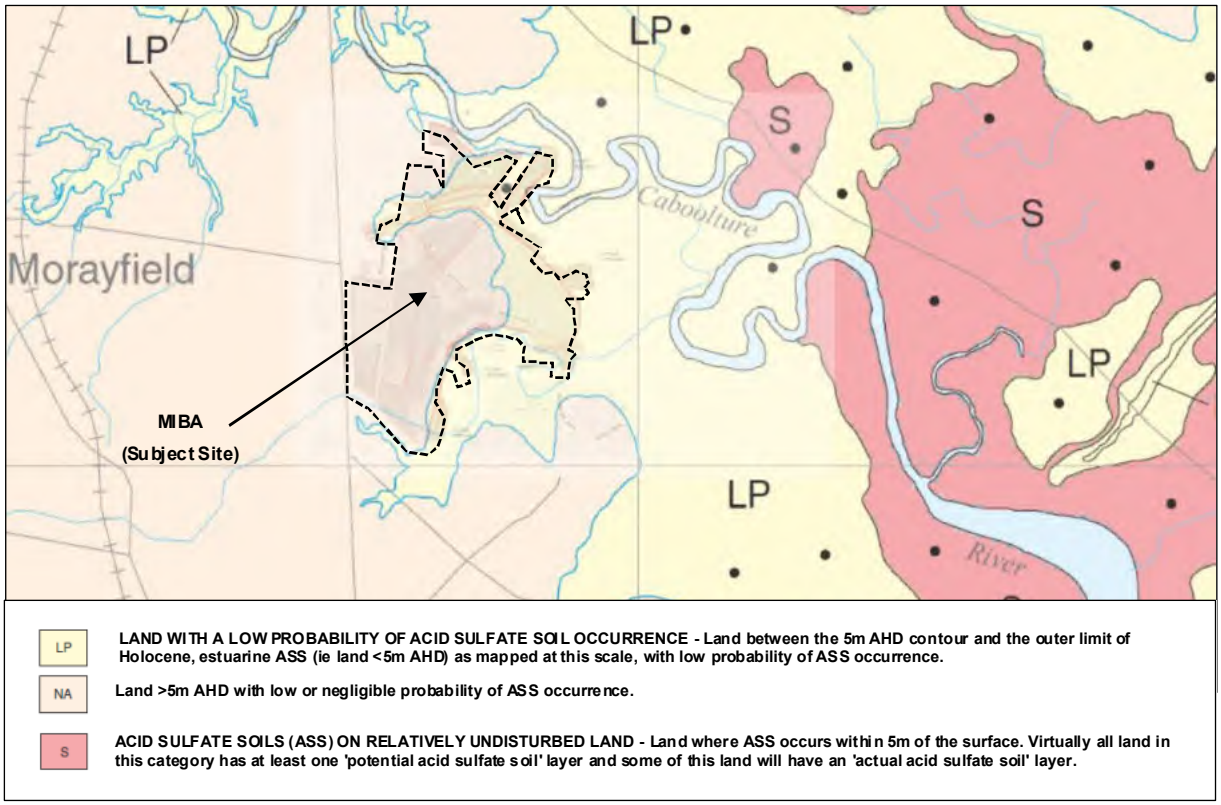
An extract from the Queensland Government's *Acid Sulfate Soils Redcliffe to Teewah Map 2* (NR&M-SEA-I-A0 3261) covering the region is shown in Text Figure 2 over page.

Mapping indicates the presence of primarily **Low Probability** "**LP**" land types across sections of the site situated below RL 5 m contour. Areas located above the RL 5 m contour are considered beyond the outer limit of Holocene estuarine ASS (i.e. land < 5 m AHD) and therefore have very low probability of ASS occurrence.

This description of the LP land type, especially across lower lying Quaternary estuarine alluvium located near Raff Creek, does not match with regional geological mapping discussed above in Section 4.2.1, or past site experience. Our experience is that some weak AASS exists within these lower lying areas.

It is noted that the established boundaries and risk probability have been established using ground contours and known geological boundaries with limited field checking. While ASS risk mapping does indicate a low probability of ASS being present across the entire site, some potential for ASS to exist would be likely across lower estuarine alluvial soils.

The presence nor absence of ASS at a site based on broad-scale mapping alone is not definitive. The presence or absence of ASS at a site may only be confirmed by completion of a site investigation, involving site assessment and quantitative analyses.



Text Figure 2: Redcliffe - Teewah Acid Sulfate Soils Map 2 (NR&M-SEA-I-A0 3261)

4.2.3 Supplementary Site Data

A number of previous ASS investigations have been completed as part of the ongoing development of North Harbour, which has involved completion of over 300 investigation boreholes, including pH field screen testing on over 2,950 samples, and quantitative analyses on over 760 samples using the chromium reducible sulfur (CRS) suite.

ASS investigation data relevant to the proposed works has been sourced from the following reports:

- North East Business Park - Residential West, *Acid Sulfate Soil Investigation Report and Management Plan (Revision 8)*, prepared by Coffey Geotechnics Pty Ltd (Report No.: GEOTKPAR01976AC-D(Rev8), dated 22 December 2015).
- *Acid Sulfate Soil Investigation & Management Plan*, Proposed Sewer Gravity Main, North Harbour, prepared by Tectonic Geotechnical Pty Ltd (Report No.: 17348-004-Rev0, dated 26 June 2018).

In addition to boreholes completed as part of the current site investigation, an additional 13 ASS investigation sites, located within 25 m of proposed works (Wetlands 1 to 3 and Moreton Bay Blvd / Urban Arterial Bridge Connection), were able to be included as part of the assessment. Supplementary ASS data obtained for these boreholes includes approximately 116 pH field screen results and 41 quantitative test results.

4.3 Field Investigation

Based on the basic geographical model and consideration for proposed key disturbance areas, a total of 85 investigation boreholes were drilled across the site to characterise sub surface soil conditions in the key areas of proposed disturbance. The investigation targeted all development disturbances associated with the proposed works, including proposed earthworks for urban development areas, compensatory cut zones and proposed constructed wetlands. The respective borehole locations and depths, relating to proposed disturbance areas are set out in Table 1.

Table 1: Investigation Summary

Proposed Works	Area	Proposed Disturbance	Current Boreholes	Target Depth	Available Supplementary Data	Investigation Frequency
Wetland 1	2.9 ha	Up to 1.5 m Cut	BH01 to BH03	2.5 m BGL	TP305 to TP309	> 2 / ha
Wetland 2	2.0 ha	Up to 1.0 m Cut	BH04 to BH05	2.0 m BGL	TP301, TP315, TP316, TP318 & TP319	> 3 / ha
Wetland 3	1.3 ha	Up to 0.5 m Cut	BH06 to BH08	2.0 m BGL	2x (TP334 & TP336)	> 2 / ha
Wetland 4	4.7 ha	Up to 0.5 m Cut	BH07 to BH11	2.0 m BGL	-	1 / ha
Wetland 5	7.5 ha	Up to 2.5 m Cut	BH12 to BH20	3.5 m BGL	-	1 / ha
Moreton Bay Blvd / Urban Arterial Connection	1.7 ha	Up to 1.5 m Cut	BH21 to BH24	2.5 m BGL	1x BH1	> 2 / ha
Buchanan Road Drainage Reserve	15 ha	Up to 0.5 m Fill Up to 2 m Cut	BH25 to BH39	3.0 m BGL	-	1 / ha
Borrow Area	16 ha	Up to 2.5 m Cut	BH40 to BH55	3.5 m BGL	-	1 / ha
General Development Earthworks (Located < RL 5 m)	~ 50 ha	Up to 0.5 m Cut Up to 3 m Fil	BH56 to BH85	2.0 m BGL	-	< 1 / ha

Fieldwork was carried out between 11 September and 27 September 2019 by experienced geotechnical engineers, engineering geologists and environmental scientists from Tectonic. Borehole investigation locations were positioned utilising hand-held GPS units with reported accuracy of ± 3 m.

Boreholes were drilled using a 100 mm auger (with TC bit) mounted on a 4WD utility, operated by a licensed driller from Contract Drilling Pty Ltd. Boreholes were logged by Tectonic in accordance with the AS1726-2017 *Geotechnical Site Investigations*. All boreholes were backfilled with drill spoil on completion, with excess spoil mounded and compacted at the surface.

Where encountered, details of groundwater seepage and/or depth to the standing groundwater table were recorded on borehole logs and are summarised in Sections 4.4 and 4.5.

The depth and locations of investigation boreholes were determined based on the extent and depth of the proposed disturbance occurring within each development area (Refer Table 1). The target depths for all boreholes completed during the site investigation exceeded the proposed disturbance depths by a minimum 1 m, except where refusal in low strength sandstone (non-ASS material) was encountered.

Soil samples were collected at 0.25 m depth intervals from all boreholes for laboratory assessment. ASS sampling protocols were observed in the field in order to restrict the potential for oxidation of samples prior to laboratory testing.

Borehole locations are illustrated in the Investigation Location Plan attached as Figure 3. Borehole logs, along with explanatory notes explaining the terms and symbols used, are presented in Appendix A.

4.3.1 Laboratory Testing

Collected soil samples were dispatched to Eurofins MGT, a NATA accredited analytical laboratory located in Brisbane.

All soil samples collected during site investigations (No. 850) were screened to determine field pH (pH_F) and pH after peroxide oxidation (pH_{FOX}). These results allow a qualitative assessment of the ASS nature of the sample.

Of the 850 soil samples submitted for screen testing, 221 samples were selected to undergo quantitative analysis by the Total Actual Acidity (TAA) and Chromium Reducible Sulfur (CRS) suite in accordance with the ASS Method 23F (TAA) and 22B (CRS) laboratory procedures.

The quantum of any actual acidity was able to be assessed using TAA while soluble (pre-oxidation) sulfur (S_{KCl}) testing was used to assess the nature of the measured acidity.

The pH screening and CRS laboratory test results are tabulated in Table B1 (Appendix B), where ASS laboratory test certificates are also presented.

4.4 Subsurface Conditions

The subsurface conditions encountered in the boreholes were generally consistent with the regional geological formations described in Section 4.2.1.

Wetland 1 (BH01 to BH03 and TP305 to TP309)

Subsurface conditions encountered across Wetland 1 consisted 0.5 m to 1.2 m depth of flood plain alluvium consisting primarily of stiff to very stiff silty and sandy clays, underlain by very stiff to hard residual sandy clay and very dense clayey sand. Distinctly weathered sandstone was encountered from 1.1 m to 2.25 m BGL, in all three current boreholes and in supplementary test pits TP306 to TP309. No seepage or standing groundwater was observed in any of investigation sites.

Wetland 2 (BH04 to BH05 and TP301, TP315, TP316, TP318 & TP319)

Subsurface conditions encountered across Wetland 2 comprised primarily of flood plain alluvium consisting interlayered firm to very stiff silty / sandy clay and clay at depth ranging from 0.2 m at the north-western end, to beyond the target depth of 2 m BGL at south-eastern end (nearer Raff Creek). The northern end was typically underlain by residual sandy clay becoming distinctly weathered sandstone. Groundwater seepage was observed across the south-eastern side of Wetland 2, with standing groundwater level recorded about 1 m BGL. Groundwater is expected to be more prevalent in closer proximity to Raff Creek.

Wetland 3 (BH06 to BH07 and TP334 & TP336)

Subsurface conditions encountered across Wetland 3 comprised interlayered firm to stiff silty clay, clayey silt and sandy clay (estuarine / river terrace alluvium) to beyond the investigation target depth of 2 m. Groundwater seepage was not observed in any of the current boreholes completed within the wetland footprint, however standing groundwater is noted on supplementary test pit logs completed approximately 50 m south of the wetland site. Standing groundwater in this area is expected to exist approximately 1.0 m to 1.5 m BGL.

Wetland 4 (BH08 to BH12)

Subsurface conditions encountered across Wetland 4 comprised interlayered firm to very stiff clayey silt and silty / sandy clay (estuarine / river terrace alluvium) to beyond the investigation target depth of 2 m. No seepage or standing groundwater was observed in any of investigation sites within Wetland 4.

Wetland 5 (BH13 to BH20)

Subsurface conditions encountered across Wetland 5 comprised mostly of stiff to hard silty / sandy clay extending to beyond 3.5 m BGL (river terrace alluvium), with some loose to medium dense clayey sand (estuarine alluvium) encountered below 2.5 m BGL at the north-eastern end nearer the bank of the Caboolture River (BH20).

Groundwater seepage was generally associated with more permeable sandy materials located closer to Caboolture River, with groundwater inflow recorded in BH20 at about 1.5 m BGL. It is noted that surface elevation at BH20 was several metres lower than the remaining wetland area.

Moreton Bay Blvd / Urban Arterial Connection (BH21 to BH24 and Supplementary BH1)

Subsurface conditions encountered across bridge abutment area associated with the Moreton Bay Blvd / Urban Arterial connection, comprised mostly of estuarine alluvial sediments consisting soft to stiff silty clay (soft estuarine clays), sandy clay and clayey sands extending to beyond the 2.5 m BGL target depth. BH21 and BH23 encountered weak soils at the target depth and were therefore extended to 4.0 m and 2.5 m respectively. As expected, low strength estuarine alluvium was present near Raff Creek. This material had been encountered during past development works on the southern side of the creek. Low strength estuarine alluvium is expected to be several metres thick, progressively thinning, and reverting to stiffer river terrace alluvial soils further back from the creek.

Standing groundwater was recorded in all boreholes in the vicinity of the Arterial road crossing, ranging from 0.4 m to 1.5 m BGL, which is expected to be influenced by surface water conditions associated with Raff Creek.

Buchanan Road Drainage Reserve (BH25 to BH39)

Subsurface conditions encountered across the drainage reserve extending eastward from Buchanan Road comprised stiff to hard silty clay and sandy clay (river terrace alluvium) to beyond the investigation target depth of 3 m. No standing groundwater was observed in any of investigation sites. Some minor seepage was noted in BH30 at a depth of about 1.7 m BGL, which is likely attributed to a small pocket of confined water created by proximity to a localised drainage pathway. No other groundwater seepage was observed at any other site.

Northern Borrow Area (BH40 to BH55)

Subsurface conditions encountered across the northern Borrow Area comprised stiff to very stiff silty clay (river terrace alluvium) to beyond the investigation target depth of 3.5 m, with some dense clayey sand recorded within the upper 1.0 m in BH40, BH45 and BH46. No seepage or standing groundwater was observed in any of investigation sites.

General Development Earthworks (BH56 to BH85)

Subsurface conditions encountered across the urban and industrial development area can be generally separated by the RL 5 m contour. Subsurface profile in areas above RL 5 m typically comprised weathered residual soil comprising sand, silt and clay, derived from weathering of Landsborough Sandstone underlying the site.

BH56 to BH59 consisted 0.7 m to 1.3 m depth of medium dense to dense sand, underlain by stiff to hard silty clay (flood plain alluvium). BH60 to BH79 and BH83 to BH85 consisted mostly of stiff to very stiff silty clay with interlayered silty sand and sandy clay (river terrace alluvium), and more sandy soils encountered in BH70 to BH76 within the upper 1.5 m.

BH80 to BH82 consisted 0.5 m to 1.2 m depth of flood plain alluvium consisting primarily of medium dense clayey and silty sand, underlain by very stiff to hard residual sandy clay and very dense clayey sand.

Standing groundwater was recorded in boreholes BH71, BH73, BH74 and BH75, ranging from 1.5 m to 1.9 m BGL, and is likely influenced by surface water conditions associated with Raff Creek and other low lying areas. No seepage or standing groundwater was observed across the remaining urban development area.

4.5 Groundwater

Groundwater conditions across the site were variable, typically dependant on local topography. Groundwater was not typically observed across elevated (> RL 2 m) parts of the site, however some minor seepage may be observed as waters become perched or confined within sandy layers, or above and/or below less permeable clay layers following rainfall events.

Lower lying sections of the site typically corresponded with the presence of standing groundwater. These areas are generally associated with estuarine and alluvial deposits and lower lying areas mapped as Quaternary age river terrace alluvium. Groundwater in the vicinity of the proposed wetland areas and Urban Arterial Road Connection is expected to be influenced by surface water conditions associated with Raff Creek, or tidal waters located adjacent to lower sections of the site.

It should be noted that groundwater conditions may vary over time, and seepage may develop at locations where not previously observed, particularly following periods of prolonged or heavy rainfall.

Groundwater samples were able to be recovered from boreholes BH04, BH024 and BH74 only which were tested in the field for ASS related physio-chemical parameters. Results are summarised in Table 2.

Table 2: Summary of Groundwater Monitoring

Parameter	Units	BH04	BH24	BH74
Depth (Standing Water Table)	m BGL	1.0	0.9	1.9
pH	pH unit	4.7	4.5	5.8
Electrical Conductivity	µS/cm	2210	6550	1340
REDOX Potential	mV	105	48	215

Groundwater pH values range from 4.5 to 5.8, indicating groundwater to be naturally acidic. This is typical of natural estuarine and alluvial groundwater environments around the North Harbour development.

EC levels indicate that the groundwater in BH74 is generally fresh (< 1,500 µS/cm), whereas groundwater in BH04 and BH24 is brackish (> 1,500 µS/cm), having been impacted by salinity at some stage. Brackish groundwater may be present either due to entrapment of saline water during soil formation or due to inundation of the site by seawater (e.g. during extreme tidal events). This is considered likely given the proximity of the site to the tidally influenced sections of Raff Creek.

REDOX values of 48 mV to 215 mV indicate that the groundwater conditions tend towards chemically oxidative conditions. This is typical of naturally unconfined alluvial groundwater conditions, where the permeable soil profile and variable groundwater conditions allow the presence and availability of *in situ* oxygen.

4.6 Laboratory Test Results

Site and laboratory investigation methods are described earlier in this report, with the current ASS investigation component generally consisting of a total of 85 boreholes, drilled to a minimum 1 m below to depth of proposed disturbances. This was further supplemented by results from 13 ASS investigation boreholes which had been previously completed to depths of between 2 m and 4.5 m BGL along the proposed alignment.

A breakdown of screen testing and quantitative testing results for each major disturbance area is provided in Section 4.7. An ASS distribution plan has been prepared and is attached as Figure 4 showing the interpreted extent of the major geological units based upon site observations, borehole logs, laboratory test results and geological mapping data.

4.6.1 Field Screen Analysis

A total of 966 samples were recovered and assessed by pH field screen analyses as part of the site assessment. Test results indicate that the soil tested from across the site generally have field pH (pH_F) values which range from about 3.7 to 9. These values indicate that *in situ* soil conditions range from strongly acidic to alkaline across the site.

It was observed that the more acidic samples, and those indicating a higher likelihood of ASS, typically came from Quaternary estuarine sediments (Wetland 3, Wetland 4 and Moreton Bay Blvd/Urban Arterial Crossing) and, to a lesser extent, Holocene river terrace alluvium and Quaternary flood plain alluvium, where these geologies exist (generally at lower topographical locations).

Oxidised pH (pH_{FOX}) testing consistently recorded pH_{FOX} values of less than 3 for samples from varying depths and locations throughout the soil profile, but again with generally higher likelihood for potential ASS to be present within Quaternary estuarine sediments and, to a lesser extent, Holocene river terrace and Quaternary flood plain alluvium located at lower topographical locations.

It is noted that pH screen testing is indicative only and cannot definitively confirm the presence of ASS, nor can it quantify the nature or strength of any acidity present. Further quantitative laboratory testing was therefore carried out on a range of samples in order to assess the strength of any acidity, and to quantify the oxidisable sulfur content present.

4.6.2 Quantitative Laboratory Analysis

Quantitative laboratory analyses from 221 samples using the CRS suite of testing were used in order to quantify the severity and nature of any acidity or potential acidity present in the soil profile. This testing was further supplemented by an additional 41 sample results which were sourced from previous site investigations within and adjacent to Wetlands 1, 2, 3 and Moreton Bay Blvd / Urban Arterial bridge abutment.

Based on the nature of the proposed disturbance, an action criteria of 0.03 %S (18 mol H^+ per tonne) was adopted for comparison with the combined actual and potential acidity results.

Of the combined 262 samples that underwent quantitative testing, 161 samples recorded a net acidity above 18 mol H^+ per tonne, indicating the presence of acidic soils at the site.

TAA levels, as a measurement of existing acidity, recorded between < 2 mol H+ per tonne and 200 mol H^+ per tonne, with an average of 60 units. There were 151 of 262 samples having TAA levels higher than 18 mol H^+ per tonne. Levels of soluble sulfur (S_{KCl}) within these samples exceeded 0.03% for only 40 of the 151 exceeding samples with an average of some 0.05%S (equivalent to 30 mol H+ pere tonne), indicating that sulfuric based acidity accounts for less than 15% of the total actual acidity recorded. The actual acidity measured is thus predominantly non sulfuric.

Oxidisable sulfur / PASS, as indicated by S_{CR} above 0.03 %, was recorded in only 14 of the 262 samples tested, typically obtained from Quaternary estuarine sediments. In the samples exceeding the action criteria, sulfide concentrations ranged from 0.03% (18 mol H+ per tonne) to 3.9% (2400 mol H+ per tonne) sulfur.

Some retained acidity, as indicated by S_{NAS} above 18 mol H+ per tonne, was also recorded in 21 of the 262 samples tested. Retained acidity was noted to be in the range <10 to 75 mol H+ per tonne with an average of some 31 units. It was variably distributed throughout Holocene River Terrace Alluvium and Quaternary flood plain alluvium. It is noted that retained acidity, where present, was noted to exist above standing groundwater, which indicates that the soluble minerals are likely to be relatively well bound *in situ*, as they have not leached out over the thousands of years since their formation.

Quantitative laboratory analysis confirms that some site soils contain levels of ASS which exceed the action criteria. It is noted that all samples which indicated the presence of existing sulfuric acidity / AASS and PASS were typically obtained from Quaternary estuarine sediments and, to a lesser extent, Holocene river terrace alluvium located at lower topographical locations, in close proximity to Raff Creek or Caboolture River.

Existing, non-sulfuric acidity was noted to be variably present throughout soils associated with Holocene age river terrace deposits, Quaternary flood plain alluvium and residual soils associated with Landsborough Sandstone located at higher topographical locations (> RL 3 m).

The quantified levels of AASS, PASS, retained acidity and ANS soil, where present or absent, as indicated by site investigation and soil test results can be used to provide effective characterisation of major works areas, based on level of ASS risk. From this characterisation appropriate management measures can be adopted for individual works, which can be tailored based on the ASS hazard present.

4.7 Spatial Distribution of ASS

Outcomes of the detailed investigation and testing generally found both actual and potential ASS to be present within some alluvial sediments with varying spatial distribution across the site.

As previously discussed, areas of proposed urban development located above RL 5 m typically consist residual Landsborough Sandstone geomorphology with no potential to contain ASS. Potential risk associated with ANS soil in these areas is considered negligible and earthworks may be completed without specific management measures.

Management strategies and controls used to mitigate risk associated with ASS during the proposed development have been based on the level of risk identified in various areas of proposed disturbance. The zones for ASS management have been characterised to ensure that all soils within that zone are appropriately managed based on the characterised ASS hazard.

4.7.1 Wetland 1

Boreholes BH01 to BH03 and TP305 to TP309 are located within and adjacent to Wetland 1.

Soils consisted 0.5 m to 1.2 m depth of alluvial silty and sandy clays underlain by residual sandy clay and clayey sand becoming weathered sandstone.

Of the 21 samples selected for quantitative testing from these locations, 18 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of existing acidity. However, the levels of soluble sulfur (S_{KCl}) within the exceeding samples were all less than 0.03%, indicating this to be non-sulfuric acidity (ANS).

No oxidisable sulfur (S_{CR}%) was recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03%.

While samples were found to contain some actual acidity, the acid present is not sulfuric in nature and was not derived as a result of oxidation of acid sulfate soil. These soils are therefore characterised as **non-ASS but contains non-sulfuric acidity (ANS)**.

The net acidity recorded across Wetland 1 samples measured between 3 to 120 mol H+ per tonne, with an average of 42 mol H+ per tonne.

4.7.2 Wetland 2

Boreholes BH04 to BH05 and TP301, TP315, TP316, TP318 and TP319 are located within Wetland 2.

Soils consisted of interlayered alluvial sandy clays at depth ranging from 0.2 m at the north-western end, to beyond the target depth of 2 m BGL at south-eastern end (nearer Raff Creek). The northern end was typically underlain by residual sandy clay grading to distinctly weathered sandstone.

Of the 19 samples selected for quantitative testing from these locations, 17 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of existing acidity. Some soluble sulfur (0.04 to 0.06%) and retained acidity (nil to 79 mol H+ per tonne) was recorded in samples originating from the southern end of the wetland, indicating the presence of some AASS and previous ASS exposure nearer Raff Creek.

No oxidisable sulfur (S_{CR}%) was generally recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03%.

These soils are therefore characterised as **AASS with some retained acidity but contains no PASS**.

The net acidity recorded across Wetland 2 samples measured between 4 to 200 mol H+ per tonne, with an average of 90 mol H+ per tonne.

4.7.3 Wetland 3

Boreholes BH06 to BH07 are located within Wetland 3, with supplementary test pits TP334 and TP336 being located approximately 30 m to the south.

Soils consisted of interlayered firm to stiff silty clay, clayey silt and sandy clay (estuarine / river terrace alluvium).

Of the 10 samples selected for quantitative testing from these locations, 9 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of existing acidity. Some soluble sulfur (0.03 to 0.04%) and retained acidity (nil to 22 mol H+ per tonne) was recorded in samples, indicating the presence of some AASS and previous ASS exposure nearer Raff Creek.

One sample from TP336 was found to contain PASS which recorded 0.06 %, however this sample was obtained from upper surface soils (0.0 to 0.25 m BGL) and is expected to have been affected by estuarine alluvial conditions nearer Raff Creek. No oxidisable sulfur (S_{CR}%) was otherwise recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03%.

These soils are therefore characterised as **AASS with some retained acidity but contains no PASS**.

The net acidity recorded across Wetland 3 samples measured between 9 to 212 mol H+ per tonne, with an average of 82 mol H+ per tonne.

4.7.4 Wetland 4

Boreholes BH08 to BH12 are located within Wetland 4.

Soils consisted interlayered firm to very stiff clayey silt and silty / sandy clay (estuarine / river terrace alluvium) to beyond the investigation target depth of 2 m.

Of the 11 samples selected for quantitative testing from these locations, 10 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of existing acidity. Some soluble sulfur (0.03 to 0.07%) and retained acidity (nil to 28 mol H+ per tonne) was recorded in samples, indicating the presence of some AASS and previous ASS exposure.

No oxidisable sulfur (S_{CR}%) was generally recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03%.

These soils are therefore characterised as **AASS with some retained acidity but contains no PASS**.

The net acidity recorded across Wetland 3 samples measured between 12 to 141 mol H+ per tonne, with an average of 61 mol H+ per tonne.

4.7.5 Wetland 5

Boreholes BH13 to BH20 are located within Wetland 5.

Subsurface conditions encountered across the majority of the Wetland 5 area comprised mostly of stiff to hard silty / sandy clay extending to beyond 3.5 m BGL (river terrace alluvium), with some loose to medium dense clayey sand (estuarine alluvium) encountered below 2.5 m BGL at the north-eastern end nearer the bank of the Caboolture River (BH20). It is noted that surface elevation at BH20 was several metres lower than the remaining wetland area.

Of the 27 samples selected for quantitative testing from Wetland 5, only 6 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of some existing acidity. Soluble sulfur was generally not present, but where present, existing in low values and did not correspond to significant levels of actual acidity.

Oxidisable sulfur (S_{CR}%) exceeding 0.03 % was recorded in estuarine alluvium present below 1.5 m BGL in BH20 but was otherwise not recorded above the lowest recordable limit of 0.005% in any other samples across the remainder of the Wetland 5 area.

The majority of Wetland 5 is characterised as **non-ASS but contains non-sulfuric acidity (ANS),** with the area in the vicinity of BH20 (adjacent Caboolture River) characterised as **containing AASS / PASS.**

The net acidity recorded across the majority of Wetland 5 samples measured between 3 to 120 mol H+ per tonne, averaging 15 mol H+ per tonne. The soils in the vicinity of BH20 measured between 18 to 552 mol H+ per tonne, averaging 218 mol H+ per tonne.

4.7.6 Moreton Bay Blvd / Urban Arterial Connection

Boreholes BH21 to BH24 are located within the proposed abutment works area associated with the Moreton Bay Blvd / Urban Arterial Connection. Supplementary borehole BH1 is located on the southern side of Raff Creek, where some abutment works have been previously completed.

Subsurface conditions encountered across the bridge abutment area comprised mostly of estuarine alluvial sediments consisting soft to stiff silty clay (soft estuarine clays), sandy clay and clayey sands extending to beyond the 2.5 m BGL target depth. These soft estuarine clays are generally water logged and commonly contain ASS.

Of the 15 samples selected for quantitative testing from the proposed abutment works area, 13 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of existing acidity. Soluble sulfur (<0.02 to 0.14%) and retained acidity (nil to 37 mol H+ per tonne) was recorded in samples, indicating the presence of AASS and previous ASS exposure.

Oxidisable sulfur (S_{CR}%) exceeding 0.03 % was recorded in 9 of the 15 samples generally increasing in strength with depth from surface, within the estuarine clays.

The proposed abutment works area associated with the Moreton Bay Blvd / Urban Arterial Connection is characterised as **containing AASS / PASS.**

The net acidity recorded across samples collected from the proposed abutment works area measured between 36 to 2665 mol H+ per tonne, averaging 562 mol H+ per tonne.

The net acidity observed within the soft estuarine clays consists of a combination of AASS and PASS. Should this material be actively dewatered or placed in a location where material is exposed to atmospheric conditions over a prolonged period without management, it is likely that oxidation of pyritic fines would occur, and sulfuric acid would be generated and/or mobilised.

This section of the proposed works represents the most significant hazard, due to the presence and severity of ASS. Specific groundwater and ASS management measures pertaining to disturbance of low-strength estuarine clay within this section are defined in Section 5.

4.7.7 Buchanan Road Drainage Reserve

Boreholes BH25 to BH39 are located within the Buchanan Road Drainage Reserve.

Soils consisted silty clay and sandy clay (river terrace alluvium) to beyond the investigation target depth of 3 m. No standing groundwater was observed in any of investigation sites.

Of the 43 samples selected for quantitative testing from these locations, 34 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of existing acidity. Some soluble sulfur (0.03 to 0.07%) and retained acidity (nil to 38 mol H+ per tonne, typically present at the eastern end) was recorded in samples, indicating the presence of some AASS and previous ASS exposure.

No oxidisable sulfur (S_{CR}%) was recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03%, with the exception of one sample. BH31 recorded an S_{CR} of 0.032 %, marginally exceeding 0.03 % action criteria. This is generally counterintuitive to the occurrence of ASS, as the sample was obtained from near surface (0.0 to 0.25 m BGL) where any PASS would likely have been oxidised under natural conditions, and is considered a tolerable outlier for soil characterisation purposes.

These soils are therefore characterised as **AASS with some retained acidity but contains no PASS**.

The net acidity recorded across the drainage reserve samples measured between 6 to 205 mol H+ per tonne, with an average of 54 mol H+ per tonne.

4.7.8 Northern Borrow Area

Boreholes BH40 to BH55 are located within the northern borrow area.

Soils consisted stiff to very stiff silty clay (river terrace alluvium) to beyond the investigation target depth of 3.5 m, with some dense clayey sand recorded within the upper 1.0 m in BH40, BH45 and BH46 nearer Caboolture River. No seepage or standing groundwater was observed in any of investigation sites.

Of the 55 samples selected for quantitative testing from these locations, 12 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of some existing acidity variably distributed across and throughout the soil profile. Levels of soluble sulfur (S_{KCl}) within the exceeding samples were all less than 0.02%, indicating this to be entirely non-sulfuric acidity (ANS). The strength of the existing acidity measured between < 3 to 38 mol H+ per tonne, with an average of 12 mol H+ per tonne.

No oxidisable sulfur (S_{CR}%) was recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03%.

While samples were found to contain some actual acidity, the acid present is not sulfuric in nature and was not derived as a result of oxidation of acid sulfate soil. These soils are therefore characterised as **Non-ASS containing minor non-sulfuric acidity (ANS).**

It is noted that the strength of the existing non-sulfuric acidity is less than 50 mol H+ per tonne (on average less than 18 mol H+ per tonne) and is therefore not likely to create negligible impact if disturbed. Excavation of materials within the borrow area may therefore be completed without need specific management measures, this includes the use of fill materials sourced from this area.

4.7.9 General Development Earthworks

Boreholes BH56 to BH85 are spread across the general urban development area, being located below RL 5 m. Proposed works across these areas are expected to typically consist of bulk filling activities and minor excavation for stripping of topsoil and installation of civil infrastructure. Standing groundwater was recorded in boreholes BH71, BH73, BH74 and BH75, ranging from 1.5 m to 1.9 m BGL, and is likely influenced by surface water conditions associated with Raff Creek and other low lying areas. No seepage or standing groundwater was generally observed across the remaining urban development area.

Subsurface conditions across proposed filling areas typically consists medium dense or denser sands, and/or firm or stiffer clay subsoils with groundwater generally not present. These being generally overconsolidated river terrace of flood plain alluvium and/or residual soil, the risk of acid migration through displacement of these soils, due to placement of fill loads is non-existent.

Of the 61 samples selected for quantitative testing from investigation locations, 33 samples recorded TAA values above 18 mol H+ per tonne indicating the presence of some existing acidity variably distributed across and throughout the soil profile.

Some minor soluble sulfur (0.03 to 0.04%) and retained acidity (nil to 35 mol H+ per tonne) was recorded in BH68, BH69, BH84 and BH85, located adjacent (and in close proximity to) the Buchanan Rd Drainage Alignment, however the majority of remaining fill areas contained no soluble sulfur or retained acidity. These boreholes are of similar topography and soil conditions to the Buchanan Rd Drainage alignment and will be similarly characterised and managed.

No oxidisable sulfur (S_{CR}%) was recorded above the lowest recordable limit of 0.005%, much less the threshold limit defining PASS of 0.03% in any samples tested.

The soils in the vicinity of BH68, BH69, BH84 and BH85 are therefore characterised as **AASS with some retained acidity but contains no PASS**. The remaining urban development area is characterised as **Non-ASS containing non-sulfuric acidity (ANS).**

The net acidity recorded across the urban development area samples measured between 2 to 158 mol H+ per tonne, with an average of 33 mol H+ per tonne.

Common indicators of ASS in acidic environments raise doubts as to the mobility of the measured acidity present within overconsolidated river terrace alluvium within the drainage reserve area, and it is thus

expected that much of the acidity present in these formations is likely to be tightly bound to the soil structure and is not likely to be readily mobile.

4.8 ASS Risk Characterisation

Based on the proposed disturbance of Quaternary Estuarine Sediments during construction of the Moreton Bay Blvd / Urban Arterial bridge abutment, a liming rate of up to 178 kg per m^3 has been calculated for the treatment of the disturbed soils and management of AASS and ANS soil risks associated with Quaternary age river terrace and flood plain alluvium. It is expected that these works will require more than 25 tonnes of agricultural lime for neutralisation. Thus, the proposed works are categorised as requiring an ***"extra high level"*** of treatment, per the categorisation guide set out in the *Queensland Acid Sulfate Soil Technical Manual*.

Whilst it is noted that the project falls within the extra high treatment category, it is reasonably expected that the ASS hazard associated with these works can be appropriately managed through application of conventional environmental management strategies for ANS, AASS and PASS, which have been already successfully implemented for development works associated with the North Harbour residential development.

Management strategies and controls used to mitigate risk associated with ASS during the proposed development have been based on the level of risk identified in various areas of proposed disturbance and are described in Section 5.

5.0 ASS MANAGEMENT PLAN

The primary objective of this management plan is to provide a framework to allow the proposed works to proceed without adverse environmental impacts related to the disturbance of ASS, and other forms of acidic soil. To successfully achieve this objective, the following strategies will be implemented:

- Minimisation of the spatial and temporal disturbance of areas where ASS may exist, and avoidance of significant changes to any areas outside the civil easement;
- Mitigation of risk associated with ASS present in disturbed soil via neutralisation of disturbed ASS and ANS soil (where potential risk exists), and successful verification testing (on ASS only);
- Containment, testing and treatment (where necessary) of any water collected during the excavation and/or during the treatment processes; and
- Limitation of any alteration to the existing groundwater conditions and appropriate treatment of any collected groundwater before re-use, offsite discharge or disposal.

5.1 Contractor Responsibilities

Any Contractor/s responsible for soil disturbance at the site shall conduct operations in accordance with this ASSMP. Prior to the commencement of works, the Contractor/s shall provide the following information to the Principal:

- Contractor's Environmental Policy.
- Program for Environmental Training of relevant staff.
- Names and responsibilities of specific staff members involved in the supervision of the implementation of this ASSMP.
- The name and qualification of a suitably qualified ASS specialist to be engaged by the Contractor.
- A site-based management plan (SBMP) for the proposed earthworks program including management strategies and controls relevant to key environmental elements.
- A schedule of proactive site inspections to identify any environmental issues and plan necessary remedial actions, and to confirm the ongoing success of any maintenance mechanisms.

The Contractor shall incorporate the requirements of this ASSMP into subsequent construction and environmental management planning. In addition to the requirements of this ASSMP, the Contractor shall also implement appropriate management strategies for mitigation of erosion and sediment transport and stormwater quality on site. Management strategies and controls must be in accordance with International Erosion Control Association's Best Practice Management Guidelines.

Whilst undertaking any works at the site, the Contractor/s shall maintain appropriately detailed records in the following areas:

- Results of any ASS testing as required by this ASSMP;
- Location of soil during the treatment process, including the source of the soil and its final destination, and the rates / total quantities of ameliorant (aglime) added to the soil requiring neutralisation;
- A register of all agricultural lime delivered to site and used on site for the purpose of soil neutralisation, including the volumes of soil treated and the treatment rate.
- A daily log of soil excavation, treatment and relocation activities shall be kept, including locations, relevant zones from the liming application rate plan in this ASSMP, horizons encountered, any observations pertinent to ASS, PASS and ANS management, stockpile dates, approximate position of treated soil placement on site, liming actions and rates, any samples taken and tested and any other information relevant to the treatment and handling of soils and ASS considered necessary by the suitably qualified ASS specialist.
- Results of surface and ground water monitoring as required by this ASSMP and/or the Contractor's SBMP; and
- Incidents, near incidents or complaints related to the performance of ASSMP requirements during the works.

Any management issues relating to the results of the monitoring of standing water levels, pH and/or acid generation in standing water shall be dealt with by the Contractor's SBMP which shall be prepared in accordance with requirements outlined in this ASSMP.

5.1.1 Maintenance of Controls

All environmental protection measures are to be operated in a proper and efficient manner and maintained in effective condition, including undertaking checks after rainfall events that may adversely impact their effectiveness.

5.1.2 Training and Orientation

A training and induction program shall be conducted for all Contractors staff involved in the excavation, transport and handling of earth or earthworks on the site. Sessions will be conducted prior to the commencement of earthworks and at other such regular intervals as required to ensure staff are fully aware of the requirement for field management of ASS and associated waters, the management strategies to be implemented, and their roles and responsibilities in achieving the desired management outcomes.

The Contractor is expected to engage the services of a Geotechnical Consultant to provide advice on various geotechnical aspects of the proposed works, including various forms of quality assurance testing. It is expected that the Geotechnical Consultant can provided advice to the Contractor with regard to the presence and location of various geological boundaries where any ambiguity exists. Should the Geotechnical Consultant provide specific ASS related advice, they must hold the relevant experience and qualification to provide such advice.

5.1.3 Management of Non-Conformance Issues

The Contractor shall assume responsibility for implementation of the ASSMP on site. Where site inspection or associated monitoring highlights an operational condition that does not comply with the requirements of the ASSMP, the breach must be reported to the project Superintendent or Principal within 24 hours of occurrence.

It is the project Principal's responsibility to inform the relevant administering authority, where necessary, within the required timeframes.

The Contractor/s shall always seek a timely resolution with respect to any complaints received in relation to the environmental performance of the works at the site. The standard procedure for dealing with complaint resolution shall be included in the Contractor's SBMP and must involve the implementation of corrective actions to address any non-conformance issues.

All environmental incidents and non-conformances must be recorded in an Environmental Incident Register. The register must be made available to the administering authority upon request.

5.2 Management of Disturbed Material

Material containing ASS, or large volumes of ANS soil, which are excavated or otherwise disturbed as part of development works, will be treated to neutralise the net acidity present, prior to reuse onsite.

The assessment of results, as discussed in Section 4, has characterised the site soils as either:

- Soil containing AASS / PASS,
- Soil containing AASS / Retained Acidity Only (No PASS)
- Non-ASS, but contains non-sulfuric acidity (ANS) requiring treatment, and
- Non-ASS, containing low non-sulfuric acidity (ANS) requiring no treatment.

The distribution of these acidic soils on the site is illustrated in Figure 4.

Methodology and instruction on adequate treatment rates for these soils are discussed below. The treatment regime that must be adopted for the treatment of all soils excavated from areas defined as

containing PASS/AASS or AASS only is set out in Section 5.2.1. Treatment of soil excavated from areas shown to contain only ANS shall be undertaken as set out in Section 5.2.2.

5.2.1 Treatment Methodology for ASS

Prior to the commencement of any excavation works in areas shown in Figure 4 as containing AASS or PASS, a treatment area (or areas) must be adequately prepared for the treatment of excavated materials.

Treatment area/s must allow for the stockpiling of excavated material during the treatment and verification process. The number and size of these treatment areas will be governed by the following factors:

- the total volume of material being excavated and treated,
- the expected rate at which the material is to be excavated, treated and verified,
- the available space within the construction site for treatment areas, and
- the intended final destination of the treated material.

Excavation of material shall not commence until sufficient space in an appropriate treatment area/s is available, firstly to treat the excavated material and then store the treated material whilst verification testing is completed.

Treatment areas may be temporary, or they may be located at the final intended destination of excavated material. The latter is appropriate in this case as the excavated materials are to be placed over a typically clayey soil subgrade which will have been mechanically compacted resulting in low permeability.

The treatment area/s shall consist of a near level area effectively controlled by drainage or earthen bunds (of non-ASS material or previously treated and verified material), placed to prevent the escape of acidic leachate or runoff from untreated/stockpiled material during the treatment process. The drainage and bunding must also exclude stormwater from areas outside the treatment area from entering the treatment area.

Where earthen bunds are used to capture and retain any leachate or runoff, the bunds must be of sufficient size to retain a 24 hour storm event with a 1 in 5 year annual recurrence interval (ARI). The storage volume within the bunds must also include an allowance for the storage of stockpiled ASS.

Where soils are treated at their final destination, controlled drainage shall be used to capture and retain any leachate or runoff from the treatment area and deliver it to a retention basin. Treatment areas must be bunded to prevent uncontrolled discharge and to direct runoff into a drainage system.

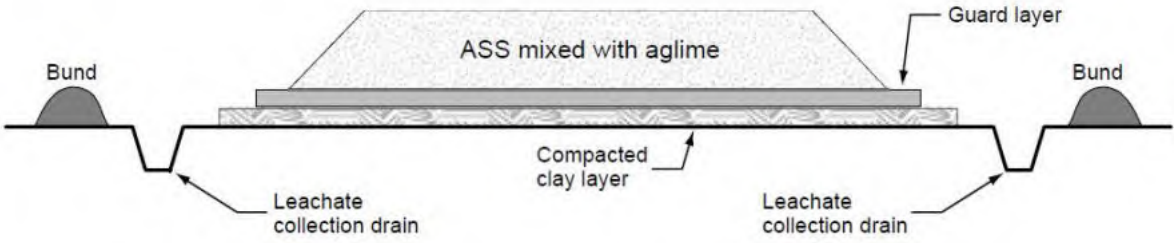
The contractor shall ensure that the permeability of the base of each treatment area is sufficiently low to reduce the likelihood that leachate from the treatment area making its way into the groundwater at the site. Soils on the base of the treatment area should have a permeability less than $1x10^{-7}$ metres per second. Lining the base of a treatment area with compacted clay may be required if the existing base consists of sandy soil.

Appropriate erosion and sediment control measures must be implemented in accordance with the International Erosion Control Association's Best Practice Guidelines, which should adequately contain and control runoff from all areas of land used for the treatment of ASS. All runoff generated from the ASS treatment area(s) (including dewatering and excavation activities) must be contained, tested and treated (if necessary) prior to discharge or re-use onsite. Treatment basins must be appropriately sized to contain and treat runoff in accordance with current industry standards. Drainage and or diversion works must also exclude stormwater from areas outside the treatment areas from entering the treatment basin / bunded area.

For the treatment of ASS excavated from the trenching required for the construction of civil infrastructure, the use of the treatment pad may be more appropriate. As backfilling normally progresses closely behind the excavation and pipe installation, it is likely that the results of validation testing of the treated backfill will not be available prior to backfill placement. In order to allow the works to progress smoothly, a stockpile of treated and validated soils should be kept on site for immediate use as trench backfill. The stockpile can be replenished with the treated materials as the results of successful validation treatment come available. Regardless of the proposed construction method, only validated backfill shall be replaced in the trenches by the Contractor.

If the selected treatment areas are to be the final placement destination of the excavated material, geotechnical advice should be sought as required regarding the construction of the treatment areas. This will ensure that the treatment areas comply with the appropriate requirements regarding placement of structural fill at the site.

An example of a typical treatment pad construction is provided as Text Figure 6 below.



Text Figure 3: Example of controlled ASS treatment pad

Regardless of whether temporary or permanent treatment areas are selected, the distance between the excavation area and treatment area is to be kept as short as practical.

Prior to the placement of any excavated material containing AASS / PASS within a treatment area, the base of the treatment area is to be pre-treated with agricultural lime at a rate of 8 kg/m^2 for every metre or part thereof in height of material to be stockpiled or placed on the site.

ASS shall be stockpiled for no more than 48 hours prior to neutralisation.

All treatment areas are to be identified by signage in order to allow for the tracking of material through the excavation, treatment and verification process.

Lime treatment will be completed at the rates specified in Table 3 in Section 5.2.3. In order to achieve successful treatment, it is critical that the appropriate quantity of lime is thoroughly mixed with the excavated material. Excavated material should be spread in layers not greater than 300mm in thickness and the appropriate quantity of lime applied before thorough mixing of the layer. Granular soils are typically easier to treat as the mixing process can be achieved more readily. In the case of cohesive soils (e.g. clays), effective mixing of the layer will be more difficult. However, techniques such as rotary hoeing or disc ploughing can be used to produce the desired mixing. Once the previous layer has been mixed, further layers may be added as required. Caution is advised with respect to total volumes treated prior to verification testing. This will be particularly relevant at the start of the excavation or until experience is gained with respect to the level of mixing which results in successful verification testing.

5.2.2 Treatment of Acidic Non-Sulfuric Soil (ANS)

To mitigate risk associated with existing acidity observed in ANS soil, disturbed ANS soil containing acidity exceeding 50 mol H+ per tonne will be treated with fine grained agricultural lime to neutralise any potential leachate from the excavated materials.

As the risk posed by ANS soils is not as significant as ASS, neutralisation may be undertaken through placement of guard layers within trench backfill, without the need for thorough mixing of treated soil, the inclusion of safety factors in liming rate calculations, or the use of a specifically contained treatment areas.

Furthermore, ANS soils exist in an environment that is naturally acidic. The use of excessively high liming rates has the potential to alter that environment. The recommended liming rates have thus been calculated to neutralise any possible acid leachate without increasing the pH of the existing environment.

Fine grained agricultural lime will be placed as guard layers between soil layers of ANS fill. The guard layers must be placed at not more than 500 mm depth intervals within the fill profile.

Lime treatment will be completed at the rates specified in Table 3 in Section 5.2.3.

Runoff and potential leachate from treatment and excavation areas must be controlled and managed to mitigate potential effects on ground or surface waters. This should be undertaken in conjunction with an approved Erosion and Sediment Control Plan with all runoff diverted via sediment basins on the site.

Verification testing for confirmation of effective treatment of ANS soil is not necessary. Verification will instead be demonstrated by recording lime delivery and use in a lime register. The register will be maintained by the Contractor and will provide an account of all lime used for the treatment of ANS (and ASS) on the site. It must record the date, quantity, delivery docket number and the area stored for all lime deliveries to the site. The register must also record the area where ASS / ANS is placed and treated, the type and source of the soil, the lime application rate in kilograms lime per square metre and the total quantity of lime used.

The register as specified shows the quantity of lime imported and the quantity of lime used. The register must also show the quantity of lime stockpiled on the site at any time. It is the Contractor's responsibility to check the lime register on a weekly basis and confirm that the quantity of lime stockpiled on the site is in accordance with the quantities shown in the lime register.

The lime register must be available for inspection by the suitably qualified ASS consultant on the project, Superintendent and administering authorities on request, to confirm that appropriate treatment has been completed.

5.2.3 Recommended Liming Rates

ASS distribution with regard to areas of disturbance is illustrated in Figure 4 attached at the end of this report. Recommended lime treatment rates for each characterised section are detailed in Table 3 over page.

These rates assume the use of fine grained agricultural lime with a purity of not less than 90%, a soil bulk density of 1.7 tonnes per cubic metre, and a factor of safety of 1.5 (included for ASS materials only), to allow for incomplete mixing and the reactivity of the lime.

These rates are recommended rates only and are based on the results of the laboratory analysis performed on the samples collected during site investigations. The applicability of these rates to the broader scale of the entire excavation is a function of the degree to which the samples taken during the investigation are representative of the material to be excavated as a whole.

Table 3: Recommended Lime Application Rates

Works Area	ASS Risk Characterisation	Liming Rate
Wetland 1	Non-ASS, but contains non-sulfuric acidity (ANS) requiring treatment	9 kg/m^3
Wetland 2	Soil containing AASS / Retained Acidity Only (No PASS)	23 kg/m^3
Wetland 3	Soil containing AASS / Retained Acidity Only (No PASS)	18 kg/m^3
Wetland 4	Soil containing AASS / Retained Acidity Only (No PASS)	13 kg/m^3
Wetland 5 (Majority)	Non-ASS, but contains non-sulfuric acidity (ANS) requiring treatment	3 kg/m^3
Wetland 5 (Northern End)	Soil containing AASS / PASS	59 kg/m^3
Moreton Bay Blvd / Urban Arterial Connection	Soil containing AASS / PASS	178 kg/m^3
Buchanan Road Drainage Reserve	Soil containing AASS / Retained Acidity Only (No PASS)	13 kg/m^3
Borrow Area	Non-ASS, containing low non-sulfuric acidity (ANS) requiring no treatment	* N/R
General Development Earthworks (Located < RL 5 m)	Non-ASS, but contains non-sulfuric acidity (ANS) requiring treatment	7 kg/m^3

* N/R Existing acidity typically < 50 mol H+ per tonne (Average < 18 mol H+ per tonne) no treatment required.

Records of lime delivery and usage at the site will be maintained by the contractor to help verify that appropriate amounts of lime have been used during construction.

Agricultural Lime Availability

The contractor must ensure that a stockpile of at least 10 tonnes of fine grained agricultural lime be kept at the treatment site during the construction period. This stockpile will be stored in a fashion so as to prevent the unplanned release of the lime into the environment, through erosion or runoff.

Lime delivery receipts must be kept and filed by the contractor and used to confirm the appropriate volumes of lime have been used for the soil treatment during the works.

5.2.4 Verification Testing

Verification testing shall be carried out on all treated ASS material to confirm successful treatment has been undertaken. Verification testing will not be required for management associated with ANS materials.

Samples for verification purposes shall be randomly taken from the treated material and tested to confirm that the treatment has been successful. Each verification sample must be taken by mixingmaterial from no less than 6 locations (including at depth) within the treatment area.

As noted above, plant may be required for the collection of these verification samples, particularly if stockpile heights are large. It is recommended that verification samples are collected by an independent testing authority and forwarded to the testing laboratory.

Turnaround times for verification testing vary from laboratory to laboratory and this delay (along with sample freight times) should be factored into the construction program. It is further recommended that an estimate of standard turnaround times is requested from the selected testing laboratory prior to the commencement of works at the site. It may be prudent to utilise rotating treatment areas to allow for the verification testing to be completed without impacting the construction process.

The frequency of verification testing is set at one sample per 500 cubic metres of treated material.

This verification sampling frequency has been selected to balance the potential risk associated with differential availability of the soil's inherent neutralising capacity in the laboratory testing environment in comparison to field conditions.

Acceptance Criteria

The laboratory test regime for validation testing shall involve the measurement of pH, total acidity (the sum of actual, potential and residual acidity) and acid neutralising capacity (ANC). Where the pH post treatment is greater than 6.0 and the ANC is not less than 1.5 times the total acidity, then the validation shall be deemed successful.

It is noted that the post treatment pH criteria is less than that recommended in the Queensland ASS Management Guidelines but is considered appropriate given the natural acidity of the environment.

If any sample in a group of five consecutive samples fails to meet the acceptance criteria, then it may be deemed to pass providing:

- The ANC is greater than the total acidity and all other samples in any five consecutive samples containing the failed sample have met the acceptance criteria; Or
- There is not more than two failed samples in any five consecutive samples containing the failed sample and the average ANC is not less than 1.5 times the average total acidity for any five consecutive samples.

Where a sample fails verification and does not meet the criteria above, re-treatment of the area represented by the sample will be required prior to another series of verification testing. This retreatment and retesting procedure must be repeated until successful treatment has been verified. The requirement for retreatment and retesting may lead to delays in construction if sufficient treatment areas are not available prior to the commencement of the excavation works.

5.3 Management of *In-situ* ASS

5.3.1 Groundwater & Dewatering

Groundwater conditions across the site were variable, usually being dependant on local topography. Groundwater was not typically observed across elevated (> RL 2 m) parts of the site, however some minor seepage may be observed as waters become perched or confined within sandy layers, or above and/or below less permeable clay layers following rainfall events.

Lower lying sections of the site (Moreton Bay Blvd / Urban Arterial Connection and eastern side of the Urban Development Area) typically corresponded with the presence of standing groundwater. Groundwater in

these areas is expected to be influenced by surface water conditions associated with Raff Creek, or tidal waters located adjacent to lower sections of the site.

Lowering of the groundwater table for the purpose of construction in areas where PASS has been identified has the potential to allow oxidation of *in situ* pyritic material. Such oxidation would cause the generation of sulfuric acid *in situ*. This process is irreversible and can cause widespread environmental problems and damage to any infrastructure which may be in contact with the acidic groundwater. Such areas (where PASS has been identified) include the Moreton Bay Blvd / Urban Arterial Connection and eastern end of Wetland 5.

The majority of urban development is anticipated to involve excavation and bulk filling, in areas where groundwater was not encountered. However in isolated cases, some localised dewatering may be required for construction associated with civil infrastructure. Small scale dewatering may be undertaken to facilitate construction of civil infrastructure and minor structures without risk in areas where PASS has not been encountered.

Where dewatering in areas containing AASS or PASS is required, the following management strategies must be undertaken during periods of dewatering:

- Periods of active dewatering without the use of groundwater recharge and management measures shall be limited to a total period of 3 days. At which time pre-existing ground and water levels should be fully reinstated and allowed to recover for a period of no less than 1 week.
- Where groundwater dewatering is required for periods longer than 3 days, active management of the impacts of dewatering must be utilised to limit oxidation of *in situ* PASS. Water pumped from the excavation will be adjusted to a neutral pH and used to maintain the surface soils within 10 metres of the excavation in a moist condition by irrigation to restrict oxygen diffusion through the soil. Alternatively, recharge trenches may be excavated around the perimeter of the excavation to maintain the groundwater levels away from the excavation and restrict the cone of groundwater depression to the immediate vicinity of the excavation.
- Depth of dewatering shall be limited to within 1 metre of the base of the required excavation.
- Quality of groundwater inflows into excavations shall be monitored to ensure *in situ* acidification is not occurring. The monitoring shall involve pH testing of inflows daily during dewatering. It should be noted that groundwater in the area is expected to be somewhat naturally acidic (pH 4.5-6.5).

5.3.2 Fill Placement

Where fill is placed over compressible soils, the load imposed by the fill can cause settlement in the compressible soils. This leads to a short term rise in water table levels and potential for the expulsion and leaching of groundwater into the receiving environment. Where the compressible soils are ASS, then the leachate may be acidic with associated high levels of dissolved metals.

Strength measurements were taken on subgrade soils at investigation sites during the field investigations. The measurements allowed the soil consistency to be recorded on all borehole and test pit logs.

The likely loads associated with fill placement and the construction of structures on the site are between 40 and 50 kPa. The subgrade soils in most boreholes have a bearing capacity far in excess of the likely load and therefore no settlement is likely to occur.

However, a zone of weaker soils (soft estuarine clay) was encountered in BH21, BH22, BH23 and BH24 associated with the Moreton Bay Blvd / Urban Arterial Connection abutment area with consistency measured between 20 and 90 kPa. Some minor settlements in that area may occur. The magnitude of the settlements has been assessed on the basis of typical consolidation parameters for similar soils in similar environments to be 40 to 80 mm. Settlements of this magnitude will have no significant impact on groundwater levels nor will there be any significant expulsion of pore water.

At all other sites, the bearing capacity of the subgrade was assessed to be in excess of 60 kPa but generally in excess of 200 kPa.

5.3.3 Mounding of Groundwater

Where fill soils are placed over relatively flat areas (where standing groundwater exists), mounding of the groundwater is possible. This can lead to the discharge of acidic or contaminated leachate into the adjacent waterways. This impact can occur where the fill materials consist of low permeability materials and the rate of infiltration exceeds the rate of discharge from the aquifer.

For this project, the fill materials consist of compacted low permeability clays and sandy clays with measured permeabilities less than 10^{-8} metres per second. Furthermore, much of the surface will be covered by housing and roads which will shed water.

As the surface infiltration will decrease and there will be no change to the hydraulic conductivity of the underlying aquifer materials, then no mounding of the groundwater is likely and the risk is considered insignificant.

5.3.4 Shear Failure

Where soft subgrade soils are present, shear failure can occur at the perimeter of the fill platform causing the subgrade soils to heave upwards. This can change soil environment in the immediate vicinity from anaerobic to aerobic and allow the oxidation of PASS if present. For this site, the soil strength was measured during the ASS investigation and recorded in the borehole and test pit logs. The investigation indicated that all soils on the site are competent to support the fill loads and that no heave will occur within or around the perimeter of the fill platform.

6.0 WATER QUALITY MANAGEMENT

For each stage of construction, a detailed Erosion and Sediment Control Plan will be prepared by the Contractor which must be implemented to manage stormwater and sediment control onsite. The plan will detail the stormwater control, water quality objectives and erosion and sediment control measures to be adopted.

Erosion and sediment control measures should be implemented in accordance with the International Erosion Control Association's Best Practice Guidelines and must incorporate the water quality objectives and management requirements outlined of this management plan.

Any stormwater release, such as from sedimentation basins, must comply with Table 4 Site Water Quality Release Criteria.

6.1 Construction Water Quality

All runoff generated from the ASS treatment area(s), including excavation activities must be contained, tested and treated (if necessary) prior to discharge or re-use onsite. The treatment basin(s) or earthen containment bunding must be constructed to industry regulation standards and must be of a size not less than that capable of accommodating a 24 hour storm event with an ARI of 1 in 5 years plus sediment storage volume.

Uncontrolled discharge of water from excavations, ASS treatment areas or exposed works areas will not be allowed to occur. Only waters meeting the release criteria specified in Table 4 may be discharged to the receiving environment. Automated dosing of contained stormwater should be undertaken to ensure specified release criteria is achieved, even when the site may be unmanned. Preference will be given to reuse of contained site water over discharge, however it is anticipated that some discharge of surface waters will be necessary during construction.

Potential site water reuses include, but are not limited to:

- groundwater recharge;
- dust suppression;
- conditioning of structural fill or road materials to assist in compaction; or
- watering of vegetation.

The Contractor will be responsible for ensuring relevant water quality criteria are met and are appropriately recorded and reported. This is consistent with general site control requirements for erosion and sediment control during construction.

If discharge from the site is required, performance criteria detailed in Table 4 (below) must be met prior to release. The Contractor will be responsible for ensuring relevant water quality criteria are met prior to discharge.

Table 4: Water Quality Release Criteria

Indicator	Release Limit	Criteria Type	Monitoring Frequency
pH	6.0 to 8.0 [1.]	Range	Once prior to, and at least hourly during release.
Turbidity	To be determined by site specific correlation testing [2.]	Maximum	Once prior to, and at least hourly during release.
Total Suspended Solids	< 50 mg/L	Maximum	Once prior to release.
Dissolved Oxygen	85% to 110 % saturation	Range	Once prior to release.
Dissolved Aluminium	0.2 mg/L	Maximum	Once prior to release.
Dissolved Iron	0.3 mg/L	Maximum	Once prior to release.
Hydrocarbons	No visible sheen or odour in release waters		At all times during any release
Litter/Gross Pollutants	No visible litter washed from the site nor any unsightly flocs deposited in waters downstream of any discharge point		At all times during any release

Notes:

1. As releases of treated water occur to Raff Creek catchment which may host acid sensitive fauna such as acid frogs, a lower level of release pH of 6.0 has been adopted based on background pH levels.
2. Potential correlation may be investigated between turbidity and suspended solids concentration. Where a correlation coefficient of 0.9 or greater is demonstrated based on quality assured sampling and analysis, the corresponding value of turbidity may be used as an operational indicator of suspended solid compliance. Correlation results must be confirmed and approved by the Superintendent prior to implementation by the Contractor. Suspended solid concentrations must still be completed but may be undertaken together with other laboratory analyses.
3. Water quality release limits requiring laboratory analyses shall be collected from stored water bodies and tested on a weekly basis during periods of discharge. Where no turbidity correlation has been achieved, an acceptable suspended solid test result must be obtained prior to commencement of release.

Treatment of ponded water may include the addition of flocculating agents to reduce the suspended solids concentration, and /or the addition of hydrated lime to control pH. In no case should alum be used due to risks of creating additional aluminium toxicity.

6.2 Temporary Groundwater Monitoring

Groundwater monitoring will be carried out at eight monitoring locations (GW101 to GW108) to monitor groundwater, where it exists, and to identify potential impacts to groundwater as a result of construction activities. The location of proposed monitoring bores is illustrated in the groundwater monitoring location plan attached as Figure 5 at the end of this report.

Monitoring bores should be installed in accordance with *Minimum Construction Requirements for Water Bores in Australia,* published by the Queensland Department of Natural Resources, Mines and Energy, to a depth no greater than 6 m BGL.

Prior to commencement of construction works expected to impact groundwater at each monitoring location, a minimum 12 rounds of pre-construction monitoring will be completed (spanning a minimum 3-month period) to obtain a set of background values. Following completion of pre-construction monitoring, regular monitoring will continue throughout the construction period and for a period of 6 months post construction.

The median value of the monitoring results shall be calculated as a running value over the most recent 5 measured values to ascertain general compliance. In addition, individual values for each parameter will be plotted versus time on a graph to demonstrate any trends. Rainfall will also be plotted on the same graphs to illustrate the impacts of rainfall events on groundwater conditions. The running median values will be assessed for compliance against the 20th and 80th percentile background values.

All non-conformances must be recorded by the Contractor in the Environmental Incident Register. The register must be made available to the administering authority upon request.

Should the monitoring indicate no substantial changes to the surface water due to works on the site, the Principal may apply to the administering authority for a reduction of the post construction monitoring program. The monitoring parameters and frequencies are set out in Table 5.

Table 5: Temporary Groundwater Monitoring Parameters and Frequencies

<table>
<tr><th rowspan="2">Parameter</th><th colspan="3">Monitoring Frequency</th></tr>
<tr><th>Pre-Construction</th><th>Construction Phase</th><th>Post Construction</th></tr>
<tr><td>Standing Groundwater Level</td><td rowspan="8">Weekly for a minimum 12 Rounds</td><td rowspan="4">Weekly throughout construction works likely to impact groundwater.</td><td rowspan="4">Weekly for a period of 3 months. Fortnightly thereafter for a consecutive 3 months.</td></tr>
<tr><td>pH</td></tr>
<tr><td>Electrical Conductivity</td></tr>
<tr><td>REDOX Potential</td></tr>
<tr><td>Dissolved Iron</td><td rowspan="4">Monthly throughout construction works likely to impact groundwater.</td><td rowspan="4">Monthly following completion of construction.</td></tr>
<tr><td>Dissolved Aluminium</td></tr>
<tr><td>Titratable Acidity</td></tr>
<tr><td>Chloride Sulfate Ratio</td></tr>
</table>

Monitoring results will be plotted against time to identify any trends or variation from background levels based on the groundwater monitoring undertaken prior to any dewatering.

Groundwater observations and ASS testing completed during previous ASS and geotechnical investigations indicate that PASS is typically located below the existing groundwater table which is usuallywithin 1.5 m of the ground surface level. Groundwater levels can also fluctuate by about 1 metre dependant on prevailing weather conditions and tidal variations. Thus, a drop-in groundwater by more than 1 m below the observed

preconstruction conditions would be expected to increase the likelihood of exposure of *in situ* PASS. It is therefore recommended that, should groundwater levels during construction consistently fall by more than 1.0 m below observed pre-construction levels, an ASS specialist should be engaged to determine whether there has been any significant environmental impact, why the unexpected drawdown is occurring and how the works may safely progress.

In the event of significant prolonged drawdown (> 1.0 m below observed pre-construction levels for a period of more than one week), or a charge in pH level by more than 1 pH unit is observed, dewatering must be ceased and the incident must be reported to the project Superintendent or Principal within 24 hours of occurrence. A report shall be prepared by the ASS specialist, which will set out details of the breach together with the proposed methodology for moving forward including additional management measures and monitoring to demonstrate the effectiveness of the revised strategy.

It is the project Principal's responsibility to inform the relevant administering authority where necessary, and within the required timeframes.

Where non-conformances occur, the suitably qualified ASS expert must be engaged within 24 hours to investigate the non-conformance, assess its likely impact and recommend remediation actions or revised management strategies to prevent future occurrences. The suitably qualified ASS expert will present a report for each such incident.

An assessment of the overall groundwater impacts following completion of post-construction monitoring will be completed and included within the closure report, as detailed in Section 7.

Groundwater sampling and field monitoring must be completed in accordance with the relevant guidelines and best practice methodologies, including the most recent version of the Department of Environment's water quality sampling manual. All samples requiring laboratory analysis are to be appropriately preserved and subsequently delivered in chilled and sealed containers within relevant holding times to a NATA accredited laboratory for analysis.

In the event that one or more of the groundwater quality monitoring wells are damaged and/or the collection of samples is no longer viable, a replacement monitoring well shall be installed forthwith.

6.3 Surface Water Monitoring

Surface water conditions in Raff Creek and Caboolture River will be regularly monitored throughout construction to gauge surface water condition and to identify potential impacts to surface water which may be resulting from disturbance of ASS or acidic soils during construction activities.

A Water Quality Monitoring Plan (WQMP) may be developed to monitor surface water quality with regard to the site to demonstrate compliance with approval conditions. However surface water monitoring as detailed herein will be completed primarily for the purpose of identifying potential water quality impacts with regard to ASS, should they occur. It is noted that construction waters will be contained and controlled within the development site by the Contractor and uncontrolled release of construction waters will not be permitted. Periodic increases in surface water monitoring may be undertaken to investigate potential impacts associated with non-conformance incidents (i.e. uncontrolled releases).

Surface water monitoring will be completed at five surface water monitoring locations. SW101 (Raff Creek) and SW102 (Caboolture River) will be located upstream of the development to provide an indication of background water quality conditions, SW103 (Raff Creek) and SW104 (Caboolture River) will be located immediately down-stream of the development site and at SW105 will be located at the confluence of Raff Creek and Caboolture River some 650 m downstream of the site. Surface watering monitoring will be conducted as per the parameters and frequencies described in Table 6 over page.

Table 6: Surface Water Monitoring Parameters and Frequencies

Parameter	Monitoring Frequency		
	Pre-Construction Phase	Construction Phase	Post Construction
pH (pH Unit)	Weekly for at least 12 rounds prior to construction	Weekly throughout construction works.	Weekly for a period of 3 months.
Electrical Conductivity (µS/cm)			
Dissolved Oxygen (%S)			
REDOX Potential (mV)			
Turbidity (NTU)			
Temperature (°C)			
Total Aluminium (mg/L)		Monthly throughout construction works.	Monthly following for a period of 3 months flowing completion of works.
Dissolved Aluminium (mg/L)			
Total Iron (mg/L)			
Dissolved Iron (mg/L)			
Total Suspended Solids (mg/L)			

General indication of surface water quality will be provided by comparison with upstream and baseline conditions and environmental values and water quality objectives for moderately disturbed, mid to upper estuary conditions, as provided within the Environmental Protection (Water) Policy 2009 for Caboolture River.

Results of regular surface water monitoring will be reviewed by the ASS Specialist and summarised with any comment as part of monthly environmental reporting provided to the Superintendent. The results of surface water monitoring would also be expected to be included in any reporting of non-conformance incidents.

Following the initial monitoring period, monitoring shall continue during the construction period.

7.0 RECORDS & REPORTING

Records must be kept by the Contractor of all information required to be kept under this ASSMP. These must include records of all background characterisations, environmental monitoring, soil testing, details of any incidents and notifications and validation testing.

These records must be made available to the Superintendent, relevant consultants and/or to the administering authority on request.

Monitoring results shall be produced and kept in a form that facilitates interpretation (i.e. excel spreadsheet), including notes (if any) pertaining to major construction activities, rainfall and issues likely to impact monitoring.

A monthly environmental report shall be prepared and provided to the site Superintendent to help gauge ongoing construction management. The report will be prepared on behalf of the Contractor and will summarise the results of environmental monitoring undertaken throughout the month. The monthly report shall include groundwater and surface water monitoring results as well as ASS characterisation and validation testing, together with discussion of any potential issues or non-compliances.

7.1 Closure Reporting

Following completion of bulk earthworks for each major works area (i.e. Wetlands, Borrow Area, etc.) and site remediation, a Closure Report will be prepared to detail the effectiveness of site management measures

undertaken during construction works. The closure report will summarise the details of ASS disturbance and management, including results of all ASS validation testing and site water quality monitoring and management (including records of discharge events). The following information will be included in the closure report:

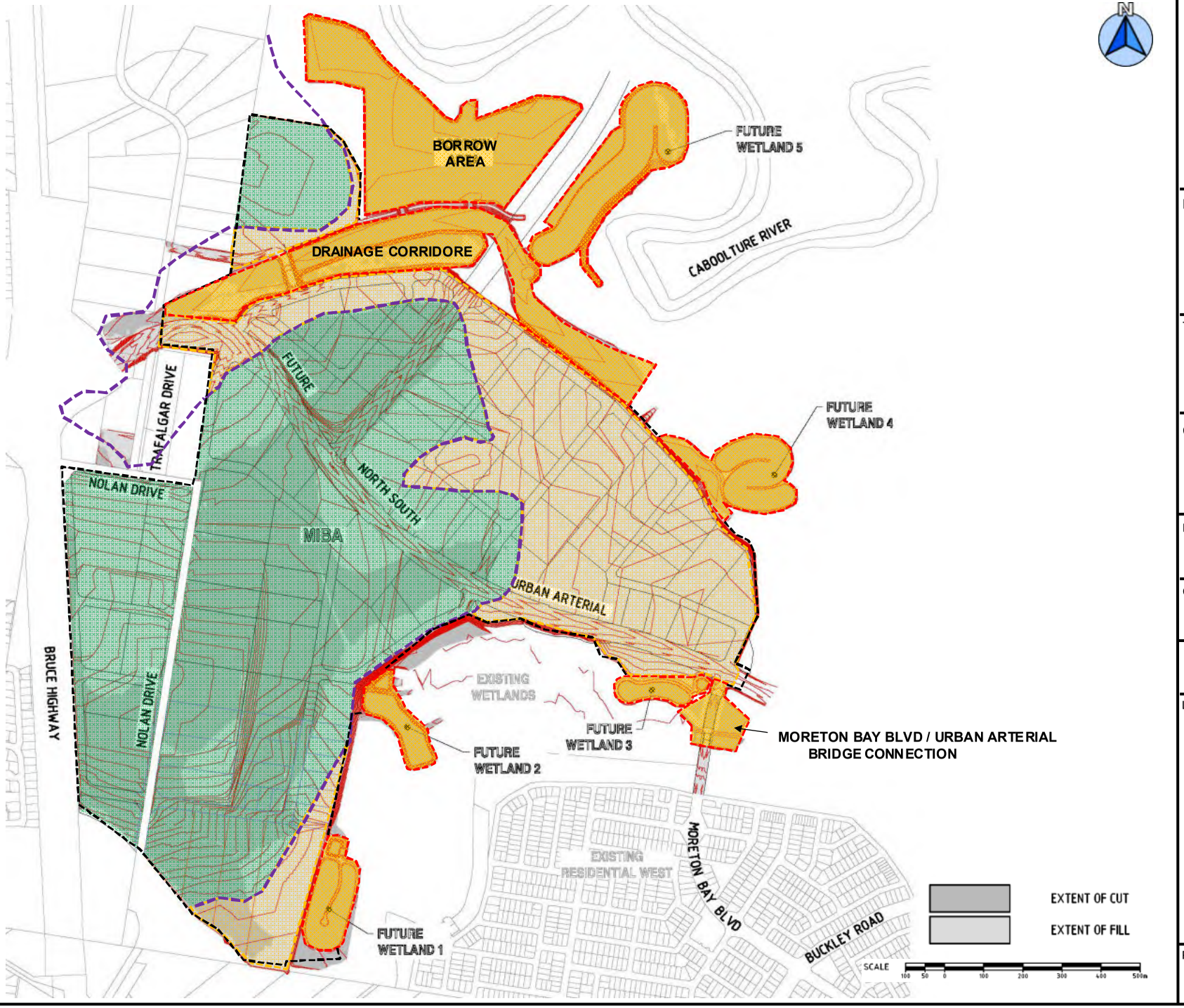
- total final volumes and dimensions of material disturbed, and neutralisation treatment completed;
- location(s) of any external treatment and/or disposal of ASS;
- summary of verification testing results for material treated on or off site;
- details of soil management strategies completed (including evidence (photographic) of specific management measures such as application of lime, mixing, material storage and of treatment areas);
- details of groundwater management undertaken at the site;
- summary of monitoring results for construction waters and groundwater;
- details of any incidence of non-conformity with the approved ASSMP and corrective actions taken;
- proposed future monitoring and/or reporting programs; and
- recommendations of any proposed remediation, if needed.

8.0 LIMITATIONS

This ASSMP has been developed to include procedures and recommendations aimed at minimising of the potential for adverse environmental impacts to result from the proposed disturbance of soils required at this development site.

Should modifications to the procedures and recommendations made in this management plan be proposed, such modifications must be approved by the appropriate regulatory authorities, in writing prior to any modifications being implemented.

Your attention is drawn to the document “Limitations”, which is included in Appendix F of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the services provided by Tectonic for this project.



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PROJECT:
MIBA - NORTH HARBOUR
ASS INVESTIGATION & MANAGEMENT PLAN

TITLE:
GENERAL LAYOUT PLAN

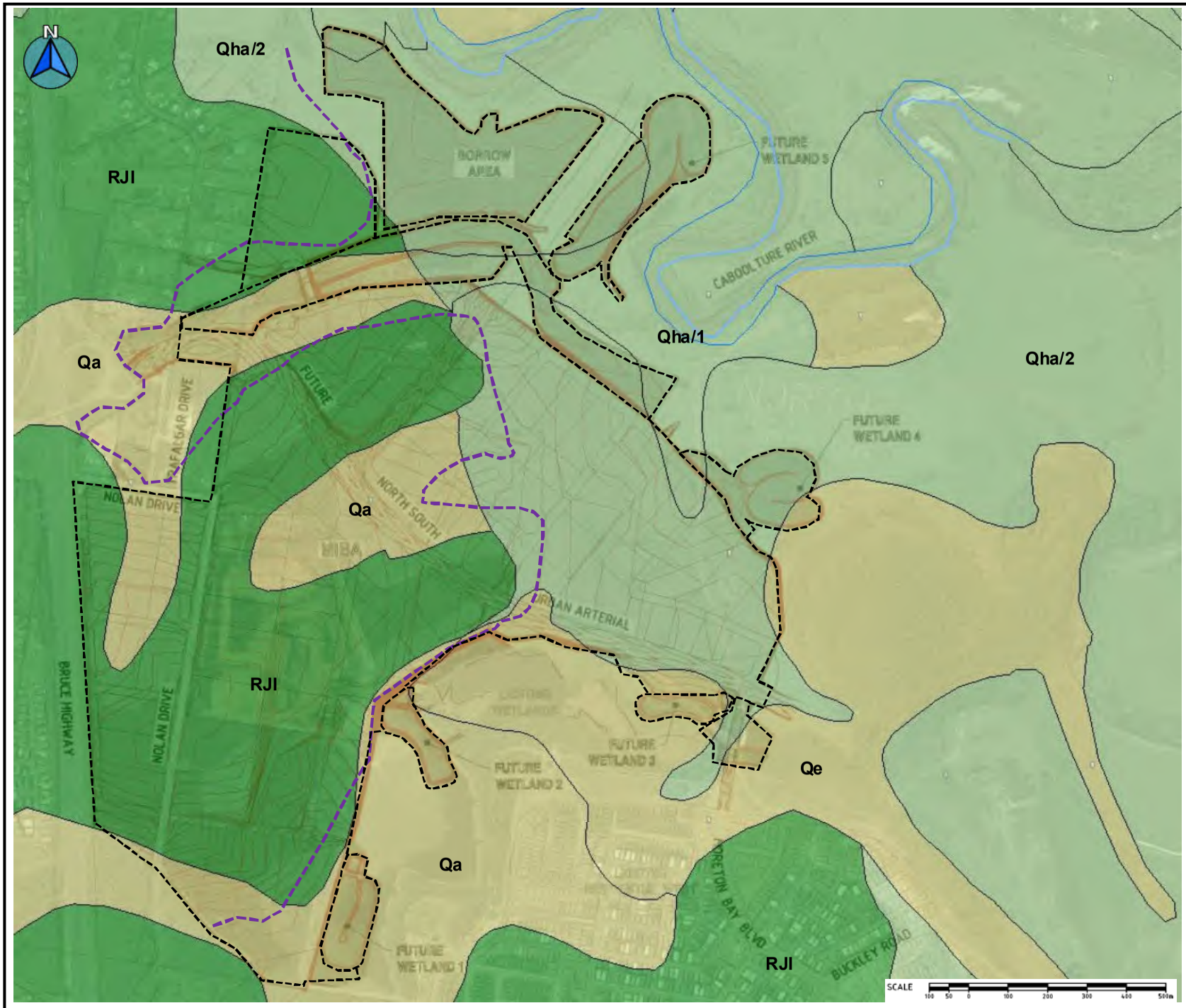
CLIENT:
NORTH HARBOUR HOLDINGS PTY LTD

DRAWN:	DATE:
MT	24/10/2019
CHECKED:	DATE:
ACD	24/10/2019

SCALE:
AS SHOWN

LEGEND:
- APPROX RL 5 m AHD CONTOUR
- BULK CUT OCCURING < RL 5 m
  - FUTURE WETLANDS (No. 1-5)
  - MORETON BAY BLVD / URBAN ARTERIAL BRIDGE CONNECTION
  - COMPENSATORY CUT
    - NTH BORROW AREA
    - DRAINAGE CORRIDORE
- BULK FILLING OCCURING < RL 5 m
- CUT / FILL OCCURING > RL 5 m

PROJECT NO.:	FIGURE:	REV:
19210-001	1	0



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PROJECT:
MIBA - NORTH HARBOUR
ASS INVESTIGATION & MANAGEMENT PLAN

TITLE:
GEOLOGY PLAN

CLIENT:
NORTH HARBOUR HOLDINGS PTY LTD

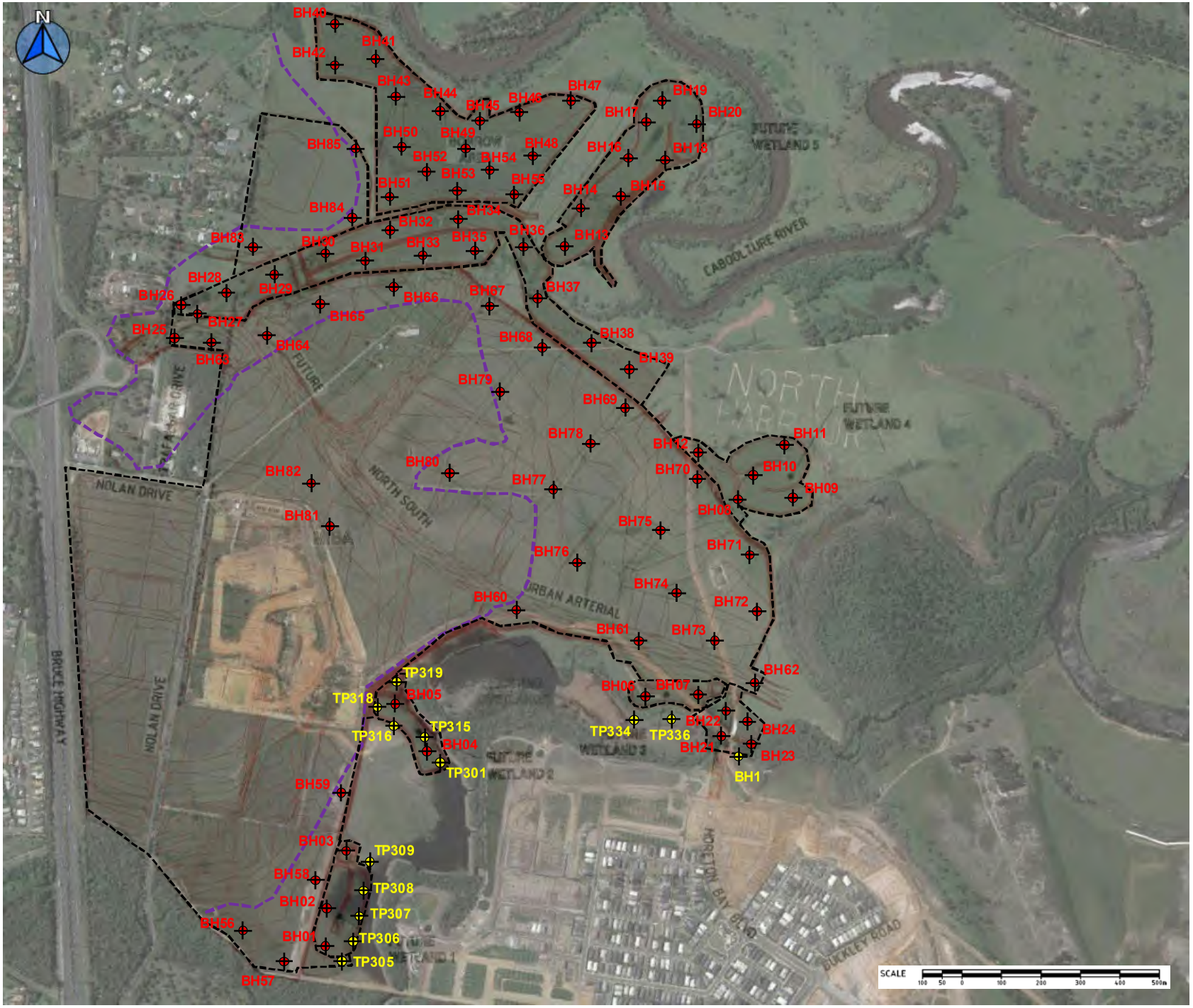
DRAWN:	DATE:
MT	24/10/2019
CHECKED:	DATE:
ACD	24/10/2019

SCALE:
AS SHOWN

LEGEND:

- APPROX R L 5 m AHD CONTOUR
- **RJI** — TRIASSIC – JURASSIC AGE LANDSBOROUGH SANDSTONE
- **Qe/Qa** — QUATERNARY AGE ALLUVIAL SEDIMENTS
  - Qa – Flood Plain Alluvium
  - Qe – Estuarine Alluvium
- **Qha** — HOLOCENE AGE RIVER TERRACE ALLUVIUM

PROJECT NO.:	FIGURE:	REV:
19210-001	2	0



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PROJECT:
MIBA - NORTH HARBOUR
ASS INVESTIGATION & MANAGEMENT PLAN

TITLE:
INVESTIGATION LOCATION PLAN

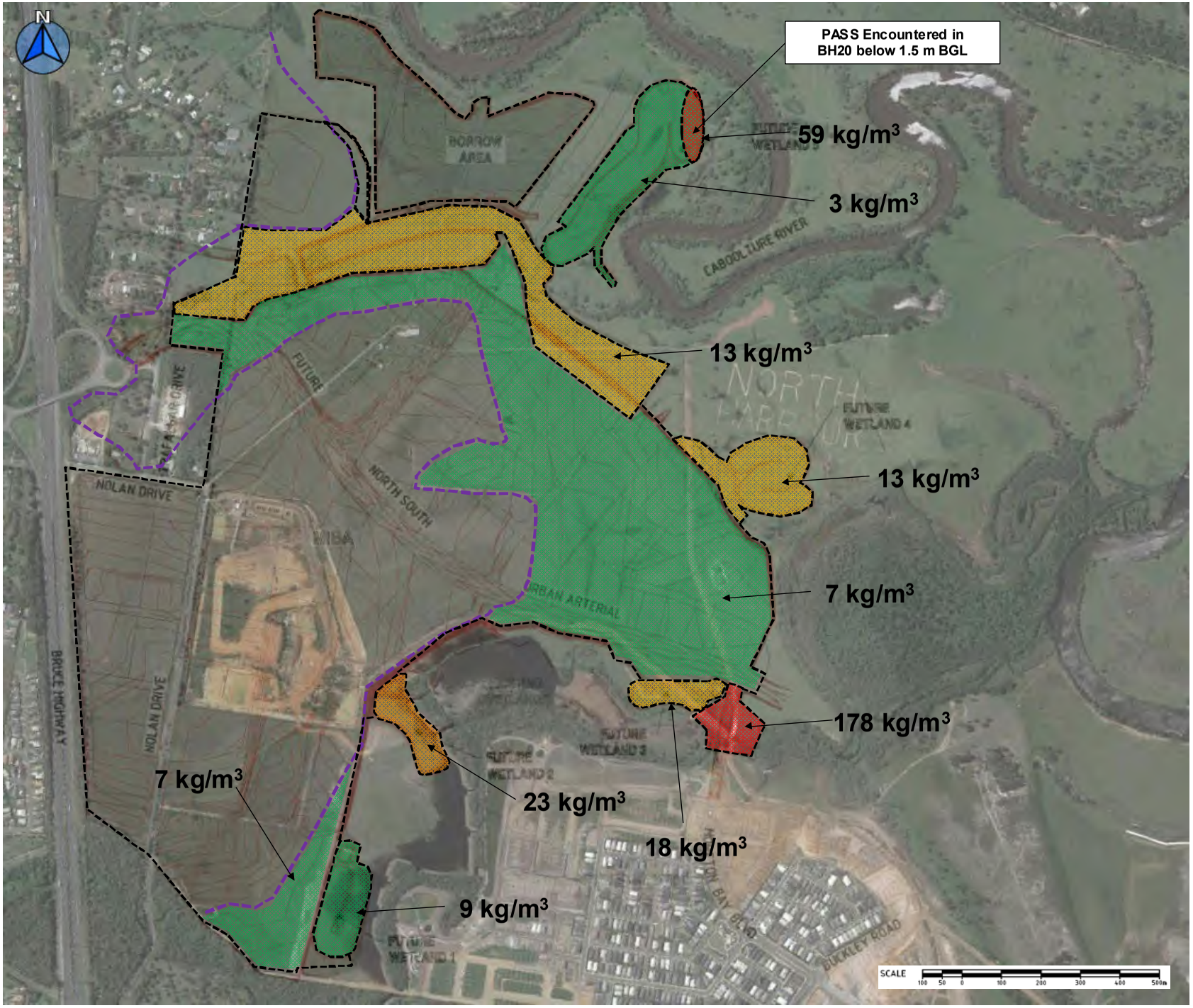
CLIENT:
NORTH HARBOUR HOLDINGS PTY LTD

DRAWN:	DATE:
MT	24/10/2019
CHECKED:	DATE:
ACD	24/10/2019

SCALE:
AS SHOWN

LEGEND:
- APPROX RL 5 m AHD CONTOUR
- CURRENT INVESTIGATION BOREHOLE
- PREVIOUS INVESTIGATION BOREHOLE

PROJECT NO.:	FIGURE:	REV:
19210-001	3	0



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PROJECT:
MIBA - NORTH HARBOUR
ASS INVESTIGATION & MANAGEMENT PLAN

TITLE:
ASS DISTRIBUTION PLAN

CLIENT:
NORTH HARBOUR HOLDINGS PTY LTD

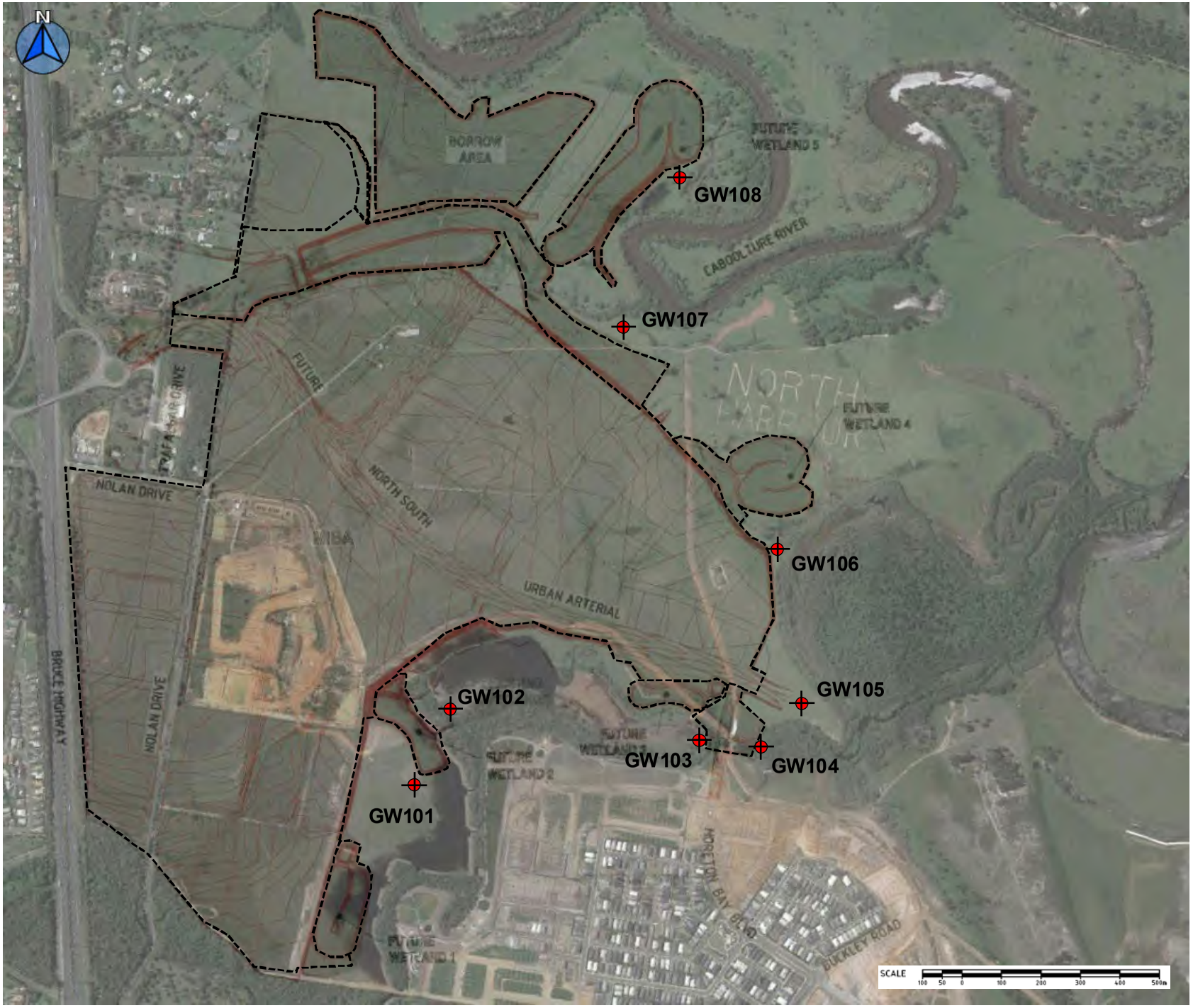
DRAWN:	DATE:
MT	24/10/2019
CHECKED:	DATE:
ACD	24/10/2019

SCALE:
AS SHOWN

LEGEND:

- APPROX RL 5 m AHD CONTOUR
- POSITIVE AASS / PASS (>18 mol / tonne)
- AASS / RETAINED ACIDITY ONLY (NO PASS) (>18 mol / tonne)
- ANS SOIL (> 50 mol / tonne) (NON AASS / NON PASS)
- NON ACIDIC (< 50 mol / tonne ANS) NON AASS / NON PASS

PROJECT NO.:	FIGURE:	REV:
19210-001	4	0



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PROJECT:
MIBA - NORTH HARBOUR
ASS INVESTIGATION & MANAGEMENT PLAN

TITLE:
GROUNDWATER MONITORING PLAN

CLIENT:
NORTH HARBOUR HOLDINGS PTY LTD

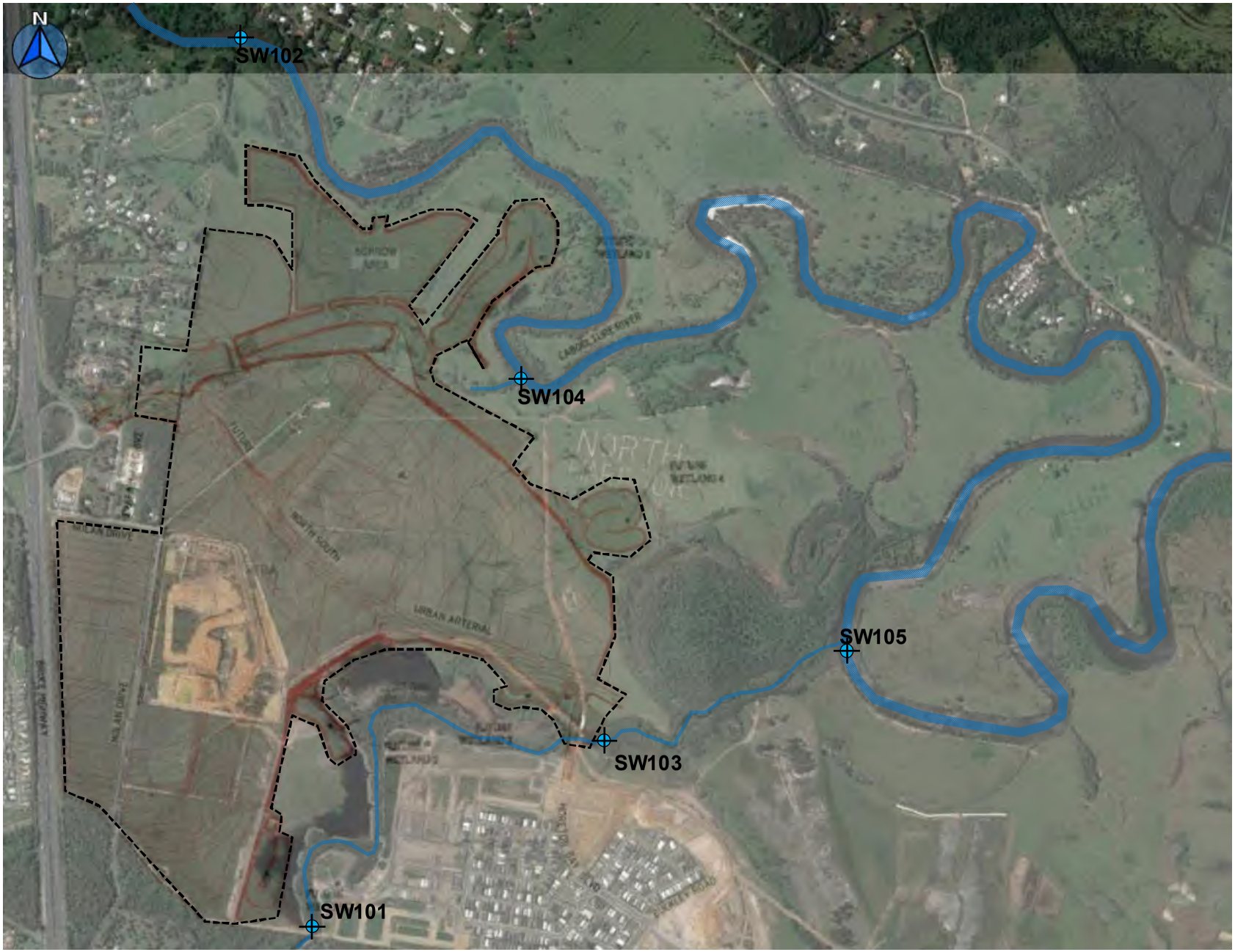
DRAWN:	DATE:
MT	24/10/2019
CHECKED:	DATE:
ACD	24/10/2019

SCALE:
AS SHOWN

LEGEND:

GROUNDWATER MONITORING BORE

PROJECT NO.:	FIGURE:	REV:
19210-001	5	0



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PROJECT:

MIBA - NORTH HARBOUR
ASS INVESTIGATION & MANAGEMENT PLAN

TITLE:

SURFACE WATER MONITORING PLAN

CLIENT:

NORTH HARBOUR HOLDINGS PTY LTD

DRAWN:	DATE:
MT	24/10/2019
CHECKED:	DATE:
ACD	24/10/2019

SCALE:
AS SHOWN

LEGEND:

SURFACE WATER MONITORING LOCATION

PROJECT NO.:	FIGURE:	REV:
19210-001	6	0

APPENDIX A

Current Investigation Borehole Logs & Explanatory Notes

Supplementary Borehole and Test Pit Logs & Explanatory Notes

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Borehole No.
BH001
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	MT
Hole Position:	498392.0 m E 7000204.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 1.6m			0.0		SP	SAND (TOPSOIL), fine to medium grained, dark brown, silt fines		MD		0.00: TOPSOIL
								CH	Sandy CLAY, high plasticity, brown to grey, fine to coarse grained sand, trace of fine to medium sized gravel and silt fines				
						0.5		CH	CLAY, high plasticity, pale grey, trace of silt and fine grained sand	M	VSt		
						1.0		CH	Sandy CLAY, medium plasticity, pale grey, fine to medium grained sand and silt fines	D to M	H		1.10: Distinctly Weathered SANDSTONE
						1.5			Hole Terminated at 1.60 m Auger Refusal				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 17:35 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13.Prj: Tectonic 2.002016-02-16

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Borehole No.
BH002
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	MT
Hole Position:	498383.0 m E 7000300.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals at 2.5m			0.0		SP	SAND (TOPSOIL), fine to medium grained, dark brown, with silt fines		MD		0.00: TOPSOIL
								CI-CH	Silty CLAY, medium to high plasticity, dark brown to pale grey, with fine to medium grained sand		St		0.20: NATURAL
						0.5		CH	CLAY, high plasticity, pale brown to pale grey, with fine to coarse grained sand, trace of fine sized gravel				
						1.0			becoming pale grey	M			
								CH	Sandy CLAY, high plasticity, pale grey, fine to coarse grained sand, trace of fine sized gravel		VSt		
						1.5							
						2.0		CI	CLAY, medium plasticity, pale grey, fine to coarse grained sand, with silt fines	D to M	H		2.10: Distinctly Weathered SANDSTONE
						2.5			Hole Terminated at 2.50 m Target depth				
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 17:35 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13.Prj: Tectonic 2.002016-02-16

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Borehole No.
BH003
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	MT
Hole Position:	498437.0 m E 7000441.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.5m			0.0		SP	SAND (TOPSOIL), fine to medium grained, dark brown, silt fines	D to M	MD		0.00: TOPSOIL
						0.5		CH	Sandy CLAY, high plasticity, red to grey, fine to coarse grained sand, trace of fine sized gravel and silt fines		VSt		
						1.0		CH	CLAY, high plasticity, grey, with fine to medium grained sand		VSt to H		1.00: Friable
						1.5		CH	Sandy CLAY, high plasticity, pale brown, fine to coarse grained sand	M	VSt		
						2.0		CI	Sandy CLAY, medium plasticity, fine to medium grained sand and silt fines				2.25: Distinctly Weathered SANDSTONE
						2.5			Hole Terminated at 2.50 m Target depth				
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 17:35 10.0.1.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13.Prj: Tectonic 2.002016-02-16

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Borehole No.
BH004
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	MT
Hole Position:	498644.0 m E 7000703.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Ground water level at 1.0 m	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, dark brown, silt fines	D to M	MD		0.00: TOPSOIL
						0.5		CH	Sandy CLAY, high plasticity, orange and grey, fine to coarse grained sand		VSt		
						1.0		CH	CLAY, high plasticity, grey, trace of fine to medium grained sand	M			
						1.5		CH	Sandy CLAY, high plasticity, grey, fine to medium grained sand	M to W	F		
								CH	CLAY, high plasticity, grey, trace of fine to medium grained sand	M	VSt		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH005
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	MT
Hole Position:	498567.0 m E 7000825.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
E		Not Encountered				0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, dark brown, with clay fines	M	MD		0.00: TOPSOIL
								CI	Sandy CLAY, medium plasticity, pale brown to brown, fine to coarse grained sand		VSt		
						0.5			becoming pale brown	D to M	H		0.50: Distinctly Weathered SANDSTONE
						1.0							
						1.5							
						2.0			Hole Terminated at 2.00 m Auger Refusal				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T - Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC - Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 17:36 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13 Prj: Tectonic 2.002016-02-16

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Borehole No.
BH006
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499201.0 m E 7000841.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density / Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material		VSt	0.00: TOPSOIL
									Silty CLAY (FILL), high plasticity, brown and red, trace of fine grained sand			0.20: FILL
						0.5			becoming grey		St	
								CH	Sandy CLAY, high plasticity, pale grey, fine to medium grained sand		F	0.75: ALLUVIUM
						1.0		CH	Silty CLAY, high plasticity, pale brown and grey, trace of fine grained sand	M		
						1.5			without sand		St	
						2.0			Hole Terminated at 2.00 m Target depth			
						2.5						
						3.0						
						3.5						
						4.0						

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH007
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499335.0 m E 7000846.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T			ASS Samples at 0.25m Intervals to 2.0m			0.0		MH	Clayey SILT, high plasticity, dark grey, with organic material		F		
									trace of organic material				
								CH	Silty CLAY, high plasticity, pale brown and grey		St		
						0.5				M			
						1.0			becoming grey, trace of fine grained sand		F		
						1.5			becoming grey and brown		St		
										W			
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH008
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499433.0 m E 7001351.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density / Pocket Penetrometer UCS (kPa)	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		MH	Clayey SILT (TOPSOIL), medium plasticity, brown, trace of organic material and fine grained sand	D		0.00: TOPSOIL
						0.5		CH	Silty CLAY, high plasticity, brown, trace of fine grained sand		VSt	
						1.0		CH	Sandy CLAY, high plasticity, pale grey, fine to medium grained sand	M	F	
								CH	Silty CLAY, high plasticity, red and grey, trace of fine grained sand			
						1.5			without sand		St	
						2.0			Hole Terminated at 2.00 m Target depth			
						2.5						
						3.0						
						3.5						
						4.0						

Pocket Penetrometer UCS (kPa): 100, 200, 300, 400, 500

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH009
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499577.0 m E 7001356.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		MH	Clayey SILT (TOPSOIL), high liquid limit, brown, trace of organic material	D	VSt		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine grained sand				
						0.5			becoming pale brown		St		
						1.0		CH	Sandy CLAY, high plasticity, pale grey, fine to medium grained sand	M	F		
						1.5		CH	Silty CLAY, high plasticity, red, orange and grey, trace of fine to medium grained sand		St		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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BH010
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499473.0 m E 7001415.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine grained sand		VSt		
						0.5			becoming brown and red, with fine to medium grained sand				
						1.0			becoming brown and orange	M	St		
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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BH011

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499555.0 m E 7001486.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		12/09/19, Groundwater level at 2.2m	ASS Samples at 0.25m Intervals to 3.0m			0.0		CH	Silty CLAY, high plasticity, dark brown, with organic material	D			
						0.5			becoming brown and grey, trace of fine grained sand, without organic material		VSt		
						1.0							
						1.5			becoming grey, trace of fine to medium grained sand	M	F		
						2.0							
						2.5			becoming grey and brown, with fine to medium grained sand		St		
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499339.0 m E 7001467.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine grained sand		H		
						0.5			becoming red and grey, without sand	M	St		
						1.0							
						1.5			becoming orange and grey				
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498996.0 m E 7002000.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY, high plasticity, grey, trace of organic material	D	H		
						1.0			becoming grey and brown				
						1.5			becoming brown and pale brown	M	VSt		
						2.0							
						2.5			becoming pale brown and orange				
						3.0					St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499037.0 m E 7002093.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D	H		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine to medium grained sand				
						1.0			becoming pale brown, without sand				
						1.5					VSt		
						2.0			becoming brown, trace of fine grained sand	M			
						2.5							
						3.0			with fine grained sand		St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499141.0 m E 7002126.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, pale grey, trace of organic material	D	L		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine to medium grained sand and organic material				
						0.5			becoming dark brown, trace of fine grained sand		H		
						1.0							
						1.3			becoming brown and orange, without sand	M	VSt		
						1.5							
						2.0							
						2.5							
						3.0							
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499160.0 m E 7002223.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and grey		H		
						1.0		CH	Sandy CLAY, high plasticity, brown				
						1.5				M	VSt		
						2.0			becoming brown and orange, trace of fine grained sand				
						2.5			becoming brown and pale grey, with fine grained sand		St		
						3.0							
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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BH017
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499203.0 m E 7002318.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark grey and brown		VSt		
						0.5							
						1.0			becoming brown				
						1.5			becoming red and brown, trace of fine to medium grained sand	M			
						2.0					St		
						2.5			becoming brown, trace of fine grained sand				
						3.0			becoming brown and orange, with fine grained sand				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH018
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499249.0 m E 7002221.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material and fine grained sand	D	H		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown	D to M			
						1.0			becoming brown and grey, trace of fine grained sand	M	VSt		
						1.5							
						2.0							
						2.5					St		
						3.0			becoming brown and red				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH019
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499245.0 m E 7002367.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.5m Intervals to 3.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material	D	H		
								CH	Silty CLAY, high plasticity, dark brown				
						0.5			becoming brown and grey, trace of fine grained sand				
						1.0							
						1.5							
						2.0			becoming grey, trace of fine to medium grained sand	M	VSt		
											St		
						2.5			becoming brown, without sand		VSt		
						3.0					St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH020
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	12/09/2019
Project Name:	MIBA - North Harbour	Completed:	12/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499328.0 m E 7002307.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Groundwater inflow at ~1.5m	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material				0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown	M	VSt		
						1.0			becoming brown and grey				
						1.5			becoming grey				
						2.0			with sand				
						2.5		SC	Clayey SAND, fine to medium grained, grey, high plasticity clay fines	W	S		
						3.0			becoming fine to coarse grained				
									trace of quartz pebbles				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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BH021
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499397.0 m E 7000746.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		11/09/19 13:00, Groundwater level at 1.4m	ASS Samples at 0.25m Intervals to 4.0m			0.0		ML-MH	Clayey SILT, medium liquid limit, dark brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and grey		VSt		
						0.5							
						1.0			becoming grey	M	F		
						1.5			becoming grey and brown, trace of organic material				
						2.0			without organic material	W	S		
						2.5							
						3.0		CL-Cl	Silty Sandy CLAY, low to medium plasticity, dark brown, high silt content, trace of organics	M to W	VSt		
						3.5							
						4.0			Hole Terminated at 4.00 m Target depth				

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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BH022
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499410.0 m E 7000807.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		11/09/19 12:30, Groundwater level at 0.4m	ASS Samples at 0.25m Intervals to 2.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, trace of organic material		F		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, grey and brown, trace of fine to medium grained sand	M	St		
						0.5		CH	Sandy CLAY, high plasticity, grey, fine to coarse grained sand				
						1.0		SC	Clayey SAND, fine to coarse grained, grey, high plasticity clay fines				
									becoming grey and brown	W	S		
						1.5		SM	Silty SAND, fine to coarse grained, grey				
						2.0							2.10: Sand cemented
								CH	Sandy CLAY, high plasticity, grey, fine to coarse grained sand		St		2.40: Without cementing
						2.5			Hole Terminated at 2.50 m Target depth				
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.

BH023

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499467.0 m E 7000734.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		17/09/19 14:00, Ground water level at 1.5m	ASS Samples at 0.25m Intervals to 3.0m			0.0		MH	Clayey SILT (TOPSOIL), low to high liquid limit, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and grey		VSt		
						0.5			becoming grey and brown	M	F		
						1.0			becoming grey		S		
						1.5			becoming grey and dark grey, with fine to medium grained sand				
						2.0		CI	Sandy CLAY, medium plasticity, dark grey, fine to medium grained sand	W	VS		
						2.5		SC	Clayey SAND, fine to medium grained, grey, high plasticity clay fines				
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH024
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	11/09/2019
Project Name:	MIBA - North Harbour	Completed:	11/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499461.0 m E 7000771.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		11/09/19, Groundwater level at 0.9m Groundwater inflow at 1.1m	ASS Samples at 0.25m Intervals to 2.5m			0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0		CH CH SC CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material Silty CLAY, high plasticity, brown and pale brown, trace of fine grained sand becoming grey, trace of fine to medium grained sand becoming grey and dark brown, trace of organic material (wood) Clayey SAND, fine to medium grained, dark grey, high plasticity clay fines Silty CLAY, high plasticity, grey and brown, with fine to medium grained sand Hole Terminated at 2.50 m Target depth	M W	St S St		0.00: TOPSOIL

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH025
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	497987.0 m E 7001778.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered				0.0		CH	Silty CLAY, high plasticity, pale brown, with organic material	D	H	×	0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, pale brown				
						0.5			becoming pale brown and red	M	St		
						1.0							
						1.5			becoming pale grey and grey				
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH026
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498062.0 m E 7001780.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), brown, trace of organic material		H		0.00: TOPSOIL
									trace of fine to medium grained sand	D			
						0.5					VSt		
						1.0		CH	Silty CLAY, high plasticity, grey and brown	M			
						1.5					St		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH027
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498056.0 m E 7001825.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D	H		0.00: TOPSOIL 0.10: FILL (BASEMENT)
									Silty CLAY (FILL), high plasticity, red brown, trace of sub-rounded gravel				
								CH	Silty CLAY, high plasticity, pale brown to brown		VSt		
						1.0			becoming grey and orange	M			
						1.5							
						2.0					St		
						2.5			becoming grey				
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH028
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498135.0 m E 7001880.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, grey		VSt		
						1.0			becoming grey and brown				
						1.5			becoming pale brown to brown	M	St		
						2.0							
						2.5							
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498254.0 m E 7001924.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark brown to brown, trace of fine grained sand		VSt		
						0.5			becoming brown, without sand				
						1.0			becoming pale brown				
						1.5			becoming pale brown and grey	M	St		
						2.0							
						2.5			becoming pale brown				
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

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Borehole No.

BH030

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498385.0 m E 7001977.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Groundwater inflow at 1.7m	ASS Samples at 0.25m Intervals to 3.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark grey, with organic material		VSt		0.00: TOPSOIL
						0.5		CH	Silty CLAY, high plasticity, grey and brown	M			
						1.0			becoming grey				
						1.5			becoming grey and red, trace of fine to medium grained sand	M to W	St		
						2.0			becoming pale grey and brown	W			
						2.5							
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498486.0 m E 7001968.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CL	Silty CLAY, low plasticity, dark grey		F		
								CH	Silty CLAY, high plasticity, dark grey				
						0.5			becoming grey and pale brown to orange				
						1.0			becoming grey				
						1.5		CI-CH	Sandy CLAY, medium to high plasticity, pale brown to orange and pale grey, fine to medium grained sand	M	St		
						2.0			becoming orange to red and pale grey				
						2.5							
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498544.0 m E 7002037.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CL	Silty CLAY, low plasticity, grey, trace of sand and organics	D	St		
						0.5		CH	Silty CLAY, high plasticity, pale brown and grey	D to M	VSt		
						1.0			becoming pale brown				
						1.5							
						2.0							
						2.5		CI	Sandy CLAY, medium plasticity, brown and grey, fine to medium grained sand	M	St		
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498638.0 m E 7001982.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CL	Silty CLAY, low plasticity, grey, trace of sand and organics	D			
						0.5		CH	Silty CLAY, high plasticity, grey to brown			×	
						1.0						×	
						1.5		CI-CH	Sandy CLAY, medium to high plasticity, orange to brown, fine to medium grained sand, trace of fine sized gravel	M	St	×	
						2.0						×	
						2.5		CH	Silty CLAY, high plasticity, pale brown to orange and pale grey, trace of fine grained sand			×	
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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BH034
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498722.0 m E 7002059.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CL	Silty CLAY, low plasticity, grey, trace of sand and organics	D			
								CH	Silty CLAY, high plasticity, pale brown and grey				
						0.5						x	
						1.0						x	
									becoming grey	M	St		
						1.5						x	
						2.0			becoming grey and brown			x	
						2.5						x	
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH035
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498767.0 m E 7001984.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered				0.0		CL	Silty CLAY, low plasticity, dark grey, trace of organics	D			
								CH	Silty CLAY, high plasticity, dark grey				
						0.5			becoming grey				
						1.0			becoming grey and pale brown				
									with fine to coarse grained sand	M	St		
						1.5							
						2.0							
						2.5			becoming pale brown, trace of fine grained sand				
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.

BH036

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	13/09/2019
Project Name:	MIBA - North Harbour	Completed:	13/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498888.0 m E 7002041.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CL	Silty CLAY, low plasticity, dark grey, trace of organics	D			
						0.5		CH	Silty CLAY, high plasticity, dark grey and brown			×	
						1.0			becoming grey and pale brown, with fine to medium grained sand			×	
						1.5		CI-CH	Silty CLAY, medium to high plasticity, pale brown to orange and pale grey, with fine to medium grained sand	M	St		
						2.0						×	
						2.5							
						3.0			Hole Terminated at 3.00 m Target depth			×	
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 17:48 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13.Prj: Tectonic 2.002016-02-16

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Borehole No.
BH037
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498925.0 m E 7001858.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.0m			0.0		CH	Silty CLAY, high plasticity, dark brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark brown, trace of fine grained sand		H	×	0.10: ALLUVIUM
						0.5			becoming grey, with fine to medium grained sand		VSt	×	
						1.0			trace of fine grained sand		St	×	
						1.5		CH	Sandy CLAY, high plasticity, pale brown, fine to medium grained sand	M			
									becoming brown		VSt	×	
						2.0		SC	Clayey SAND, fine to medium grained, pale grey, high plasticity clay fines				2.25: RESIDUAL
						2.5			becoming brown				
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH038
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499063.0 m E 7001750.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.5m Intervals to 3.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and dark brown, trace of fine grained sand		H	×	
						0.5			becoming grey and red, trace of fine to medium grained sand			✱	
						1.0			without sand		VSt		
						1.5			becoming grey	M		✱	
						2.0			with fine to medium grained sand		St		
						2.5						✱	
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH039
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499163.0 m E 7001680.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.5m Intervals to 3.0m			0.5			Silty CLAY (TOPSOIL), high plasticity, brown	D	H		0.00: TOPSOIL
						1.0		CH	Silty CLAY, high plasticity, grey and red, with fine to medium grained sand	M	St		
						1.5			becoming red and grey, trace of fine to medium grained sand				
						2.0			becoming pale grey, with fine to medium grained sand				
						2.5			becoming pale brown, with fine to medium grained sand				
						3.0			Hole Terminated at 3.00 m Target depth				
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH040
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498413.0 m E 7002569.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.5m Intervals to 3.5m			0.0		SM	Silty SAND (TOPSOIL), fine grained, grey, trace of organic material and low plasticity clay fines	D			0.00: TOPSOIL
								CH	Sandy CLAY, high plasticity, brown, fine to medium grained sand	D to M			
						0.5		CH	Silty CLAY, high plasticity, brown and dark grey, trace of fine to medium grained sand		VSt		
						1.0			becoming pale brown, without sand		St		
						1.5							
						2.0				M	VSt		
									trace of fine to medium sized gravel				
						2.5			trace of fine to medium grained sand				
						3.0					St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH041
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498456.0 m E 7002524.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.5m Intervals to 3.5m			0.5		CI	Silty Sandy CLAY (TOPSOIL), medium plasticity, brown, trace of organic material, fine to medium grained sand	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, grey and brown, trace of fine grained sand				
						1.0			without sand	M	VSt		
						1.5							
						2.0							
						2.5							
						3.0			becoming grey, trace of fine grained sand		St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH042
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498408.0 m E 7002479.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
						0.5		CH	Silty CLAY, high plasticity, brown, trace of fine to medium grained sand				
						1.0					VSt		
						1.5			without sand	M			
						2.0			becoming dark brown, with fine to medium grained sand, trace of fine to medium sized sub-rounded gravel				
						2.5			without sand and gravel				
									becoming brown, trace of fine grained sand		St		
						3.0							
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH043
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498559.0 m E 7002380.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		MH	Clayey Sandy SILT (TOPSOIL), high liquid limit, grey, trace of organic material	D	H		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, pale brown, trace of fine grained sand				
						1.0			becoming pale brown and dark grey, with organic material (wood)				
						1.5			becoming pale brown, without organic material	M	VSt		
						2.0					St		
						2.5			becoming pale brown and pale grey		VSt		
						3.0					St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH044
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498710.0 m E 7002343.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, grey and brown, trace of organic material				0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and orange, trace of fine grained sand	D			
						0.5			trace of coarse grained sand				
						1.0			becoming brown, without gravel		VSt		
						1.5				M			
						2.0							
						2.5			becoming pale grey and brown				
						3.0			becoming pale grey, trace of fine grained sand		St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH045
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498781.0 m E 7002344.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		SM	Silty Clayey SAND (TOPSOIL), fine grained, brown, high plasticity, trace of organic material	D			0.00: TOPSOIL
								SM	Silty Clayey SAND, fine grained, brown, high plasticity clay fines				
						1.0		CH	Silty CLAY, high plasticity, brown, trace of fine to medium grained and and sub-rounded gravel	M	VSt		
						1.5							
						2.0							
						2.5							
						3.0		Cl	Silty CLAY, medium plasticity, brown and orange		St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498883.0 m E 7002341.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		SM	Silty SAND (TOPSOIL), fine grained sand, grey and brown, medium plasticity clay fines, trace of organic material	D	H		0.00: TOPSOIL
									Silty SAND, fine grained, grey and brown, medium plasticity clay fines				
						0.5		CH	Silty CLAY, high plasticity, dark brown, trace of fine grained sand				
						1.0			becoming brown, trace of coarse grained sand				
									without sand		VSt		
						1.5							
						2.0				M			
						2.5			becoming pale brown, with fine grained sand		St		
						3.0							
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499014.0 m E 7002368.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Sample at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, grey, with organic material				0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine grained sand		H		
						1.0			without sand	D	VSt		
						1.5			becoming brown and orange	M	St		
						2.0							
						2.5					VSt		
						3.0			becoming brown, trace of fine grained sand		St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498913.0 m E 7002224.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, grey, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and dark brown, trace of fine grained sand				
						1.0			without sand				
						1.5			becoming brown and orange, trace of fine grained sand				
						2.0			becoming brown	M	VSt		
						2.5			becoming brown and red				
						3.0			becoming pale brown, with fine grained sand		MD		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

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Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498756.0 m E 7002250.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, grey, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, grey, with fine grained sand	D to M	VSt		
						0.5			becoming brown and grey, trace of fine to medium grained sand		H		
						1.0					VSt		
						1.5			becoming pale brown, without sand	M			
						2.0							
						2.5			becoming brown and red		St		
						3.0			becoming orange, trace of fine grained sand				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498584.0 m E 7002257.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material and fine to medium grained sand	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine grained sand	D to M	VSt	× 300	
						1.0			trace of fine sized rounded gravel			× 300	
						1.5			becoming pale brown, without gravel and sand			× 100	
						2.0				M		× 100	
						2.5			becoming pale brown and grey		St	× 100	
						3.0			becoming pale brown			× 100	
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498544.0 m E 7002118.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		ML	Clayey SILT (TOPSOIL), low liquid limit, grey, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine to medium grained sand and fine sized gravel	D to M	VSt		
						1.0			becoming brown and grey, without gravel and sand				
						1.5							
						2.0				M	St		
						2.5			becoming grey and red				
						3.0			becoming brown				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498643.0 m E 7002188.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and grey, trace of fine grained sand	D to M			
									without sand		VSt		
						1.0			becoming pale brown and grey, trace of fine to medium sized rounded gravel				
						1.5				M	St		
						2.0							
						2.5							
						3.0			becoming red and brown, trace of fine to medium grained sand				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498735.0 m E 7002139.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		CH	Silty Sandy CLAY (TOPSOIL), high plasticity, pale grey, trace of fine grained sand	D			0.00: TOPSOIL
						0.5		CH	Silty CLAY, high plasticity, brown and orange, trace of fine grained sand	D to M	H		
						1.0			becoming pale brown, without sand		VSt		
						1.5							
						2.0			becoming pale grey and brown, trace of fine grained sand	M	St		
						2.5							
						3.0			becoming orange				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498811.0 m E 7002201.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		ML	Clayey SILT (TOPSOIL), low liquid limit, brown, trace of fine grained sand and organic material	D to M			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown		VSt		
						0.5							
						1.0			becoming brown and grey				
						1.5			becoming pale brown and grey	M	St		
						2.0							
						2.5			becoming brown and orange				
						3.0			becoming orange				
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH055
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498869.0 m E 7002128.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 3.5m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine grained sand	D to M	H		
						0.5			becoming brown and orange				
									without sand				
						1.0							
						1.5					VSt		
						2.0			becoming dark brown and orange, trace of fine grained sand	M			
						2.5			becoming brown, trace of fine grained sand				
						3.0			becoming grey and brown		St		
						3.5			Hole Terminated at 3.50 m Target depth				
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH056
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498177.0 m E 7000247.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, dark grey, trace of organic material				0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, grey				
						0.5			becoming pale grey and pale brown				
						1.0		SC	Clayey SAND, fine to medium grained, pale brown to orange, high plasticity clay fines	M			
								CH	Sandy CLAY, high plasticity, orange, fine to medium grained sand		St	x	
						1.5						x	
						2.0			Hole Terminated at 2.00 m Target depth			x	
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH057
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498280.0 m E 7000166.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Groundwater inflow at 0.6m	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, dark grey, trace of organic material				0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, grey and dark grey	M			
						0.5		SC	Clayey SAND, fine to medium grained, grey, high plasticity clay fines	W			
						1.0		CH	Sandy CLAY, high plasticity, pale brown and orange, fine to medium grained sand		F		
						1.5		CH	Silty CLAY, high plasticity, red and orange, trace of fine to medium grained sand	M	VSt		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH058
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498361.0 m E 7000373.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, dark grey, trace of organic material	D			0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, dark grey and grey	D to M			
						0.5							
								CH	Silty CLAY, high plasticity, grey and red, with fine to medium grained sand, trace of fine to medium sized rounded gravel		VSt		
						1.0			becoming pale brown and orange, trace of fine to medium grained sand, without gravel	M			
						1.5			becoming pale grey, with fine to medium grained sand		St		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH059
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498430.0 m E 7000 60.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SP	SAND (TOPSOIL), fine to medium grained, pale grey, trace of organic material	D			0.00: TOPSOIL
								SP	SAND, fine to medium grained, pale grey	D to M			
						0.5		SC	Clayey SAND, fine to medium grained, pale grey, high plasticity clay fines				
								CH	Sandy CLAY, high plasticity, pale grey and pale brown, fine to medium grained sand		VSt	×	
						1.0		CH	Silty CLAY, high plasticity, pale brown, trace of fine to medium grained sand	M	H	× × ×	
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH060
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498876.0 m E 7001060.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, grey, trace of organic material	M			0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, dark grey, with high plasticity clayfines				
						0.5		CH	Sandy CLAY, high plasticity, pale brown		St	×	
								CH	Silty CLAY, high plasticity, pale brown and red, with fine to medium grained sand	M	VSt	×	
						1.0							
						1.5			becoming pale grey and brown, trace of fine grained sand			×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH061
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499187.0 m E 7000987.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material				0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and red, trace of fine to medium sized sub-rounded gravel		VSt		
						0.5			becoming pale grey, trace of fine grained sand				
						1.0			becoming brown, without sand	M	St		
						1.5			becoming pale grey and brown				
									trace of fine to medium grained sand				
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH062
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499480.0 m E 7000877.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, grey, trace of organic material	D			0.00: TOPSOIL
								SC	Clayey SAND, fine to medium grained, brown, with high plasticity clayfines				
						0.5			becoming orange, trace of high plasticity clay fines	M			
								SP	SAND, fine to medium grained, pale grey				
						1.0			becoming grey				
								SM	Silty SAND, fine to medium grained, brown to dark brown				
						1.5			becoming grey	W			
								SC	Clayey SAND, fine to medium grained, pale grey, high plasticity clay fines				
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH063
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498159.0 m E 7001765.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, grey, trace of organic material and fine to medium grained sand	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and grey, trace of fine to medium grained sand	D to M	H		
						1.0			becoming brown, with fine to medium grained sand	M	St		
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH064
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498273.0 m E 7001710.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), high plasticity, grey, low plasticity clay fines, trace of organic material	D			0.00: TOPSOIL
								SM	Silty SAND, fine grained, grey				
						0.5			becoming brown				
								CH	Sandy CLAY, high plasticity, brown, fine to medium grained sand				
						1.0			becoming grey and brown, trace of fine to medium sized gravel	M	VSt		
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH065
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498314.0 m E 7001826.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, grey, trace of organic material and fine to medium grained sand	D	H		0.00: TOPSOIL
						0.5		CH	Silty CLAY, high plasticity, grey and dark grey, trace of fine to medium grained sand		VSt		
						1.0			becoming brown and orange, with fine to medium grained sand	M			
						1.5					St		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH066
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498558.0 m E 7001895.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		ML	Clayey SILT, low liquid limit, dark grey, with organic material				
						0.5		CH	Silty CLAY, high plasticity, dark grey, trace of organic material		St		0.40: ALLUVIUM
									becoming grey and brown				
						1.0			becoming grey, with fine to medium grained sand	M	F		
						1.5			becoming pale brown, trace of fine to medium grained sand		St		1.50: RESIDUAL
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH067
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498801.0 m E 7001842.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark brown, trace of fine to medium grained sand	D to M	H		
						0.5			becoming grey and brown, without sand		St		
						1.0			becoming pale brown and orange, with fine to medium grained sand	M	VSt		
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498941.0 m E 7001735.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.5		CI CH	Silty Sandy CLAY (TOPSOIL), medium plasticity, brown, fine to medium grained sand, trace of organic material Silty CLAY, high plasticity, dark brown and brown, trace of fine to medium grained sand	D D to M	H	×	0.00: TOPSOIL
						1.0 1.5			becoming brown and red, without sand	M	St	×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5 3.0 3.5 4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH069
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499148.0 m E 7001589.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material				0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark brown, trace of fine grained sand		H		
						0.5			becoming red and grey, trace of fine to coarse grained sand				
						1.0				M	St		
									trace of fine to medium grained sand				
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH070
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499332.0 m E 7001397.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, with fine to medium grained sand, trace of organic material	D	VSt	×	0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and orange, trace of fine to medium grained sand				
						0.5		SM	Silty SAND, fine to medium grained, grey, trace of high plasticity clay fines				
						1.0		CH	Silty CLAY, high plasticity, grey and orange, fine to medium grained sand	M	St	×	
									becoming orange				
						1.5		CH	Silty CLAY, high plasticity, pale brown and pale grey, with fine to medium grained sand			×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH071
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499466.0 m E 7001208.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density / Pocket Penetrometer UCS (kPa)	Structure and Additional Observations
AD/T		Groundwater inflow at 0.6m	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Sandy CLAY (TOPSOIL), high plasticity, dark grey, fine to medium grained sand, with organic material		St	0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown and dark brown, with fine to medium grained sand		VSt	
						0.5		SC	Clayey SAND, fine to medium grained, dark grey, high plasticity clay fines			0.50: Perched water
								SM	Silty SAND, fine to medium grained, orange and brown, trace of high plasticity clay fines	M		
						1.0		CH	Silty CLAY, high plasticity, orange and brown, with fine to medium grained sand		St	
						1.5			becoming orange and grey			
						2.0			Hole Terminated at 2.00 m Target depth			
						2.5						
						3.0						
						3.5						
						4.0						

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
BH072
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499483.0 m E 7001060.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SP	SAND, fine to medium grained, pale grey, trace of organic material				0.00: TOPSOIL
						0.1		SP	SAND, fine to medium grained, pale grey	D			0.10: ALLUVIUM
						0.5							
						1.0			becoming fine to coarse grained, grey				
						1.5		SC	Clayey SAND, fine to medium grained, grey, high plasticity clay fines	M			
								CH	Silty CLAY, high plasticity, pale grey, trace of fine to medium grained sand		St	x	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Borehole No.
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499372.0 m E 7000989.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		24/09/19, Groundwater level at 1.5m	ASS Samples at 0.25m Intervals to 2.0m			0.5		SP	SAND, fine to medium grained, pale grey, trace of organic material	D			0.00: TOPSOIL
								SP	SAND, fine to medium grained, pale grey				
						1.0			becoming coarser, trace of fine sized rounded gravel	M			
						1.5			becoming fine to coarse grained	W			
						2.0		CH	Silty CLAY, high plasticity, dark grey and brown, trace of fine to medium grained sand		VSt	×	
									Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499276.0 m E 7001109.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Groundwater inflow at 1.5m 27.09/19, Groundwater level at 1.9m	ASS Samples at 0.25m Intervals to 2.0m			0.5		SM	Silty SAND (TOPSOIL), fine to medium grained, trace of organic material	D			0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, pale brown				
						1.0			becoming grey, trace of organic material	M			
						1.5		SC	Clayey SAND, fine to medium grained, dark grey, high plasticity clay fines, trace of organic material				
								CH	Silty CLAY, high plasticity, pale grey and brown			×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	27/09/2019
Project Name:	MIBA - North Harbour	Completed:	27/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499247.0 m E 7001269.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		01/10/19, Groundwater level at 1.4m	ASS Samples at 0.25m Intervals to 2.0m			0.5		SM	Silty SAND, fine to medium grained, pale brown, trace of organic material				0.00: TOPSOIL
								SP	SAND, fine to medium grained, pale brown	D			
						1.0			becoming pale grey				
						1.5		SM	Silty SAND, fine to medium grained, pale grey	M			
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498958.0 m E 7001155.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density / Pocket Penetrometer UCS (kPa)	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine grained, grey, trace of organic material			0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, brown, trace of high plasticity clay fines			
						0.5		CH	Sandy CLAY, high plasticity, orange, fine to medium grained sand		VSt	
						1.0				D		
						1.5			becoming orange and red		H	
						2.0			Hole Terminated at 2.00 m Target depth			
						2.5						
						3.0						
						3.5						
						4.0						

Pocket Penetrometer UCS (kPa): 100, 200, 300, 400, 500

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498992.0 m E 7001376.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material and fine grained sand	D	H		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown to pale brown, trace of fine grained sand				
						1.0			becoming pale grey and orange, trace of fine to medium grained sand	M	St		
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	23/09/2019
Project Name:	MIBA - North Harbour	Completed:	23/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	499039.0 m E 7001487.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density / Pocket Penetrometer UCS (kPa)	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, dark brown, trace of organic material	D		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark brown		H	
						1.0			becoming grey and brown, trace of fine to medium grained sand	M	VSt	
						1.5			with fine to medium grained sand		St	
						2.0			Hole Terminated at 2.00 m Target depth			
						2.5						
						3.0						
						3.5						
						4.0						

Pocket Penetrometer UCS (kPa): 100, 200, 300, 400, 500

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498840.0 m E 7001627.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained sand, brown, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, red and brown, trace of fine to medium grained sand		H	×	
						0.5			becoming brown and red, without sand			×	
						1.0			becoming grey	M	St	×	
						1.5			becoming red and grey, trace of fine to medium grained sand			×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH080
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498704.0 m E 7001418.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 1.6m			0.0		SM	Silty SAND (TOPSOIL), fine to medium grained, grey, trace of organic material	D			0.00: TOPSOIL
								SM	Silty SAND, fine to medium grained, grey				
						0.5		CH	Silty CLAY, high plasticity, brown and orange, with fine to medium grained sand	M	St	×	
						1.0						×	
						1.5		SC	Clayey SAND, fine to medium grained, grey, high plasticity clay fines				
									Hole Terminated at 1.60 m Target depth				
						2.0							
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

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BH081
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498400.0 m E 7001212.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		SM	Silty SAND (TOPSOIL), high plasticity, grey, trace of organic material	D	D		0.00: TOPSOIL
						0.2		SM	Silty SAND, fine to medium grained, grey, without organic				
						0.5		CH	Sandy CLAY, high plasticity, grey and red, fine to medium grained sand	M	MD		
						1.0							
						1.5			becoming brown				
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

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Borehole No.
BH082
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Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	26/09/2019
Project Name:	MIBA - North Harbour	Completed:	26/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498348.0 m E 7001391.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.5		SM	Silty SAND (TOPSOIL), fine to medium grained, grey, trace of organic material	D			0.00: TOPSOIL
								SC	Clayey SAND, fine to medium grained, brown, high plasticity clay	D to M			
						1.0		CH	Sandy CLAY, high plasticity, brown and orange, fine to medium grained sand	M	St	×	
						1.5						×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 18:05 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13 Prj: Tectonic 2.002016-02-16

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Borehole No.
BH083
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498461.0 m E 7002233.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		ML	Sandy SILT (TOPSOIL), low liquid limit, grey, fine grained sand, trace of organic material	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, dark brown and brown, trace of fine to medium grained sand	D to M	H	×	
						0.5			becoming brown, without sand			×	
						1.0			becoming brown and orange	M	St	×	
						1.5			becoming brown and red			×	
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 18:05 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13 Prj: Tectonic 2.002016-02-16

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Borehole No.
BH084
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498419.0 m E 7002043.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description						Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.0		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material and fine to medium grained sand	D			0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown, trace of fine to medium grained sand and fine sized rounded gravel	D to M	H	×	
						0.5			becoming brown and red, without gravel	M	VSt	✱	
						1.0			becoming grey and brown, without sand		St	✱	
						1.5							
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 18:06 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13 Prj: Tectonic 2.002016-02-16

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Borehole No.
BH085
Page 1 of 1

Engineering Log - Borehole

Project No.: 19210

Client:	North Harbour Holdings Pty Ltd.	Commenced:	24/09/2019
Project Name:	MIBA - North Harbour	Completed:	24/09/2019
Hole Location:		Logged By:	BZ
Hole Position:	498205.0 m E 7001997.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	Edson CP1	Inclination:	-90°	RL Surface:	No survey	
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	Structure and Additional Observations
AD/T		Not Encountered	ASS Samples at 0.25m Intervals to 2.0m			0.5		CH	Silty CLAY (TOPSOIL), high plasticity, brown, trace of organic material	D	H		0.00: TOPSOIL
								CH	Silty CLAY, high plasticity, brown				
						1.0			becoming brown and red	M	VSt		
						1.5			becoming pale brown		St		
						2.0			Hole Terminated at 2.00 m Target depth				
						2.5							
						3.0							
						3.5							
						4.0							

Method
AD/T- Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Moisture Condition
D - Dry
M - Moist
W - Wet

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Plastic Limit
< PL
= PL
< PL

TECTONIC 2.00.2 LIB.GLB Log 1 TECTONIC BOREHOLE 19210.GPJ <<DrawingFile>> 01/10/2019 18:06 10.01.00.01 Datgel Lab and InSitu Tool - DGD | Lib: Tectonic 2.00.2 2016-10-13 Prj: Tectonic 2.002016-02-16

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Borehole No.
BH1
Page 1 of 1

Engineering Log - Borehole

Project No.: 17348

Client:	North East Business Park	Commenced:	11/10/2017
Project Name:	Sewer Trunk Main and Pump Station	Completed:	11/10/2017
Hole Location:	Buckley-Ulhmann Road, North Harbour	Logged By:	MT
Hole Position:	499434.0 m E 7000692.0 m N MGA94 Zone 56	Checked By:	ACD

Drill Model and Mounting:	4WD Auger	Inclination:	-90°	RL Surface:	1.40 m		
Hole Diameter:	100 mm	Bearing:	360°	Datum:	AHD	Operator:	Contract Drilling

Drilling Information							Soil Description					Observations
Method	Penetration	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description soil type: plasticity or particle characteristics, secondary and minor components, colour	Moisture Condition	Consistency Relative Density	Pocket Penetrometer UCS (kPa) 100 200 300 400 500	STRUCTURE & Other Observations
AD/T		11/10/17, Groundwater level at 0.6m	ASS Samples at 0.25m Intervals to 5m					CH	Silty CLAY, high plasticity, dark brown, organics and silt fines		St		0.00: Alluvium (Marine)
								CH	Silty CLAY, high plasticity, grey mottled brown (10%)				0.30: DPP = 90-100kPa
			SPT 1,1,1 N=2		0.4	1			becoming grey, mottle ceases	M	F		0.90: DPP = 80-90kPa
													1.30: DPP = 90-100kPa
											S		1.60: DPP = 25kPa
					-0.6	2			trace of fine to medium grained sand				2.00: DPP = 25kPa
			U50 2.5-2.95m										2.40: DPP = 10-15kPa
					-1.6	3							2.95: PP = 25-50kPa
										W	VS		
			SPT HW,HW,1 N=1		-2.6	4							4.00: DPP < 25kPa
									trace of fine to coarse grained sand				
					-3.6	5			some fine to coarse grained sand				5.00: DPP < 50kPa
									becoming pale grey, trace of fine to coarse grained sand				5.50: DPP = 120-150kPa
			SPT 2,3,4 N=7		-4.6	6			becoming mottled red orange	M	St		6.20: DPP = 180-200kPa
					-5.6	7			Hole Terminated at 6.45 m Target depth				

Method
AD/T-Auger Drilling TC Bit
RR - Rock Roller
RD - Rotary Drilling
NMLC -Rock Core
HA - Hand Auger

Penetration
No resistance ranging to refusal

Water
Level (Date)
Inflow
Partial Loss
Complete Loss

Graphic Log/Core Loss
Core recovered (hatching indicates material)
Core loss

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Moisture Condition
D - Dry
M - Moist
W - Wet

Plastic Limit
< PL
= PL
< PL

Consistency/Relative Density
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

TECTONIC 2.00.1 LIB.GLB Log 1 TECTONIC BOREHOLE 17348.GPJ <<DrawingFile>> 01/11/2017 11:45 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Tectonic 2.00.1 2016-02-17 Prj: Tectonic 2.00 2016-02-16

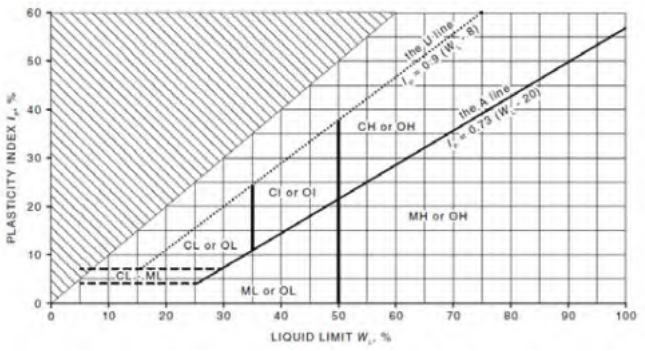
METHOD OF SOIL DESCRIPTION USED ON LOGS

CLASSIFICATION AND INFERRED STRATIGRAPHY
Soil is classified and described in borehole and test pit logs using the preferred method given in AS1726 – 2017.
The material properties are assessed in the field by visual/tactile methods.

Particle Size

Major Division	Sub Division	Particle Size
BOULDERS		> 200 mm
COBBLES		63 to 200 mm
GRAVEL	Coarse	19 to 63 mm
	Medium	6.7 to 19 mm
	Fine	2.36 to 6.7 mm
SAND	Coarse	0.6 to 2.36 mm
	Medium	0.21 to 0.6 mm
	Fine	0.075 to 0.21
SILT		0.002 to 0.075
CLAY		< 0.002 mm

Plasticity Properties



NOTE: The U line is an approximate upper bound for most materials. Data which plot above the U line may represent unusual/problem soil behavior, or unreliable data and should be considered carefully.

MOISTURE CONDITION AS1726 - 2017

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays & Silts may be brittle or friable and powdery.
M	Moist	Soils are darker than in the dry condition & may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

CONSISTENCY AND DENSITY AS1726 - 2017

Symbol	Term	Undrained Shear Strength		Symbol	Term	Density Index %	SPT "N" #
VS	Very Soft	0 to 12 kPa		VL	Very Loose	Less than 15	0 to 4
S	Soft	12 to 25 kPa		L	Loose	15 to 35	4 to 10
F	Firm	25 to 50 kPa		MD	Medium Dense	35 to 65	10 to 30
St	Stiff	50 to 100 kPa		D	Dense	65 to 85	30 to 50
VSt	Very Stiff	100 to 200 kPa		VD	Very Dense	Above 85	Above 50
H	Hard	Above 200 kPa					

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.
SPT correlations are not stated in AS1726 – 2017, and may be subject to corrections for overburden pressure and equipment type.

coffey

Engineering Log - Excavation

		Excavation ID.	***TP301***
		sheet:	1 of 1
		project no.	***GEOTKPAR01976AC***
client:	***NORTH EAST BUSINESS PARK***	date excavated:	***08 Jul 2015***
principal:		date completed:	***08 Jul 2015***
project:	***NORTH EAST BUSINESS PARK - ASSMP***	logged by:	***AS***
location:	***REFER TO PLAN***	checked by:	***MT***

position: E: 498679; N: 7000675 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

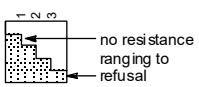
method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description **SOIL TYPE**: plasticity or particle characteristic, colour, secondary and minor components	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N			ASS				CH	**Sandy CLAY**: high plasticity, brown, fine to medium grained sand, trace of silt.	M	L		**TOPSOIL**
				ASS				CH	**Sandy CLAY**: high plasticity, pale brown, orange/red mottle, fine to medium grained sand. ... colour changing to grey, orange/red mottle, fine to medium grained sand		F / St		
				ASS		1.0					St		DIST PP = 150-200kPa DIST PP = 150-200kPa
				ASS				SC	**Clayey SAND**: fine to coarse grained, grey, orange mottle, high plastic clay fines.		D		Some lenses of HP clay with DPP=150kPa
				ASS		2.0			Test pit TP301 terminated at 2.0 m	W			LIMIT OF INVESTIGATION
				ASS		3.0							
				ASS		4.0							
				ASS		5.0							
				ASS		6.0							

image:

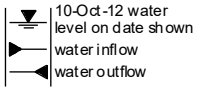
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

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

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coffey

Engineering Log - Excavation

Excavation ID.	***TP305***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***09 Jul 2015***
principal:	date completed: ***09 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498420; N: 7000164 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		Not Observed	ASS		0.0		SM	**Silty SAND**: fine to medium grained, dark brown, trace of clay fines and organics.	M	MD		**TOPSOIL**
				ASS				SC	**Clayey SAND**: fine to medium grained, brown, orange mottle, low to high plastic clay fines.				
				ASS					... colour changing to pale grey, orange mottle				
				ASS		1.0		SC	**Clayey SAND**: fine to coarse grained, grey, orange/brown mottle, low to high plastic clay fines.				
				ASS									
				ASS									
				ASS									
				ASS		2.0			Test pit TP305 terminated at 2.0 m				LIMIT OF INVESTIGATION
						3.0							
						4.0							
						5.0							
						6.0							

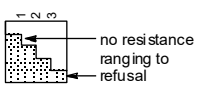
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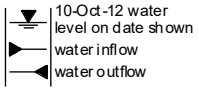
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

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

coffey

Engineering Log - Excavation

Excavation ID.	***TP306***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***09 Jul 2015***
principal:	date completed: ***09 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498455; N: 7000220 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		Not Observed	ASS		0.0		CH	**Sandy CLAY**: high plasticity, dark brown, fine to medium grained sand, trace of silt and organics.	M	L		**TOPSOIL**
				ASS				SC	**Clayey SAND**: fine to coarse grained, dark grey, high plastic clay fines.		F / St		DIST PP = 100-150kPa
				ASS				CH	**Sandy CLAY**: high plasticity, grey, red/orange mottle, fine to coarse grained sand.		VSt		DIST PP = 100-150kPa
				ASS		1.0					VSt / H		DIST PP = 300-350kPa
				ASS				CH	**Sandy CLAY**: high plasticity, grey, red/orange mottle, fine to coarse grained sand.				DIST PP = 300-350kPa
				ASS				SC	**Clayey SAND**: fine to coarse grained, pale grey, red/orange mottle, fine to coarse grained sand.		VD		DIST PP = 350-400kPa
				ASS		2.0			Test pit TP306 terminated at 2.0 m				**XW MATERIAL**
						3.0							LIMIT OF INVESTIGATION
						4.0							
						5.0							
						6.0							

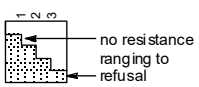
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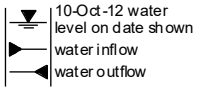
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

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

coffey

Engineering Log - Excavation

Excavation ID.	***TP307***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***09 Jul 2015***
principal:	date completed: ***09 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498471; N: 7000284 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		Not Observed	ASS		0.0		CH	**Sandy CLAY**: high plasticity, dark brown, fine to medium grained sand, trace of silt and organics.	M	L		**TOPSOIL**
				ASS				CH	**CLAY**: high plasticity, pale grey/pale brown, orange mottle, fine to medium grained sand, trace of silt. ... colour changing to grey, with some fine to medium grained sand		St / VSt		DIST PP = 150-200kPa DIST PP = 150-200kPa DIST PP = 200-300kPa DIST PP = 200-300kPa
				ASS		1.0		SC	**Clayey SAND**: fine to coarse grained, grey, orange/red mottle, high plastic clay fines, trace of fine to medium grained gravel.		VD		DIST PP = 250-300kPa DIST PP = 250-300kPa **XW MATERIAL** Observed XW Sandstone
						2.0			Test pit TP307 terminated at 2.0 m				LIMIT OF INVESTIGATION
						3.0							
						4.0							
						5.0							
						6.0							

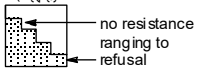
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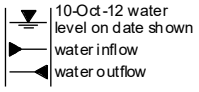
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests

U##	undisturbed sample ##mm diameter
D	disturbed sample
B	bulk disturbed sample
E	environmental sample
HP	hand penetrometer (kPa)
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
VS	vane shearpeak/remouded (uncorrected kPa)
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture

D	dry
M	moist
W	wet
W_P	plastic limit
W_L	liquid limit

consistency / relative density

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

coffey

Engineering Log - Excavation

Excavation ID.	***TP308***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***09 Jul 2015***
principal:	date completed: ***09 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498483; N: 7000351 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		Not Observed	ASS				SC	**Clayey SAND**: fine to medium grained, dark brown, high plasticity clay fines, trace of silt and organics.	M	F / St		**TOPSOIL**
				ASS				CH			VSt		DIST PP = 250-300kPa
				ASS				CH	**Sandy CLAY**: high plasticity, grey/brown, orange mottle, fine to coarse grained sand.				DIST PP = 250-300kPa
				ASS									DIST PP = 250-300kPa
				ASS		1.0		CH	**CLAY**: low to high plasticity, grey, with some fine to medium grained sand, trace of silt.		VSt / H		DIST PP = 250-300kPa
				ASS					**Sandy CLAY**: low to high plasticity, grey, orange mottle, fine to coarse grained sand.				DIST PP = 300-360kPa
				ASS				SC	**Clayey SAND**: fine to coarse grained, grey, orange/red mottle, clay fines.		VD		DIST PP = 300-360kPa
						2.0			Test pit TP308 terminated at 1.85 m				**XW MATERIAL**
						3.0							XW Sandstone - residual material
						4.0							LIMIT OF INVESTIGATION - EXCAVATOR REFUSAL
						5.0							
						6.0							

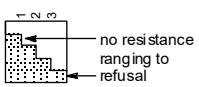
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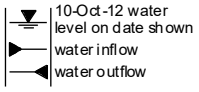
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

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

coffey

Engineering Log - Excavation

Excavation ID.	***TP309***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***09 Jul 2015***
principal:	date completed: ***09 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498500; N: 7000419 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N		Not Observed	ASS		0.0		SC	**Clayey SAND**: fine to medium grained, dark brown, clay fines, trace of silt and organics.	M	L		**TOPSOIL**
				ASS				CH	**CLAY**: high plasticity, grey, yellow/brown mottle, trace of fine to medium grained sand.		St		DIST PP = 150-200kPa
				ASS									DIST PP = 150-200kPa
				ASS							VSt		DIST PP = 250-300kPa
				ASS		1.0							DIST PP = 250-300kPa
				ASS									DIST PP = 250-300kPa
				ASS									DIST PP = 250-300kPa
				ASS									DIST PP = 350kPa
				ASS		2.0		SC	**Clayey SAND**: fine to coarse grained, grey, orange mottle, high plastic clay fines.		VD		DIST PP = 350kPa
									Test pit TP309 terminated at 2.0 m				**XW MATERIAL**
						3.0							LIMIT OF INVESTIGATION
						4.0							
						5.0							
						6.0							

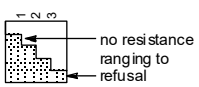
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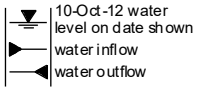
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

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

coffey

Engineering Log - Excavation

Excavation ID.	***TP315***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***08 Jul 2015***
principal:	date completed: ***08 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498631; N: 7000736 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

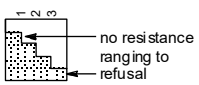
method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa)	structure and additional observations
E	N			ASS				CH	**Sandy CLAY**: low to high plasticity, brown, fine to medium grained sand, organics, trace of silt.	M	S / F		**TOPSOIL**
				ASS				CH	**Sandy CLAY**: high plasticity, orange brown, red/orange mottle, fine to medium grained sand.		St		DIST PP = 100-150kPa
				ASS					... colour changing to orange brown, orange mottle				DIST PP = 100-150kPa
				ASS		1.0			... colour changing to dark grey, orange mottle				DIST PP = 100-150kPa
				ASS									DIST PP = 100-150kPa
				ASS				SC	**Clayey SAND**: fine to medium grained, dark grey, low to high plastic clay fines.	W	MD / D		
						2.0			Test pit TP315 terminated at 2.0 m				LIMIT OF INVESTIGATION
						3.0							
						4.0							
						5.0							
						6.0							

image:

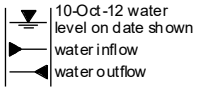
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

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

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coffey

Engineering Log - Excavation

Excavation ID.	***TP316***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***08 Jul 2015***
principal:	date completed: ***08 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498551; N: 7000763 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration 1 2 3	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		Not Observed	ASS		0.0		SM	**Silty SAND**: fine to medium grained, dark brown, trace of clay fines, organics.	D	L		**TOPSOIL**
				ASS				SC	**Clayey SAND**: fine to medium grained, grey/brown, orange mottle, high plastic clay fines.	M	MD		
				ASS									
				ASS									
				ASS		1.0		CH	**Sandy CLAY**: high plasticity, grey, orange mottle, fine to coarse grained sand.		St		**XW MATERIAL** DIST PP = 100-150kPa
				ASS									DIST PP = 100-150kPa
				ASS									
				ASS				SC	**Clayey SAND**: fine to coarse grained, grey, low to high plastic fines.		VD		
						2.0			Test pit TP316 terminated at 2.0 m				LIMIT OF INVESTIGATION
						3.0							
						4.0							
						5.0							
						6.0							

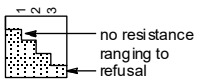
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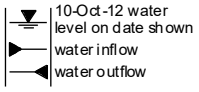
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

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

coffey

Engineering Log - Excavation

Excavation ID.	***TP318***
sheet:	1 of 1
project no.	***GEOTKPAR01976AC***
client: ***NORTH EAST BUSINESS PARK***	date excavated: ***08 Jul 2015***
principal:	date completed: ***08 Jul 2015***
project: ***NORTH EAST BUSINESS PARK - ASSMP***	logged by: ***AS***
location: ***REFER TO PLAN***	checked by: ***MT***

position: E: 498510; N: 7000828 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N		Not Observed	ASS		0.0		SM	**Silty SAND**: fine to medium grained, dark brown, trace of clay fines, organics.	M	L / MD		**TOPSOIL**
				ASS				SM	**Silty SAND**: fine to medium grained, grey/brown.				
				ASS				SC	**Clayey SAND**: fine to coarse grained, grey, orange/brown mottle, high plastic clay fines.		MD / D		**RESIDUAL**
				ASS		1.0			... colour changing to grey, red/brown mottle				
				ASS				CH	**Sandy CLAY**: high plasticity, grey, yellow/brown mottle, fine to coarse grained sand.		VSt		DIST PP = 200-250kPa
				ASS									DIST PP = 200-250kPa
				ASS		2.0			Test pit TP318 terminated at 2.0 m				DIST PP = 200-250kPa
													LIMIT OF INVESTIGATION
						3.0							
						4.0							
						5.0							
						6.0							

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration

1 2 3 — no resistance ranging to refusal

water

10-Oct-12 water level on date shown
water inflow
water outflow

samples & field tests

U##	undisturbed sample ##mm diameter
D	disturbed sample
B	bulk disturbed sample
E	environmental sample
HP	hand penetrometer (kPa)
N	standard penetration test (SPT)
N*	SPT - sample recovered
Nc	SPT with solid cone
VS	vane shearpeak/remouded (uncorrected kPa)
R	refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

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

coffey

Engineering Log - Excavation

		Excavation ID.	***TP319***
		sheet:	1 of 1
		project no.	***GEOTKPAR01976AC***
client:	***NORTH EAST BUSINESS PARK***	date excavated:	***08 Jul 2015***
principal:		date completed:	***08 Jul 2015***
project:	***NORTH EAST BUSINESS PARK - ASSMP***	logged by:	***AS***
location:	***REFER TO PLAN***	checked by:	***MT***

position: E: 498561; N: 7000878 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation:

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N			ASS				SC	**Clayey SAND**: fine to medium grained, dark grey, trace of silt, organics.	M	L		**TOPSOIL**
				ASS				CH	**Sandy CLAY**: low to high plasticity, grey/brown, orange mottle, fine to coarse grained sand.		St	X X	DIST PP = 200kPa DIST PP = 200kPa
				ASS		1.0			...orange mottle increasing				Some lenses of SP fine to coarse grained sand
				ASS				SC	**Silty SAND**: fine to coarse grained, grey, orange mottle, low to high plastic clay fines.		D / VD		**XW MATERIAL** Observed some XW Sandstone
				ASS		2.0			Test pit TP319 terminated at 2.0 m				LIMIT OF INVESTIGATION
						3.0							
						4.0							
						5.0							
						6.0							

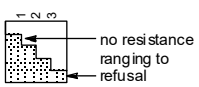
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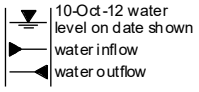
method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration



water



samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

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

coffey

Engineering Log - Excavation

		Excavation ID.	***TP334***
		sheet:	1 of 1
		project no.	***GEOTKPAR01976AC***
client:	***NORTH EAST BUSINESS PARK***	date excavated:	***07 Jul 2015***
principal:		date completed:	***07 Jul 2015***
project:	***NORTH EAST BUSINESS PARK - ASSMP***	logged by:	***MC***
location:	***REFER TO PLAN***	checked by:	***MT***

position: E: 499171; N: 7000784 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation: E-W

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N			ASS				CH	**Silty CLAY**: high plasticity, dark brown, trace of fine grained sand.	M	F / St		**TOPSOIL**
				ASS				CH	**CLAY**: high plasticity, orange brown, trace of fine grained sand.		St		Small roots observed in top 400mm
				ASS					... colour changing to grey, orange/brown mottle				DIST PP = 110kPa
				ASS		1.0							
				ASS				SP	**SAND**: fine to coarse grained, grey, with some medium to high plastic fines, with some fine to medium grained rounded gravel.		MD		
				ASS									
				ASS									
				ASS		2.0							LIMIT OF INVESTIGATION
									Test pit TP334 terminated at 2.0 m				
						3.0							
						4.0							
						5.0							
						6.0							

image:

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
- HP hand penetrometer (kPa)
- N standard penetration test (SPT)
- N* SPT - sample recovered
- Nc SPT with solid cone
- VS vane shearpeak/remouded (uncorrected kPa)
- R refusal

classification symbol & soil description
based on Unified Classification System

moisture
- D dry
- M moist
- W wet
- W_P plastic limit
- W_L liquid limit

consistency / relative density

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

coffey

Engineering Log - Excavation

		Excavation ID.	***TP336***
		sheet:	1 of 1
		project no.	***GEOTKPAR01976AC***
client:	***NORTH EAST BUSINESS PARK***	date excavated:	***07 Jul 2015***
principal:		date completed:	***07 Jul 2015***
project:	***NORTH EAST BUSINESS PARK - ASSMP***	logged by:	***MC***
location:	***REFER TO PLAN***	checked by:	***MT***

position: E: 499266; N: 7000787 (MGA94 Zone 56 J) surface elevation : Not Specified pit orientation: E-W

equipment type: 8T Excavator excavation method: excavation dimensions: 3.0 m long 0.5 m wide

excavation information | **material substance**

method	support	penetration (1 2 3)	water	samples & field tests	RL (m)	depth (m)	graphic log	classification symbol	material description (SOIL TYPE: plasticity or particle characteristic, colour, secondary and minor components)	moisture condition	consistency / relative density	hand penetrometer (kPa) 100 200 300 400	structure and additional observations
E	N			ASS				CH	**Silty CLAY**: high plasticity, dark brown, trace of sand.	M	F / St		**TOPSOIL** Numerous grass roots
				ASS				CH	**CLAY**: high plasticity, orange brown/grey, trace of fine to medium grained sand.				DIST PP = 90kPa
				ASS				CH	**CLAY**: high plasticity, grey.		St		DIST PP = 110kPa
				ASS		1.0		SC	**Silty SAND**: fine to coarse grained, grey, high plastic fines, with some fine to medium grained rounded gravel.		D		
				ASS				SP					
				ASS				CH	**SAND**: fine to coarse grained, grey, with some high plastic fines, trace of fine grained rounded gravel.		VSt		
						2.0			**Gravelly CLAY**: high plasticity, grey, fine to medium grained rounded gravel, with some fine to coarse grained sand.				LIMIT OF INVESTIGATION
						3.0			Test pit TP336 terminated at 2.2 m				
						4.0							
						5.0							
						6.0							

image:

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method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- N none
- S shoring

penetration
1 2 3 — no resistance ranging to refusal

water
- 10-Oct-12 water level on date shown
- water inflow
- water outflow

samples & field tests
- U## undisturbed sample ##mm diameter
- D disturbed sample
- B bulk disturbed sample
- E environmental sample
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classification symbol & soil description
based on Unified Classification System

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VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey

Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μm to 2.36 mm
	medium	200 μm to 600 μm
	fine	75 μm to 200 μm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

coffey

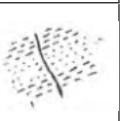
Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit w_L less than 35%. • Medium plasticity – w_L between 35% and 50%. • High plasticity – w_L greater than 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

APPENDIX B

Table B1 – Summary of ASS Laboratory Testing

ASS Laboratory Test Certificates

tectonic
geotechnical & environmental engineers

Table B1 - Summary of ASS Laboratory Testing

Ref: 19210

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH01	0.0-0.25		7.9	L	4.7	M	3										
	0.25-0.5		7.6	L	5.6	M	1	5.5	9	< 0.02	< 0.005	< 3	n/a	n/a	9	0.5	0.8
	0.5-0.75		6.1	L	4.9	L	1										
	0.75-1.0		6.3	L	5.3	L	1										
	1.0-1.25		6.2	L	5.5	L	1										
	1.25-1.5		6.8	L	6.0	L	1	5.6	6.1	< 0.02	< 0.005	< 3	n/a	n/a	6.1	0.3	0.5
	1.5-1.75		6.9	L	6.1	L	1										
BH02	0.0-0.25		6.3	L	3.4	M	2										
	0.25-0.5		5.3	L	3.4	M	3										
	0.5-0.75		5.5	L	4.5	L	2	4.4	35	< 0.02	< 0.005	< 3	< 10	n/a	35	1.8	3.0
	0.75-1.0		5.5	L	4.1	L	2										
	1.0-1.25		5.8	L	4.6	L	2										
	1.25-1.5		5.8	L	5.0	L	2										
	1.5-1.75		5.9	L	4.6	L	2										
	1.75-2.0		5.7	L	4.6	L	2	4.6	23	< 0.02	< 0.005	< 3	n/a	n/a	23	1.2	2.0
	2.0-2.25		5.9	L	5.2	L	1										
	2.25-2.5		5.9	L	5.4	L	1										
BH03	0.0-0.25		7.1	L	4.5	M	3	6.1	3.4	< 0.02	< 0.005	< 3	n/a	n/a	3.4	0.2	0.3
	0.25-0.5		5.2	L	4.1	L	2										
	0.5-0.75		5.3	L	4.2	L	2										
	0.75-1.0		5.2	L	4.2	L	1										
	1.0-1.25		5.4	L	4.6	L	2	4.6	22	< 0.02	< 0.005	< 3	n/a	n/a	22	1.1	1.9
	1.25-1.5		5.4	L	4.6	L	1										
	1.5-1.75		5.6	L	4.8	L	1										
	1.75-2.0		5.6	L	4.8	L	2										
	2.0-2.25		5.5	L	4.8	L	1										
	2.25-2.5		5.5	L	5.1	L	1										
TP305	0.0-0.25		4.9	M	3.8	M	1	5.1	29	< 0.02	< 0.005	< 3	n/a	n/a	29	1.5	2.5
	0.25-0.5		4.7	M	3.2	M	1										
	0.5-0.75		4.8	M	3.6	M	1	4.9	33	< 0.02	< 0.005	< 3	n/a	n/a	33	1.7	2.8
	0.75-1.0		4.4	M	3.2	M	1										
	1.0-1.25		4.4	M	3.4	M	1										
	1.25-1.5		4.6	M	3.3	M	1	5.0	24	< 0.02	< 0.005	< 3	n/a	n/a	24	1.2	2.0
	1.5-1.75		4.4	M	3.2	M	1										
	1.75-2.0		4.4	M	3.5	M	1										
TP306	0.0-0.25		5.4	L	3.6	M	3										
	0.25-0.5		4.9	M	3.0	M	1	5.3	15	< 0.02	< 0.005	< 3	n/a	n/a	15	0.8	1.3
	0.5-0.75		4.5	M	3.1	M	1										
	0.75-1.0		4.7	M	3.5	M	1	4.6	45	< 0.02	< 0.005	< 3	n/a	n/a	45	2.3	3.8
	1.0-1.25		4.5	M	3.4	M	1										
	1.25-1.5		4.6	M	3.5	M	1	4.5	41	< 0.02	< 0.005	< 3	n/a	n/a	41	2.1	3.5
	1.5-1.75		4.4	M	3.4	M	1										
	1.75-2.0		4.3	M	3.6	M	1										
TP307	0.0-0.25		4.9	M	3.6	M	1	4.3	110	< 0.02	< 0.005	< 3	< 10	n/a	110	5.5	9.4
	0.25-0.5		4.5	M	2.5	H	1										
	0.5-0.75		4.6	M	2.8	M	1										
	0.75-1.0		4.4	M	3.2	M	1										
	1.0-1.25		4.7	M	3.2	M	1	4.7	40	< 0.02	< 0.005	< 3	n/a	n/a	40	2.0	3.4
	1.25-1.5		4.2	M	2.9	M	1										
	1.5-1.75		4.9	M	3.3	M	1										
	1.75-2.0		5.2	L	4.4	L	1	5.1	21	< 0.02	< 0.005	< 3	n/a	n/a	21	1.1	1.8

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
TP308	0.0-0.25		5.0	L	2.7	H	3	4.2	120	< 0.02	< 0.005	< 3	< 10	n/a	120	6.0	10.2
	0.25-0.5		4.6	M	3.5	M	1										
	0.5-0.75		5.1	L	3.1	M	1										
	0.75-1.0		4.5	M	3.5	M	1										
	1.0-1.25		4.5	M	3.8	M	1	4.4	68	0.02	< 0.005	< 3	< 10	n/a	68	3.4	5.8
	1.25-1.5		4.7	M	3.7	M	1										
	1.5-1.75		4.6	M	3.7	M	1										
	1.75-2.0		4.8	M	4.0	L	1	4.8	24	< 0.02	< 0.005	< 3	n/a	n/a	24	1.2	2.0
TP309	0.0-0.25		5.1	L	2.6	H	3	4.4	120	< 0.02	0.008	5	< 10	n/a	120	6.0	10.2
	0.25-0.5		4.6	M	2.1	H	1										
	0.5-0.75		5.3	L	2.9	H	1	4.5	62	< 0.02	< 0.005	< 3	< 10	n/a	62	3.1	5.3
	0.75-1.0		4.3	M	3.4	M	1										
	1.0-1.25		4.6	M	3.5	M	1										
	1.25-1.5		4.3	M	3.0	M	1										
	1.5-1.75		4.0	M	3.7	M	1										
	1.75-2.0		4.1	M	4.4	L	1	4.7	35	< 0.02	< 0.005	< 3	n/a	n/a	35	1.8	3.0
BH04	0.0-0.25		6.6	L	3.8	M	3										
	0.25-0.5		3.9	H	2.9	M	2	3.9	37	0.04	< 0.005	< 3	79	n/a	116	8.7	14.8
	0.5-0.75		3.8	H	2.9	M	2										
	0.75-1.0		3.9	H	2.9	M	2										
	1.0-1.25		4.0	M	2.8	M	2										
	1.25-1.5		4.2	M	2.7	M	2	4.2	110	< 0.02	< 0.005	< 3	32	n/a	142	10.7	18.1
	1.5-1.75		4.0	M	2.9	M	2										
	1.75-2.0		4.2	M	3.2	M	2										
BH05	0.0-0.25		5.6	L	3.2	M	4										
	0.25-0.5		5.9	L	3.9	M	2	4.4	60	< 0.02	0.006	3.6	17	n/a	80.6	6.0	10.3
	0.5-0.75		5.9	L	5.1	L	1										
	0.75-1.0		6.2	L	5.1	L	1	4.5	33	< 0.02	< 0.005	< 3	n/a	n/a	33	2.5	4.2
	1.0-1.25		5.8	L	4.9	L	1										
TP301	0.0-0.25		5.3	L	3.2	M	3	4.3	150	< 0.02	< 0.005	< 3	10	n/a	160	12.0	20.4
	0.25-0.5		4.0	M	3.0	M	2										
	0.5-0.75		3.9	H	2.9	M	1										
	0.75-1.0		3.9	H	3.0	M	1	4.0	190	0.06	< 0.005	< 3	< 10	n/a	190	14.3	24.2
	1.0-1.25		3.8	H	2.7	M	2										
	1.25-1.5		3.8	H	2.7	M	1										
	1.5-1.75		4.2	M	2.6	M	1	4.0	180	0.05	< 0.005	< 3	< 10	n/a	180	13.5	23.0
	1.75-2.0		3.8	H	2.5	M	1										
TP315	0.0-0.25		4.5	M	3.5	M	1	4.2	150	< 0.02	< 0.005	< 3	< 10	n/a	150	11.3	19.1
	0.25-0.5		5.0	L	3.4	M	1										
	0.5-0.75		4.4	M	3.0	M	1										
	0.75-1.0		4.7	M	3.2	M	1	4.2	200	0.02	< 0.005	< 3	< 10	n/a	200	15.0	25.5
	1.0-1.25		4.7	M	3.1	M	1										
	1.25-1.5		4.7	M	3.2	M	1										
	1.5-1.75		5.1	L	3.5	M	3	3.9	120	< 0.02	< 0.005	< 3	< 10	n/a	120	9.0	15.3
	1.75-2.0		4.5	M	2.9	M	1										
TP316	0.0-0.25		5.6	L	3.6	M	3										
	0.25-0.5		5.1	L	3.9	M	1	4.6	44	< 0.02	< 0.005	< 3	n/a	n/a	44	3.3	5.6
	0.5-0.75		5.0	L	3.8	M	1										
	0.75-1.0		5.1	L	3.4	M	1										
	1.0-1.25		5.7	L	4.3	L	1	4.6	48	< 0.02	< 0.005	< 3	n/a	n/a	48	3.6	6.1
	1.25-1.5		5.4	L	3.8	M	1										
	1.5-1.75		5.0	L	4.1	L	1										
	1.75-2.0		5.3	L	4.4	L	1	4.5	64	< 0.02	< 0.005	< 3	< 10	n/a	64	4.8	8.2

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
TP318	0.0-0.25		5.3	L	3.1	M	2										
	0.25-0.5		5.5	L	3.5	M	1	5.9	4	< 0.02	< 0.005	< 3	n/a	n/a	4	0.3	0.5
	0.5-0.75		5.2	L	3.6	M	1										
	0.75-1.0		5.9	L	3.6	M	1										
	1.0-1.25		5.0	L	3.7	M	1	4.9	25	< 0.02	< 0.005	< 3	n/a	n/a	25	1.9	3.2
	1.25-1.5		4.7	M	3.5	M	2										
	1.5-1.75		4.8	M	3.5	M	1										
	1.75-2.0		5.5	L	4.0	L	1	4.5	51	< 0.02	< 0.005	< 3	n/a	n/a	51	3.8	6.5
TP319	0.0-0.25		5.4	L	2.8	M	2	5.4	10	< 0.02	< 0.005	< 3	n/a	n/a	10	0.8	1.3
	0.25-0.5		5.2	L	3.9	M	1										
	0.5-0.75		5.1	L	3.3	M	2	4.8	23	< 0.02	< 0.005	< 3	n/a	n/a	23	1.7	2.9
	0.75-1.0		5.4	L	4.0	L	1										
	1.0-1.25		4.9	M	3.9	M	1										
	1.25-1.5		4.9	M	4.1	L	1										
	1.5-1.75		4.8	M	4.1	L	1	4.2	73	< 0.02	< 0.005	< 3	< 10	n/a	73	5.5	9.3
	1.75-2.0		5.1	L	4.2	L	1										
BH06	0.0-0.25		5.5	L	2.9	H	4										
	0.25-0.5		5.1	L	3.8	M	3										
	0.5-0.75		5.2	L	3.6	M	2	4.4	57	< 0.02	< 0.005	< 3	13	n/a	70	5.3	8.9
	0.75-1.0		4.9	M	3.5	M	1										
	1.0-1.25		4.5	M	3.7	M	2										
	1.25-1.5		4.5	M	3.8	M	1										
	1.5-1.75		5.0	L	3.7	M	1										
	1.75-2.0		5.2	L	4.0	L	1	4.3	46	0.03	< 0.005	< 3	21	n/a	67	5.0	8.5
BH07	0.0-0.25		5.4	L	3.3	M	4	4.3	110	< 0.02	0.013	8.3	22	n/a	140.3	10.5	17.9
	0.25-0.5		4.9	M	3.7	M	2										
	0.5-0.75		4.9	M	3.5	M	2										
	0.75-1.0		4.8	M	3.3	M	2										
	1.0-1.25		4.8	M	3.0	M	1										
	1.25-1.5		4.8	M	3.2	M	1	4.5	50	< 0.02	< 0.005	< 3	< 10	n/a	50	3.8	6.4
	1.5-1.75		4.9	M	3.0	M	1										
	1.75-2.0		4.6	M	3.1	M	2										
TP334	0.0-0.25		4.9	M	3.2	M	1										
	0.25-0.5		4.7	M	3.3	M	1	4.2	100	0.02	< 0.005	< 3	< 10	n/a	100	7.5	12.8
	0.5-0.75		4.5	M	3.1	M	1										
	0.75-1.0		4.3	M	2.8	M	1	4.3	99	0.04	< 0.005	< 3	< 10	n/a	99	7.4	12.6
	1.0-1.25		4.4	M	2.8	M	1										
	1.25-1.5		5.1	L	3.2	M	1	5.4	9	< 0.02	< 0.005	< 3	n/a	n/a	9	0.7	1.1
	1.5-1.75		5.2	L	3.0	M	1										
	1.75-2.0		5.3	L	3.3	M	1										
TP336	0.0-0.25		4.4	M	2.3	H	3	4.2	170	0.02	0.068	42	< 10	n/a	212	15.9	27.0
	0.25-0.5		4.2	M	2.8	M	1										
	0.5-0.75		4.0	M	2.6	M	1										
	0.75-1.0		4.2	M	2.7	M	1										
	1.0-1.25		4.5	M	2.9	M	1										
	1.25-1.5		4.5	M	2.6	M	1	4.6	26	< 0.02	< 0.005	< 3	n/a	n/a	26	2.0	3.3
	1.5-1.75		4.4	M	2.3	H	2										
	1.75-2.0		4.4	M	2.6	M	1	4.4	48	0.03	0.007	4	< 10	n/a	52	3.9	6.6

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH08	0.0-0.25		5.8	L	3.2	M	4										
	0.25-0.5		5.6	L	3.4	M	3	4.3	73	< 0.02	< 0.005	< 3	< 10	n/a	77.7	5.8	9.9
	0.5-0.75		4.9	M	3.5	M	3										
	0.75-1.0		5.0	L	3.7	M	3										
	1.0-1.25		4.8	M	3.6	M	2	4.9	12	< 0.02	< 0.005	< 3	n/a	n/a	12	0.9	1.5
	1.25-1.5		4.8	M	3.9	M	1										
	1.5-1.75		4.8	M	3.8	M	1										
	1.75-2.0		4.8	M	3.8	M	1										
BH09	0.0-0.25		4.6	M	3.1	M	3	4.3	87	< 0.02	< 0.005	< 3	16	n/a	103	7.7	13.1
	0.25-0.5		4.6	M	3.3	M	2										
	0.5-0.75		4.4	M	3.4	M	3										
	0.75-1.0		4.4	M	3.4	M	2										
	1.0-1.25		4.5	M	3.3	M	2										
	1.25-1.5		4.8	M	3.7	M	2										
	1.5-1.75		4.7	M	3.6	M	2										
	1.75-2.0		4.7	M	3.7	M	2	4.5	32	0.05	< 0.005	< 3	18	n/a	50	3.8	6.4
BH10	0.0-0.25		5.7	L	3.2	M	4										
	0.25-0.5		5.2	L	3.4	M	4	4.4	57	< 0.02	< 0.005	< 3	19	n/a	76	5.7	9.7
	0.5-0.75		5.1	L	3.8	M	2										
	0.75-1.0		4.8	M	3.6	M	1										
	1.0-1.25		4.7	M	3.9	M	1	4.9	20	0.04	< 0.005	< 3	n/a	n/a	20	1.5	2.6
	1.25-1.5		4.9	M	3.9	M	1										
	1.5-1.75		5.0	L	4.4	L	1										
	1.75-2.0		5.0	L	4.6	L	1										
BH11	0.0-0.25		5.1	L	3.3	M	4	4.6	58	0.03	0.006	3.7	n/a	n/a	61.7	4.6	7.9
	0.25-0.5		4.5	M	2.8	M	4										
	0.5-0.75		4.1	M	3.2	M	4										
	0.75-1.0		4.0	M	3.3	M	2										
	1.0-1.25		3.9	H	3.0	M	2										
	1.25-1.5		3.9	H	3.0	M	2										
	1.5-1.75		4.0	M	2.9	M	2	4.1	110	0.07	0.005	3.2	28	n/a	141.2	10.6	18.0
	1.75-2.0		4.1	M	2.7	M	4										
	2.0-2.25		4.4	M	2.9	M	2										
	2.25-2.5		4.3	M	2.8	M	2										
	2.5-2.75		4.5	M	3.4	M	4										
	2.75-3.0		4.7	M	3.5	M	2	4.3	41	0.04	< 0.005	< 3	14	n/a	55	4.1	7.0
BH12	0.0-0.25		4.4	M	3.3	M	4										
	0.25-0.5		5.7	L	4.2	L	2										
	0.5-0.75		5.3	L	3.5	M	3	4.6	27	0.03	0.005	3.3	n/a	n/a	30.3	2.3	3.9
	0.75-1.0		4.9	M	3.8	M	2										
	1.0-1.25		4.8	M	4.0	L	1										
	1.25-1.5		4.9	M	4.1	L	1										
	1.5-1.75		4.9	M	4.3	L	1										
	1.75-2.0		5.0	L	4.4	L	1	4.5	27	0.04	< 0.005	< 3	21	n/a	48	3.6	6.1

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH13	0.0-0.25		6.0	L	3.0	M	4										
	0.25-0.5		5.9	L	3.1	M	4										
	0.5-0.75		6.2	L	3.1	M	4	4.6	40	< 0.02	< 0.005	< 3	n/a	n/a	40	2.0	3.4
	0.75-1.0		6.4	L	4.9	L	4										
	1.0-1.25		6.8	L	5.3	L	4										
	1.25-1.5		7.3	L	6.2	L	4										
	1.5-1.75		7.3	L	6.6	L	4										
	1.75-2.0		7.3	L	6.3	L	4	6.1	4.4	0.04	< 0.005	< 3	n/a	n/a	4.4	0.2	0.4
	2.0-2.25		7.4	L	7.2	L	4										
	2.25-2.5		7.3	L	6.2	L	4										
	2.5-2.75		7.4	L	6.6	L	4										
	2.75-3.0		7.6	L	6.9	L	4										
	3.0-3.25		7.7	L	7.3	L	4	6.1	3.5	0.03	< 0.005	< 3	n/a	n/a	3.5	0.2	0.3
	3.25-3.5		8.0	L	7.0	L	4										
BH14	0.0-0.25		5.9	L	3.4	M	3										
	0.25-0.5		6.0	L	4.2	L	3	4.5	39	< 0.02	< 0.005	< 3	< 10	n/a	39	2.0	3.3
	0.5-0.75		6.9	L	5.1	L	4										
	0.75-1.0		7.3	L	6.6	L	4										
	1.0-1.25		7.3	L	5.6	L	4										
	1.25-1.5		7.8	L	7.4	L	4										
	1.5-1.75		7.8	L	8.2	L	4	6.4	2.1	< 0.02	< 0.005	< 3	n/a	n/a	2.1	0.1	0.2
	1.75-2.0		7.7	L	7.9	L	4										
	2.0-2.25		7.7	L	8.1	L	4										
	2.25-2.5		7.7	L	8.2	L	4										
	2.5-2.75		7.6	L	8.2	L	4										
	2.75-3.0		7.6	L	7.8	L	4										
	3.0-3.25		7.6	L	8.2	L	4	6.4	< 2	0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	3.25-3.5		7.5	L	8.2	L	4										
BH15	0.0-0.25		5.1	L	2.5	M	3	4.4	120	< 0.02	< 0.005	< 3	< 10	n/a	120	6.0	10.2
	0.25-0.5		5.8	L	3.0	M	3										
	0.5-0.75		6.3	L	4.4	L	3										
	0.75-1.0		6.9	L	5.9	L	4	5.7	12	< 0.02	< 0.005	< 3	n/a	n/a	12	0.6	1.0
	1.0-1.25		7.8	L	6.3	L	3										
	1.25-1.5		7.8	L	8.0	L	4										
	1.5-1.75		8.1	L	8.2	L	4										
	1.75-2.0		7.6	L	7.8	L	4										
	2.0-2.25		7.7	L	8.0	L	4	6.6	< 2	< 0.02	< 0.005	< 3	n/a	95	0	0.0	0.0
	2.25-2.5		7.5	L	7.9	L	4										
	2.5-2.75		7.8	L	8.1	L	4										
	2.75-3.0		8.1	L	8.6	L	4										
	3.0-3.25		8.1	L	8.5	L	4	6.3	2.3	< 0.02	< 0.005	< 3	n/a	n/a	2.3	0.1	0.2
	3.25-3.5		7.9	L	8.3	L	4										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH16	0.0-0.25		5.9	L	3.2	M	3										
	0.25-0.5		6.2	L	3.4	M	3										
	0.5-0.75		6.5	L	4.2	M	2	4.8	25	< 0.02	< 0.005	< 3	n/a	n/a	25	1.3	2.1
	0.75-1.0		6.9	L	6.0	L	4										
	1.0-1.25		7.4	L	6.4	L	4										
	1.25-1.5		7.5	L	6.5	L	4										
	1.5-1.75		8.0	L	8.6	L	4										
	1.75-2.0		8.4	L	8.5	L	4	6.7	< 2	< 0.02	< 0.005	< 3	n/a	110	0	0.0	0.0
	2.0-2.25		8.1	L	8.2	L	4										
	2.25-2.5		8.1	L	8.1	L	4										
	2.5-2.75		8.3	L	8.2	L	4	6.6	< 2	< 0.02	< 0.005	< 3	n/a	180	0	0.0	0.0
	2.75-3.0		8.6	L	8.2	L	4										
	3.0-3.25		8.4	L	8.3	L	4										
	3.25-3.5		8.7	L	8.2	L	4										
BH17	0.0-0.25		6.4	L	3.5	M	3	5.0	22	< 0.02	< 0.005	< 3	n/a	n/a	22	1.1	1.9
	0.25-0.5		6.7	L	3.7	M	2										
	0.5-0.75		6.9	L	4.9	M	4										
	0.75-1.0		7.0	L	6.3	L	4										
	1.0-1.25		7.1	L	7.0	L	4	5.6	13	< 0.02	< 0.005	< 3	n/a	n/a	13	0.7	1.1
	1.25-1.5		7.1	L	6.9	L	4										
	1.5-1.75		7.4	L	7.6	L	4										
	1.75-2.0		7.3	L	7.5	L	4										
	2.0-2.25		7.7	L	6.7	L	4										
	2.25-2.5		7.7	L	7.5	L	4	5.7	5.4	< 0.02	< 0.005	< 3	n/a	n/a	5.4	0.3	0.5
	2.5-2.75		7.5	L	7.1	L	2										
	2.75-3.0		7.7	L	6.7	L	4										
	3.0-3.25		7.5	L	6.4	L	2										
	3.25-3.5		7.5	L	6.3	L	2	5.6	5.8	< 0.02	< 0.005	< 3	n/a	n/a	5.8	0.3	0.5
BH18	0.0-0.25		6.0	L	3.5	M	4										
	0.25-0.5		6.6	L	4.7	L	4										
	0.5-0.75		7.8	L	7.7	L	4	6.2	4.9	< 0.02	< 0.005	< 3	n/a	n/a	4.9	0.2	0.4
	0.75-1.0		8.5	L	8.4	L	4										
	1.0-1.25		8.6	L	8.6	L	4										
	1.25-1.5		8.8	L	8.7	L	4										
	1.5-1.75		8.7	L	8.8	L	4										
	1.75-2.0		8.8	L	8.9	L	4	7.5	< 2	< 0.02	< 0.005	< 3	n/a	190	0	0.0	0.0
	2.0-2.25		8.9	L	8.9	L	4										
	2.25-2.5		9.0	L	9.0	L	4										
	2.5-2.75		8.9	L	8.9	L	4										
	2.75-3.0		8.8	L	8.8	L	4										
	3.0-3.25		9.0	L	9.2	L	4										
	3.25-3.5		8.7	L	9.0	L	4										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH19	0.0-0.25		5.8	L	3.1	M	3										
	0.25-0.5		6.2	L	3.3	M	4	4.8	38	< 0.02	< 0.005	< 3	n/a	n/a	38	1.9	3.2
	0.5-0.75		6.5	L	3.7	M	4										
	0.75-1.0		7.1	L	4.9	M	2										
	1.0-1.25		7.0	L	5.2	L	4	5.6	8	< 0.02	< 0.005	< 3	n/a	n/a	8	0.4	0.7
	1.25-1.5		6.8	L	6.0	L	4										
	1.5-1.75		7.5	L	6.8	L	4										
	1.75-2.0		7.3	L	6.9	L	4										
	2.0-2.25		7.5	L	6.1	L	2										
	2.25-2.5		7.9	L	6.0	L	2	5.7	5.4	< 0.02	< 0.005	< 3	n/a	n/a	5.4	0.3	0.5
	2.5-2.75		7.6	L	6.4	L	4										
	2.75-3.0		7.6	L	6.5	L	4										
	3.0-3.25		7.6	L	6.7	L	4	5.6	7.9	< 0.02	< 0.005	< 3	n/a	n/a	7.9	0.4	0.7
	3.25-3.5		7.5	L	7.0	L	4										
BH20	0.0-0.25		6.2	L	3.7	M	3										
	0.25-0.5		6.3	L	3.9	M	3										
	0.5-0.75		6.3	L	4.0	M	3	5.1	18	< 0.02	< 0.005	< 3	n/a	n/a	18	1.4	2.3
	0.75-1.0		6.0	L	4.4	L	4										
	1.0-1.25		6.3	L	4.5	L	2										
	1.25-1.5		6.9	L	4.4	M	2										
	1.5-1.75		7.3	L	2.2	H	4	5.4	12	0.04	0.86	540	n/a	n/a	552	41.4	70.4
	1.75-2.0		7.4	L	2.4	H	4										
	2.0-2.25		7.1	L	2.2	H	4										
	2.25-2.5		7.1	L	2.2	H	4										
	2.5-2.75		6.9	L	2.2	H	4	5.5	5.9	0.03	0.4	250	n/a	n/a	255.9	19.2	32.6
	2.75-3.0		6.5	L	2.6	H	4										
	3.0-3.25		6.3	L	2.5	H	4										
	3.25-3.5		6.2	L	2.7	H	4	5.8	3.4	< 0.02	0.07	44	n/a	n/a	47.4	3.6	6.0
BH21	0.0-0.25		4.2	M	2.5	M	3										
	0.25-0.5		4.0	M	2.9	M	2										
	0.5-0.75		3.8	H	2.8	M	2	4.0	36	0.07	< 0.005	< 3	41	n/a	77	5.8	9.8
	0.75-1.0		3.8	H	2.9	M	3										
	1.0-1.25		4.0	M	2.6	M	2	4.1	180	0.03	< 0.005	< 3	15	n/a	195	14.6	24.9
	1.25-1.5		3.8	H	2.7	M	2										
	1.5-1.75		4.1	M	2.3	M	4										
	1.75-2.0		4.0	M	1.9	H	4										
	2.0-2.25		4.5	M	1.8	H	4	4.1	190	0.17	3.9	2400	75	n/a	2665	199.9	339.8
	2.25-2.5		4.6	M	1.8	H	4										
	2.5-2.75		6.0	L	2.0	H	4										
	2.75-3.0		7.0	L	5.5	L	2										
	3.0-3.25		7.1	L	5.3	L	2										
	3.25-3.5		6.9	L	5.1	L	2										
	3.5-3.75		6.6	L	4.8	L	2										
	3.75-4.0		7.1	L	5.3	L	1										
BH22	0.0-0.25		5.2	L	3.0	M	4										
	0.25-0.5		5.1	L	3.2	M	2										
	0.5-0.75		5.3	L	3.1	M	1										
	0.75-1.0		5.3	L	3.2	M	1	5.0	14	< 0.02	0.046	28	n/a	n/a	42	3.2	5.4
	1.0-1.25		5.2	L	2.8	H	1										
	1.25-1.5		5.2	L	3.0	M	1										
	1.5-1.75		5.1	L	3.0	M	1										
	1.75-2.0		4.3	M	2.3	H	4	5.5	4	< 0.02	0.052	32	n/a	n/a	36	2.7	4.6
	2.0-2.25		5.1	L	2.1	H	2										
	2.25-2.5		5.8	L	2.6	H	3										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH23	0.0-0.25		4.8	M	3.0	M	4	4.4	110	0.03	0.007	4.1	26	n/a	140.1	10.5	17.9
	0.25-0.5		4.3	M	3.2	M	4										
	0.5-0.75		4.1	M	3.0	M	4										
	0.75-1.0		4.1	M	2.9	M	4										
	1.0-1.25		4.5	M	2.8	M	4										
	1.25-1.5		4.5	M	1.4	H	4	4.2	120	0.14	1.9	1200	37	n/a	1357	101.8	173.0
	1.5-1.75		4.4	M	1.7	H	4										
	1.75-2.0		4.7	M	1.8	H	4										
	2.0-2.25		4.5	M	1.8	H	4										
	2.25-2.5		4.6	M	1.8	H	4	4.5	34	0.02	0.5	310	n/a	n/a	344	25.8	43.9
BH24	0.0-0.25		4.8	M	3.1	M	4										
	0.25-0.5		4.4	M	3.3	M	4										
	0.5-0.75		4.2	M	2.8	M	4										
	0.75-1.0		4.5	M	3.0	M	4	4.3	87	< 0.02	0.006	3.8	< 10	n/a	90.8	6.8	11.6
	1.0-1.25		4.9	M	2.7	H	4										
	1.25-1.5		5.1	L	2.2	H	4										
	1.5-1.75		4.4	M	2.6	M	4	4.3	120	< 0.02	0.044	28	16	n/a	164	12.3	20.9
	1.75-2.0		-	-	-	-	-										
	2.0-2.25		4.6	M	2.8	M	4										
	2.25-2.5		4.8	M	4.3	L	4										
BH1	0.0-0.25		4.9	M	2.7	H	3										
	0.25-0.5		4.4	M	3.1	M	2	4.2	59	0.08	< 0.005	< 3	< 10	n/a	59	4.4	7.5
	0.5-0.75		4.2	M	2.8	M	1										
	0.75-1.0		4.1	M	2.8	M	1										
	1.0-1.25		4.2	M	2.8	M	1	4.1	70	0.05	0.006	4	< 10	n/a	74	5.6	9.4
	1.25-1.5		4.4	M	2.7	M	1										
	1.5-1.75		5.1	L	1.9	H	4										
	1.75-2.0		5.7	L	1.8	H	4	4.4	47	0.09	2	1300	< 10	n/a	1347	101.0	171.7
	2.0-2.25		5.4	L	1.9	H	4										
	2.25-2.5		6.2	L	1.9	H	4										
	2.5-2.75		6.5	L	1.8	H	4										
	2.75-3.0		6.8	L	1.7	H	4										
	3.0-3.25		6.6	L	1.7	H	4	5.0	20	0.09	2.2	1400	n/a	n/a	1420	106.5	181.1
	3.25-3.5		5.9	L	1.9	H	4										
	3.5-3.75		6.3	L	2.0	H	4										
	3.75-4.0		6.1	L	1.8	H	4										
	4.0-4.25		6.5	L	1.9	H	4										
	4.25-4.5		6.8	L	2.1	H	4										
	4.5-4.75		6.9	L	2.2	H	4	5.2	5	0.05	0.68	420	n/a	n/a	425	31.9	54.2
	4.75-5.0		6.7	L	2.0	H	4										
BH25	0.0-0.25		5.7	L	2.9	H	4										
	0.25-0.5		5.5	L	4.2	L	1	4.1	64	0.02	< 0.005	< 3	< 10	n/a	64	4.8	8.2
	0.5-0.75		5.4	L	4.0	L	2										
	0.75-1.0		5.4	L	4.1	L	4										
	1.0-1.25		5.3	L	3.9	M	4										
	1.25-1.5		5.4	L	4.3	L	4	4.3	37	< 0.02	< 0.005	< 3	18	n/a	55	4.1	7.0
	1.5-1.75		6.7	L	4.1	M	4										
	1.75-2.0		5.9	L	5.0	L	4										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH26	0.0-0.25		6.3	L	3.4	M	4	4.5	52	< 0.02	< 0.005	< 3	n/a	n/a	56.5	4.2	7.2
	0.25-0.5		6.0	L	3.0	M	4										
	0.5-0.75		5.6	L	3.5	M	2										
	0.75-1.0		5.3	L	3.9	M	2										
	1.0-1.25		5.4	L	4.0	L	1										
	1.25-1.5		5.4	L	3.9	M	1	4.0	17	< 0.02	< 0.005	< 3	13	n/a	30	2.3	3.8
	1.5-1.75		5.3	L	3.8	M	4										
	1.75-2.0		5.5	L	4.1	L	4										
BH27	0.0-0.25		5.0	L	3.7	M	4	4.2	98	< 0.02	< 0.005	< 3	17	n/a	115	8.6	14.7
	0.25-0.5		5.0	L	3.5	M	4										
	0.5-0.75		5.3	L	3.0	M	4	4.2	97	< 0.02	< 0.005	< 3	< 10	n/a	97	7.3	12.4
	0.75-1.0		4.8	M	3.6	M	4										
	1.0-1.25		4.7	M	3.7	M	4										
	1.25-1.5		4.7	M	3.4	M	4										
	1.5-1.75		4.6	M	3.6	M	4										
	1.75-2.0		4.7	M	3.4	M	4										
	2.0-2.25		4.8	M	3.8	M	4	4.0	15	0.04	< 0.005	< 3	21	n/a	36	2.7	4.6
	2.25-2.5		4.9	M	4.0	L	4										
	2.5-2.75		5.0	L	4.0	L	4										
	2.75-3.0		4.9	M	3.7	M	4										
BH28	0.0-0.25		5.2	L	3.7	M	4										
	0.25-0.5		5.3	L	3.3	M	4										
	0.5-0.75		4.9	M	3.2	M	4										
	0.75-1.0		5.0	L	3.5	M	4	4.2	71	< 0.02	< 0.005	< 3	< 10	n/a	71	5.3	9.1
	1.0-1.25		4.7	M	3.7	M	4										
	1.25-1.5		4.7	M	3.7	M	4										
	1.5-1.75		4.8	M	3.8	M	4	3.9	11	< 0.02	< 0.005	< 3	11	n/a	22	1.7	2.8
	1.75-2.0		5.0	L	3.7	M	4										
	2.0-2.25		4.7	M	3.6	M	4										
	2.25-2.5		5.0	L	4.1	L	4										
	2.5-2.75		5.1	L	4.5	L	4										
	2.75-3.0		5.2	L	4.5	L	4	4.4	29	< 0.02	< 0.005	< 3	15	n/a	44	3.3	5.6
BH29	0.0-0.25		5.2	L	3.1	M	4										
	0.25-0.5		5.1	L	3.8	M	4	4.3	110	0.03	< 0.005	< 3	13	n/a	123	9.2	15.7
	0.5-0.75		4.7	M	3.7	M	4										
	0.75-1.0		4.8	M	3.6	M	4										
	1.0-1.25		4.7	M	3.6	M	4										
	1.25-1.5		4.7	M	4.0	L	1	4.1	52	< 0.02	< 0.005	< 3	22	n/a	74	5.6	9.4
	1.5-1.75		4.8	M	3.8	M	4										
	1.75-2.0		5.0	L	4.4	L	4										
	2.0-2.25		5.0	L	4.3	L	4										
	2.25-2.5		5.1	L	4.5	L	1	4.4	24	< 0.02	< 0.005	< 3	13	n/a	37	2.8	4.7
	2.5-2.75		6.1	L	5.8	L	4										
	2.75-3.0		5.4	L	4.9	L	4										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH30	0.0-0.25		5.1	L	3.2	M	4										
	0.25-0.5		4.9	M	3.5	M	4										
	0.5-0.75		4.4	M	3.9	M	4										
	0.75-1.0		4.4	M	3.5	M	4	4.0	24	< 0.02	< 0.005	< 3	15	n/a	39	2.9	5.0
	1.0-1.25		4.5	M	3.5	M	4										
	1.25-1.5		4.5	M	3.6	M	4	3.9	23	< 0.02	< 0.005	< 3	15	n/a	38	2.9	4.8
	1.5-1.75		4.5	M	3.3	M	4										
	1.75-2.0		4.4	M	3.2	M	4										
	2.0-2.25		4.7	M	3.7	M	1										
	2.25-2.5		4.6	M	3.9	M	2	4.1	91	0.03	< 0.005	< 3	13	n/a	104	7.8	13.3
	2.5-2.75		4.5	M	3.7	M	1										
	2.75-3.0		4.7	M	3.7	M	1										
BH31	0.0-0.25		5.4	L	3.5	M	4	4.2	170	< 0.02	0.036	22	13	n/a	205	15.4	26.1
	0.25-0.5		5.6	L	3.4	M	4										
	0.5-0.75		5.3	L	3.8	M	2										
	0.75-1.0		5.2	L	3.7	M	2										
	1.0-1.25		5.3	L	3.6	M	2	4.1	88	0.04	< 0.005	< 3	< 10	n/a	88	6.6	11.2
	1.25-1.5		5.2	L	3.7	M	2										
	1.5-1.75		5.2	L	4.0	L	2										
	1.75-2.0		5.1	L	4.2	L	4										
	2.0-2.25		5.2	L	4.1	L	4	4.1	80	< 0.02	< 0.005	< 3	23	n/a	103	7.7	13.1
	2.25-2.5		5.3	L	4.3	L	4										
	2.5-2.75		5.5	L	4.6	L	4										
	2.75-3.0		5.8	L	4.8	L	4										
BH32	0.0-0.25		6.6	L	3.7	M	4										
	0.25-0.5		6.6	L	4.4	M	4	4.7	25	< 0.02	< 0.005	< 3	n/a	n/a	25	1.9	3.2
	0.5-0.75		6.5	L	5.7	L	4										
	0.75-1.0		6.7	L	6.5	L	4										
	1.0-1.25		7.1	L	6.3	L	4										
	1.25-1.5		7.0	L	6.5	L	4	5.8	6.3	< 0.02	< 0.005	< 3	n/a	n/a	6.3	0.5	0.8
	1.5-1.75		7.3	L	6.6	L	4										
	1.75-2.0		7.3	L	6.9	L	4										
	2.0-2.25		7.5	L	6.7	L	4										
	2.25-2.5		7.5	L	8.3	L	4										
	2.5-2.75		7.4	L	8.2	L	4										
	2.75-3.0		7.5	L	8.3	L	4	5.8	4.3	< 0.02	< 0.005	< 3	n/a	n/a	4.3	0.3	0.5
BH33	0.0-0.25		5.8	L	3.6	M	4										
	0.25-0.5		5.8	L	4.7	L	3										
	0.5-0.75		6.1	L	4.7	L	4										
	0.75-1.0		6.0	L	4.6	L	4	4.8	19	< 0.02	< 0.005	< 3	n/a	n/a	19	1.4	2.4
	1.0-1.25		5.6	L	4.5	L	2										
	1.25-1.5		5.4	L	4.4	L	2										
	1.5-1.75		5.2	L	4.3	L	2										
	1.75-2.0		5.5	L	4.3	L	1	5.0	13	< 0.02	< 0.005	< 3	n/a	n/a	13	1.0	1.7
	2.0-2.25		5.1	L	4.3	L	2										
	2.25-2.5		5.1	L	4.4	L	4										
	2.5-2.75		5.2	L	4.8	L	2	4.4	22	< 0.02	< 0.005	< 3	< 10	n/a	22	1.7	2.8
	2.75-3.0		5.1	L	4.6	L	4										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH34	0.0-0.25		6.0	L	3.3	M	4	4.8	33	< 0.02	< 0.005	< 3	n/a	n/a	33	2.5	4.2
	0.25-0.5		6.4	L	4.6	L	4	4.8	32	< 0.02	< 0.005	< 3	n/a	n/a	32	2.4	4.1
	0.5-0.75		7.1	L	5.9	L	4										
	0.75-1.0		7.8	L	7.3	L	4										
	1.0-1.25		7.7	L	6.8	L	4										
	1.25-1.5		7.8	L	7.7	L	4	5.8	6.2	< 0.02	< 0.005	< 3	n/a	n/a	6.2	0.5	0.8
	1.5-1.75		7.9	L	7.0	L	4										
	1.75-2.0		7.9	L	6.9	L	4										
	2.0-2.25		7.9	L	8.1	L	4										
	2.25-2.5		8.0	L	7.8	L	4										
	2.5-2.75		7.9	L	8.2	L	4										
	2.75-3.0		8.0	L	7.9	L	4										
BH35	0.0-0.25		6.2	L	3.6	M	4	4.3	95	< 0.02	< 0.005	< 3	< 10	n/a	95	7.1	12.1
	0.25-0.5		5.9	L	3.6	M	4										
	0.5-0.75		5.5	L	4.1	L	4										
	0.75-1.0		5.3	L	4.2	L	2										
	1.0-1.25		5.5	L	4.8	L	4										
	1.25-1.5		5.5	L	4.5	L	4	4.4	36	0.04	< 0.005	< 3	16	n/a	52	3.9	6.6
	1.5-1.75		5.9	L	4.7	L	4										
	1.75-2.0		5.7	L	4.8	L	4										
	2.0-2.25		6.0	L	5.2	L	4										
	2.25-2.5		6.2	L	5.2	L	4	5.0	13	< 0.02	< 0.005	< 3	n/a	n/a	13	1.0	1.7
	2.5-2.75		6.2	L	5.3	L	4										
	2.75-3.0		6.3	L	5.2	L	4										
BH36	0.0-0.25		5.8	L	3.4	M	4	4.7	50	< 0.02	< 0.005	< 3	n/a	n/a	50	3.8	6.4
	0.25-0.5		5.8	L	4.2	L	4										
	0.5-0.75		5.6	L	4.4	L	4										
	0.75-1.0		5.4	L	5.1	L	4										
	1.0-1.25		4.9	M	3.9	M	4	4.4	34	< 0.02	< 0.005	< 3	< 10	n/a	34	2.6	4.3
	1.25-1.5		4.5	M	3.9	M	4										
	1.5-1.75		4.5	M	3.9	M	4										
	1.75-2.0		4.5	M	4.0	L	4										
	2.0-2.25		4.6	M	3.9	M	4										
	2.25-2.5		4.7	M	4.1	L	2	4.1	53	< 0.02	< 0.005	< 3	10	n/a	63	4.7	8.0
	2.5-2.75		4.8	M	4.3	L	2										
	2.75-3.0		4.8	M	4.3	L	2										
BH37	0.0-0.25		6.2	L	3.5	M	4										
	0.25-0.5		5.9	L	3.9	M	3										
	0.5-0.75		5.5	L	4.0	L	3	4.5	41	< 0.02	< 0.005	< 3	n/a	n/a	41	3.1	5.2
	0.75-1.0		5.1	L	3.9	M	2										
	1.0-1.25		5.2	L	3.8	M	1										
	1.25-1.5		4.8	M	3.9	M	2										
	1.5-1.75		5.3	L	4.3	L	1	4.5	45	< 0.02	< 0.005	< 3	< 10	n/a	45	3.4	5.7
	1.75-2.0		5.3	L	4.4	L	1										
	2.0-2.25		5.3	L	4.1	L	2										
	2.25-2.5		5.2	L	4.3	L	1										
	2.5-2.75		5.2	L	4.5	L	2	4.2	72	< 0.02	< 0.005	< 3	< 10	n/a	72	5.4	9.2
	2.75-3.0		5.3	L	4.4	L	1										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH38	0.0-0.25		5.8	L	3.2	M	3										
	0.25-0.5		5.7	L	4.0	L	3	4.5	46	< 0.02	< 0.005	< 3	n/a	n/a	46	3.5	5.9
	0.5-0.75		4.9	M	4.1	L	2										
	0.75-1.0		4.8	M	3.9	M	2										
	1.0-1.25		4.6	M	3.7	M	2										
	1.25-1.5		4.6	M	3.7	M	2	4.4	47	0.05	< 0.005	< 3	27	n/a	74	5.6	9.4
	1.5-1.75		4.8	M	3.9	M	2										
	1.75-2.0		4.7	M	4.0	L	2										
	2.0-2.25		4.7	M	4.3	L	2										
	2.25-2.5		5.0	L	4.6	L	2										
	2.5-2.75		5.0	L	4.3	L	2	4.6	28	< 0.02	< 0.005	< 3	n/a	n/a	28	2.1	3.6
	2.75-3.0		5.1	L	4.7	L	4										
BH39	0.0-0.25		6.4	L	3.2	M	4										
	0.25-0.5		6.3	L	4.1	M	4	4.6	43	< 0.02	< 0.005	< 3	n/a	n/a	43	3.2	5.5
	0.5-0.75		5.7	L	4.4	L	4										
	0.75-1.0		5.6	L	4.3	L	2										
	1.0-1.25		5.3	L	4.6	L	4										
	1.25-1.5		5.0	L	4.6	L	4	4.2	49	0.07	< 0.005	< 3	38	n/a	87	6.5	11.1
	1.5-1.75		5.1	L	4.5	L	4										
	1.75-2.0		5.0	L	4.4	L	4										
	2.0-2.25		5.2	L	4.7	L	4	4.5	17	0.03	< 0.005	< 3	n/a	n/a	17	1.3	2.2
	2.25-2.5		5.5	L	4.4	L	1										
	2.5-2.75		5.5	L	4.3	L	1										
	2.75-3.0		5.3	L	4.3	L	1										
BH40	0.0-0.25		6.2	L	3.2	M	3										
	0.25-0.5		6.8	L	4.3	M	1	5.3	7.7	< 0.02	< 0.005	< 3	n/a	n/a	7.7	0.4	0.7
	0.5-0.75		7.5	L	5.7	L	1										
	0.75-1.0		7.7	L	6.0	L	4										
	1.0-1.25		8.2	L	7.8	L	4										
	1.25-1.5		8.0	L	6.4	L	4	6.3	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	1.5-1.75		8.4	L	8.8	L	4										
	1.75-2.0		8.2	L	7.7	L	4										
	2.0-2.25		7.9	L	8.4	L	4										
	2.25-2.5		9.1	L	9.4	L	4	8.7	< 2	< 0.02	< 0.005	< 3	n/a	990	0	0.0	0.0
	2.5-2.75		8.8	L	9.4	L	4										
	2.75-3.0		8.9	L	9.5	L	4										
	3.0-3.25		9.0	L	8.2	L	4										
	3.25-3.5		8.9	L	9.6	L	4										
BH41	0.0-0.25		6.1	L	3.2	M	4	4.6	38	< 0.02	< 0.005	< 3	n/a	n/a	38	1.9	3.2
	0.25-0.5		6.5	L	4.0	M	4										
	0.5-0.75		7.1	L	5.2	L	4										
	0.75-1.0		7.5	L	5.8	L	4										
	1.0-1.25		7.5	L	6.2	L	4	6.0	6.1	< 0.02	< 0.005	< 3	n/a	n/a	6.1	0.3	0.5
	1.25-1.5		8.1	L	7.6	L	4										
	1.5-1.75		8.3	L	8.0	L	4										
	1.75-2.0		7.8	L	6.3	L	4										
	2.0-2.25		8.6	L	7.4	L	4										
	2.25-2.5		-	-	-	-	-	6.2	4	< 0.02	< 0.005	< 3	n/a	n/a	4	0.2	0.3
	2.5-2.75		8.5	L	7.1	L	4										
	2.75-3.0		8.5	L	7.1	L	1										
	3.0-3.25		8.2	L	7.0	L	4										
	3.25-3.5		8.3	L	6.8	L	4	6.1	4.1	< 0.02	< 0.005	< 3	n/a	n/a	4.1	0.2	0.3

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH42	0.0-0.25		5.7	L	3.1	M	3	5.0	22	< 0.02	< 0.005	< 3	n/a	n/a	22	1.1	1.9
	0.25-0.5		6.3	L	4.6	L	4										
	0.5-0.75		6.4	L	5.0	L	4										
	0.75-1.0		6.5	L	4.9	L	2										
	1.0-1.25		7.3	L	7.5	L	4	6.1	2.9	< 0.02	< 0.005	< 3	n/a	n/a	2.9	0.1	0.2
	1.25-1.5		7.2	L	6.5	L	4										
	1.5-1.75		7.1	L	8.1	L	4										
	1.75-2.0		7.5	L	8.2	L	4										
	2.0-2.25		7.4	L	8.5	L	4	6.2	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	2.25-2.5		7.5	L	8.4	L	4										
	2.5-2.75		8.3	L	7.1	L	2										
	2.75-3.0		7.8	L	8.1	L	4										
	3.0-3.25		8.1	L	8.1	L	4	6.0	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	3.25-3.5		8.2	L	7.8	L	4										
BH43	0.0-0.25		5.5	L	3.6	M	4										
	0.25-0.5		6.5	L	4.2	M	4										
	0.5-0.75		6.3	L	4.7	L	2										
	0.75-1.0		6.1	L	6.1	L	4	4.8	20	< 0.02	< 0.005	< 3	n/a	n/a	20	1.0	1.7
	1.0-1.25		6.8	L	3.9	M	2										
	1.25-1.5		7.6	L	7.1	L	4										
	1.5-1.75		7.4	L	7.1	L	4										
	1.75-2.0		7.6	L	8.3	L	4	5.3	7.3	< 0.02	< 0.005	< 3	n/a	n/a	7.3	0.4	0.6
	2.0-2.25		8.1	L	8.5	L	4										
	2.25-2.5		8.1	L	8.3	L	4										
	2.5-2.75		8.2	L	8.4	L	4										
	2.75-3.0		8.5	L	7.5	L	4	6.5	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	3.0-3.25		8.3	L	8.2	L	4										
	3.25-3.5		8.3	L	7.6	L	4										
BH44	0.0-0.25		6.5	L	3.6	M	4	4.6	26	< 0.02	< 0.005	< 3	n/a	n/a	26	1.3	2.2
	0.25-0.5		6.3	L	4.4	L	4										
	0.5-0.75		6.8	L	5.9	L	4										
	0.75-1.0		7.8	L	7.1	L	4	6.3	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	1.0-1.25		7.9	L	6.9	L	4										
	1.25-1.5		8.1	L	7.6	L	4										
	1.5-1.75		8.3	L	8.4	L	4										
	1.75-2.0		8.1	L	8.0	L	4	6.4	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	2.0-2.25		8.4	L	8.1	L	4										
	2.25-2.5		8.5	L	7.2	L	2										
	2.5-2.75		8.4	L	7.2	L	4										
	2.75-3.0		8.2	L	7.1	L	4	6.4	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	3.0-3.25		8.5	L	7.3	L	2										
	3.25-3.5		8.5	L	7.1	L	1										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH45	0.0-0.25		5.5	L	3.4	M	4										
	0.25-0.5		5.9	L	3.4	M	4	4.9	20	< 0.02	< 0.005	< 3	n/a	n/a	20	1.0	1.7
	0.5-0.75		6.4	L	3.8	M	4										
	0.75-1.0		6.6	L	4.6	M	4										
	1.0-1.25		6.6	L	5.2	L	3										
	1.25-1.5		7.1	L	6.7	L	2	5.8	8.1	< 0.02	< 0.005	< 3	n/a	n/a	8.1	0.4	0.7
	1.5-1.75		7.5	L	8.2	L	4										
	1.75-2.0		7.9	L	8.3	L	4										
	2.0-2.25		7.5	L	8.0	L	4										
	2.25-2.5		8.1	L	7.3	L	2										
	2.5-2.75		8.3	L	7.3	L	2										
	2.75-3.0		8.3	L	8.2	L	4										
	3.0-3.25		8.5	L	7.3	L	2	6.7	< 2	< 0.02	< 0.005	< 3	n/a	73	0	0.0	0.0
	3.25-3.5		8.6	L	7.2	L	2										
BH46	0.0-0.25		6.6	L	3.8	M	2										
	0.25-0.5		6.4	L	4.1	M	4	5.2	14	< 0.02	< 0.005	< 3	n/a	n/a	14	0.7	1.2
	0.5-0.75		6.6	L	4.5	M	2										
	0.75-1.0		6.7	L	4.9	L	2										
	1.0-1.25		7.4	L	6.1	L	4										
	1.25-1.5		7.4	L	7.7	L	4										
	1.5-1.75		7.6	L	7.8	L	4	5.9	6.8	< 0.02	< 0.005	< 3	n/a	n/a	6.8	0.3	0.6
	1.75-2.0		7.9	L	7.9	L	2										
	2.0-2.25		8.0	L	7.0	L	4										
	2.25-2.5		8.2	L	7.7	L	4										
	2.5-2.75		8.0	L	7.8	L	4										
	2.75-3.0		8.6	L	6.8	L	2	6.2	4	< 0.02	< 0.005	< 3	n/a	n/a	4	0.2	0.3
	3.0-3.25		8.7	L	8.4	L	2										
	3.25-3.5		8.8	L	8.4	L	4										
BH47	0.0-0.25		6.4	L	3.6	M	4	5.3	17	< 0.02	< 0.005	< 3	n/a	n/a	17	0.9	1.4
	0.25-0.5		6.9	L	5.7	L	2										
	0.5-0.75		7.2	L	5.7	L	4										
	0.75-1.0		7.4	L	5.8	L	4										
	1.0-1.25		7.7	L	7.4	L	4	6.1	6.1	< 0.02	< 0.005	< 3	n/a	n/a	6.1	0.3	0.5
	1.25-1.5		8.1	L	7.9	L	1										
	1.5-1.75		8.1	L	8.3	L	4										
	1.75-2.0		8.1	L	8.4	L	4										
	2.0-2.25		8.1	L	8.2	L	4	6.0	6.9	< 0.02	< 0.005	< 3	n/a	n/a	6.9	0.3	0.6
	2.25-2.5		7.9	L	8.3	L	4										
	2.5-2.75		7.7	L	8.1	L	4										
	2.75-3.0		7.8	L	8.2	L	4										
	3.0-3.25		7.6	L	8.2	L	4										
	3.25-3.5		7.8	L	8.1	L	4	5.8	6.9	< 0.02	< 0.005	< 3	n/a	n/a	6.9	0.3	0.6

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH48	0.0-0.25		6.4	L	3.3	M	4	5.1	20	n/a	< 0.005	< 3	n/a	n/a	20	1.0	1.7
	0.25-0.5		6.6	L	3.9	M	4										
	0.5-0.75		6.9	L	5.0	L	4										
	0.75-1.0		7.1	L	5.3	L	4	5.6	12	< 0.02	< 0.005	< 3	n/a	n/a	12	0.6	1.0
	1.0-1.25		7.3	L	7.2	L	4										
	1.25-1.5		7.6	L	7.6	L	4										
	1.5-1.75		7.3	L	7.5	L	4										
	1.75-2.0		7.7	L	7.3	L	4	6.3	4	< 0.02	< 0.005	< 3	n/a	n/a	4	0.2	0.3
	2.0-2.25		7.6	L	8.4	L	4										
	2.25-2.5		8.0	L	8.3	L	4										
	2.5-2.75		8.1	L	8.2	L	4										
	2.75-3.0		8.2	L	7.0	L	4										
	3.0-3.25		8.3	L	7.2	L	4										
	3.25-3.5		8.3	L	6.9	L	4										
BH49	0.0-0.25		6.3	L	3.5	M	4										
	0.25-0.5		6.5	L	3.8	M	3	5.1	17	< 0.02	< 0.005	< 3	n/a	n/a	17	0.9	1.4
	0.5-0.75		6.9	L	5.3	L	3										
	0.75-1.0		6.9	L	5.4	L	4										
	1.0-1.25		7.3	L	6.4	L	4										
	1.25-1.5		7.9	L	6.6	L	2	6.4	3.1	< 0.02	< 0.005	< 3	n/a	n/a	3.1	0.2	0.3
	1.5-1.75		8.0	L	7.2	L	4										
	1.75-2.0		7.9	L	7.5	L	4										
	2.0-2.25		7.9	L	7.8	L	4										
	2.25-2.5		8.0	L	7.2	L	4										
	2.5-2.75		8.0	L	6.9	L	2										
	2.75-3.0		8.1	L	7.0	L	2	6.4	3.3	< 0.02	< 0.005	< 3	n/a	n/a	3.3	0.2	0.3
	3.0-3.25		8.1	L	7.1	L	4										
	3.25-3.5		8.0	L	8.1	L	4										
BH50	0.0-0.25		5.8	L	3.2	M	3	4.9	28	< 0.02	< 0.005	< 3	n/a	n/a	28	1.4	2.4
	0.25-0.5		6.1	L	4.2	L	4										
	0.5-0.75		6.5	L	4.5	M	4										
	0.75-1.0		6.8	L	4.8	M	4										
	1.0-1.25		7.2	L	5.5	L	4	5.6	8.5	< 0.02	< 0.005	< 3	n/a	n/a	8.5	0.4	0.7
	1.25-1.5		7.5	L	6.8	L	4										
	1.5-1.75		7.8	L	7.2	L	2										
	1.75-2.0		8.0	L	7.6	L	4										
	2.0-2.25		8.2	L	7.2	L	2	6.2	3.1	< 0.02	< 0.005	< 3	n/a	n/a	3.1	0.2	0.3
	2.25-2.5		8.3	L	7.0	L	2										
	2.5-2.75		8.3	L	8.1	L	4										
	2.75-3.0		8.2	L	7.0	L	2										
	3.0-3.25		8.3	L	7.1	L	2	6.5	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	3.25-3.5		8.3	L	7.0	L	2										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH51	0.0-0.25		5.7	L	3.3	M	3										
	0.25-0.5		5.9	L	4.6	L	3										
	0.5-0.75		5.7	L	4.5	L	3	4.6	37	< 0.02	< 0.005	< 3	n/a	n/a	37	1.9	3.1
	0.75-1.0		5.7	L	4.5	L	2										
	1.0-1.25		6.7	L	5.3	L	2										
	1.25-1.5		6.5	L	4.8	L	2										
	1.5-1.75		7.5	L	6.2	L	1	5.8	7.3	< 0.02	< 0.005	< 3	n/a	n/a	7.3	0.4	0.6
	1.75-2.0		7.3	L	5.8	L	2										
	2.0-2.25		7.3	L	6.3	L	2										
	2.25-2.5		7.6	L	6.4	L	2										
	2.5-2.75		7.8	L	6.5	L	2	6.0	4.5	< 0.02	< 0.005	< 3	n/a	n/a	4.5	0.2	0.4
	2.75-3.0		8.0	L	6.5	L	2										
	3.0-3.25		7.6	L	6.4	L	2										
	3.25-3.5		7.5	L	5.7	L	2										
BH52	0.0-0.25		6.1	L	4.0	M	4	4.9	22	< 0.02	< 0.005	< 3	n/a	n/a	22	1.1	1.9
	0.25-0.5		5.9	L	3.9	M	3										
	0.5-0.75		6.7	L	4.9	L	2										
	0.75-1.0		6.9	L	5.1	L	2										
	1.0-1.25		7.8	L	6.4	L	4										
	1.25-1.5		7.8	L	6.8	L	4	5.9	5.6	< 0.02	< 0.005	< 3	n/a	n/a	5.6	0.3	0.5
	1.5-1.75		7.9	L	7.6	L	4										
	1.75-2.0		8.1	L	7.4	L	4										
	2.0-2.25		8.1	L	7.2	L	2										
	2.25-2.5		7.8	L	6.5	L	4	5.9	4.9	< 0.02	< 0.005	< 3	n/a	n/a	4.9	0.2	0.4
	2.5-2.75		8.1	L	6.7	L	1										
	2.75-3.0		8.0	L	6.9	L	4										
	3.0-3.25		8.2	L	6.9	L	2										
	3.25-3.5		8.3	L	6.8	L	2	6.1	4.1	< 0.02	< 0.005	< 3	n/a	n/a	4.1	0.2	0.3
BH53	0.0-0.25		6.1	L	3.2	M	4	5.1	20	< 0.02	< 0.005	< 3	n/a	n/a	20	1.0	1.7
	0.25-0.5		6.4	L	3.7	M	4										
	0.5-0.75		6.8	L	4.7	M	4										
	0.75-1.0		7.3	L	5.1	M	4										
	1.0-1.25		7.9	L	7.1	L	4										
	1.25-1.5		8.0	L	7.3	L	4	6.5	< 2	< 0.02	< 0.005	< 3	n/a	n/a	0	0.0	0.0
	1.5-1.75		8.1	L	8.0	L	4										
	1.75-2.0		8.0	L	8.1	L	4										
	2.0-2.25		8.3	L	8.1	L	4										
	2.25-2.5		8.2	L	7.8	L	4										
	2.5-2.75		8.4	L	7.7	L	4										
	2.75-3.0		8.3	L	7.6	L	4	6.7	< 2	< 0.02	< 0.005	< 3	n/a	95	0	0.0	0.0
	3.0-3.25		8.2	L	7.1	L	4										
	3.25-3.5		8.3	L	7.2	L	4										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH54	0.0-0.25		6.2	L	3.2	M	3	4.9	30	< 0.02	0.005	3.4	n/a	n/a	30	1.5	2.6
	0.25-0.5		6.5	L	4.0	M	4										
	0.5-0.75		6.6	L	4.9	L	2										
	0.75-1.0		6.7	L	5.2	L	2										
	1.0-1.25		7.5	L	6.0	L	4										
	1.25-1.5		7.6	L	7.6	L	4	5.6	6.5	< 0.02	< 0.005	< 3	n/a	n/a	6.5	0.3	0.6
	1.5-1.75		7.6	L	7.1	L	4										
	1.75-2.0		8.0	L	6.6	L	2										
	2.0-2.25		7.9	L	6.7	L	2										
	2.25-2.5		8.2	L	6.6	L	2										
	2.5-2.75		8.3	L	6.8	L	4										
	2.75-3.0		8.1	L	6.5	L	2	6.3	3.6	< 0.02	< 0.005	< 3	n/a	n/a	3.6	0.2	0.3
	3.0-3.25		8.2	L	6.7	L	1										
	3.25-3.5		8.4	L	6.7	L	2										
BH55	0.0-0.25		6.2	L	3.4	M	4	5.1	21	< 0.02	< 0.005	< 3	n/a	n/a	21	1.1	1.8
	0.25-0.5		6.2	L	3.7	M	4										
	0.5-0.75		6.5	L	4.9	L	4										
	0.75-1.0		7.0	L	6.1	L	4										
	1.0-1.25		7.8	L	6.5	L	4	6.2	4.2	< 0.02	< 0.005	< 3	n/a	n/a	4.2	0.2	0.4
	1.25-1.5		7.7	L	6.6	L	4										
	1.5-1.75		8.0	L	8.2	L	4										
	1.75-2.0		7.5	L	8.1	L	4										
	2.0-2.25		8.2	L	7.9	L	4	6.6	< 2	< 0.02	< 0.005	< 3	n/a	140	0	0.0	0.0
	2.25-2.5		8.4	L	8.9	L	4										
	2.5-2.75		8.5	L	8.2	L	4										
	2.75-3.0		8.4	L	8.5	L	4										
	3.0-3.25		8.4	L	8.6	L	4	6.8	< 2	< 0.02	< 0.005	< 3	n/a	76	0	0.0	0.0
	3.25-3.5		8.5	L	8.5	L	4										
BH56	0.0-0.25		6.2	L	3.4	M	3	5.4	15	< 0.02	< 0.005	< 3	n/a	n/a	15	0.8	1.3
	0.25-0.5		6.4	L	3.6	M	2										
	0.5-0.75		6.4	L	4.8	L	2										
	0.75-1.0		6.1	L	4.8	L	2										
	1.0-1.25		5.8	L	4.9	L	1	5.5	8.5	< 0.02	< 0.005	< 3	n/a	n/a	8.5	0.4	0.7
	1.25-1.5		5.6	L	4.7	L	1										
	1.5-1.75		5.7	L	4.8	L	2										
	1.75-2.0		5.6	L	4.6	L	2										
BH57	0.0-0.25		6.3	L	3.6	M	3										
	0.25-0.5		6.4	L	4.7	L	3	5.5	7.5	< 0.02	< 0.005	< 3	n/a	n/a	7.5	0.4	0.6
	0.5-0.75		6.5	L	5.0	L	3										
	0.75-1.0		6.5	L	5.1	L	2										
	1.0-1.25		6.4	L	5.5	L	1										
	1.25-1.5		5.6	L	5.0	L	1	5.5	8.3	< 0.02	< 0.005	< 3	n/a	n/a	8.3	0.4	0.7
	1.5-1.75		5.3	L	4.5	L	1										
	1.75-2.0		5.2	L	4.5	L	1										
BH58	0.0-0.25		5.7	L	3.2	M	2										
	0.25-0.5		5.6	L	3.6	M	1										
	0.5-0.75		5.6	L	3.9	M	1	5.7	4.8	< 0.02	< 0.005	< 3	n/a	n/a	4.8	0.2	0.4
	0.75-1.0		5.6	L	4.5	L	1										
	1.0-1.25		5.2	L	4.3	L	2										
	1.25-1.5		5.3	L	4.3	L	2										
	1.5-1.75		5.7	L	5.2	L	2	5.1	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
	1.75-2.0		6.0	L	5.4	L	2										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH59	0.0-0.25		6.6	L	4.6	M	1										
	0.25-0.5		6.4	L	4.9	L	1										
	0.5-0.75		5.7	L	4.9	L	1										
	0.75-1.0		5.2	L	4.4	L	1	4.8	14	< 0.02	< 0.005	< 3	n/a	n/a	14	0.7	1.2
	1.0-1.25		5.2	L	4.4	L	2										
	1.25-1.5		5.2	L	4.5	L	2										
	1.5-1.75		5.5	L	4.7	L	3										
	1.75-2.0		5.5	L	5.0	L	4	4.6	23	< 0.02	< 0.005	< 3	n/a	n/a	23	1.2	2.0
BH60	0.0-0.25		5.8	L	3.0	M	3	5.3	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
	0.25-0.5		5.9	L	3.4	M	3										
	0.5-0.75		5.9	L	4.2	L	2										
	0.75-1.0		5.2	L	4.4	L	2										
	1.0-1.25		5.4	L	4.6	L	1	4.4	39	< 0.02	< 0.005	< 3	15	n/a	39	2.0	3.3
	1.25-1.5		5.3	L	4.7	L	1										
	1.5-1.75		5.4	L	4.8	L	2										
	1.75-2.0		5.5	L	4.8	L	2										
BH61	0.0-0.25		5.7	L	3.0	M	3										
	0.25-0.5		5.7	L	3.5	M	3	4.5	41	< 0.02	< 0.005	< 3	< 10	n/a	41	2.1	3.5
	0.5-0.75		5.3	L	4.3	L	2										
	0.75-1.0		5.3	L	4.4	L	2										
	1.0-1.25		5.5	L	4.9	L	2										
	1.25-1.5		5.5	L	4.8	L	2	4.5	24	< 0.02	< 0.005	< 3	21	n/a	45	2.3	3.8
	1.5-1.75		5.7	L	4.6	L	2										
	1.75-2.0		5.7	L	4.9	L	1										
BH62	0.0-0.25		6.1	L	3.1	M	2										
	0.25-0.5		6.3	L	4.2	M	1	5.4	10	< 0.02	< 0.005	< 3	n/a	n/a	10	0.5	0.9
	0.5-0.75		5.7	L	4.3	L	2										
	0.75-1.0		5.9	L	4.5	L	1										
	1.0-1.25		6.1	L	4.2	L	1	5.9	3.5	< 0.02	< 0.005	< 3	n/a	n/a	3.5	0.2	0.3
	1.25-1.5		6.4	L	4.4	M	1										
	1.5-1.75		6.2	L	4.3	L	1										
	1.75-2.0		6.4	L	3.9	M	2	5.5	5.4	< 0.02	< 0.005	< 3	n/a	n/a	5.4	0.3	0.5
BH63	0.0-0.25		5.6	L	2.5	H	4										
	0.25-0.5		5.4	L	4.2	L	1										
	0.5-0.75		5.5	L	4.5	L	1	4.5	31	< 0.02	< 0.005	< 3	n/a	n/a	31	1.6	2.6
	0.75-1.0		5.4	L	4.7	L	1										
	1.0-1.25		5.6	L	5.0	L	1										
	1.25-1.5		5.6	L	5.1	L	1										
	1.5-1.75		6.2	L	5.6	L	1										
	1.75-2.0		6.5	L	5.7	L	1	4.7	20	< 0.02	< 0.005	< 3	n/a	n/a	20	1.0	1.7
BH64	0.0-0.25		6.5	L	4.0	L	2	5.2	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
	0.25-0.5		5.9	L	4.3	L	2										
	0.5-0.75		5.6	L	5.5	L	4										
	0.75-1.0		6.2	L	5.9	L	4	5.2	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
	1.0-1.25		5.8	L	4.7	L	2										
	1.25-1.5		5.7	L	4.6	L	2										
	1.5-1.75		5.8	L	4.5	L	2										
	1.75-2.0		5.9	L	4.6	L	1										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH65	0.0-0.25		5.4	L	2.6	H	4										
	0.25-0.5		5.5	L	2.8	H	4										
	0.5-0.75		5.4	L	3.9	M	4										
	0.75-1.0		5.4	L	4.2	L	2	4.3	40	< 0.02	< 0.005	< 3	< 10	n/a	40	2.0	3.4
	1.0-1.25		5.9	L	4.7	L	2										
	1.25-1.5		5.9	L	4.8	L	2										
	1.5-1.75		5.9	L	4.9	L	1										
	1.75-2.0		6.0	L	5.0	L	1	4.5	33	< 0.02	< 0.005	< 3	< 10	n/a	33	1.7	2.8
BH66	0.0-0.25		5.4	L	3.9	M	3										
	0.25-0.5		5.1	L	3.6	M	3										
	0.5-0.75		5.3	L	3.2	M	2	4.2	130	< 0.02	0.025	16	12	n/a	158	7.9	13.4
	0.75-1.0		5.2	L	3.6	M	4										
	1.0-1.25		5.2	L	3.7	M	2										
	1.25-1.5		5.0	L	3.9	M	2										
	1.5-1.75		5.1	L	3.9	M	4	4.3	44	0.02	< 0.005	< 3	11	n/a	55	2.8	4.7
	1.75-2.0		5.0	L	4.1	L	1										
BH67	0.0-0.25		5.8	L	2.9	H	4	4.9	23	< 0.02	< 0.005	< 3	n/a	n/a	23	1.2	2.0
	0.25-0.5		4.7	M	3.2	M	4										
	0.5-0.75		4.9	M	3.8	M	4										
	0.75-1.0		5.7	L	4.3	L	1	3.9	19	< 0.02	< 0.005	< 3	< 10	n/a	19	1.0	1.6
	1.0-1.25		5.3	L	3.9	M	4										
	1.25-1.5		5.5	L	4.7	L	4										
	1.5-1.75		5.7	L	4.9	L	4										
	1.75-2.0		5.7	L	4.9	L	4										
BH68	0.0-0.25		5.5	L	3.4	M	4										
	0.25-0.5		5.9	L	3.7	M	4	4.5	49	0.03	< 0.005	< 3	n/a	n/a	49	2.5	4.2
	0.5-0.75		5.1	L	4.6	L	4										
	0.75-1.0		5.3	L	4.4	L	2										
	1.0-1.25		5.2	L	4.4	L	4										
	1.25-1.5		5.5	L	4.5	L	1	4.6	22	0.06	< 0.005	< 3	n/a	n/a	22	1.1	1.9
	1.5-1.75		5.5	L	4.7	L	2										
	1.75-2.0		5.5	L	4.9	L	2										
BH69	0.0-0.25		-	-	-	-	-	4.5	51	< 0.02	< 0.005	< 3	n/a	n/a	51	2.6	4.3
	0.25-0.5		5.9	L	4.4	L	4										
	0.5-0.75		5.0	L	4.3	L	2										
	0.75-1.0		5.1	L	4.1	L	1	4.3	42	0.07	< 0.005	< 3	34	n/a	76	3.8	6.5
	1.0-1.25		4.9	M	4.1	L	1										
	1.25-1.5		5.0	L	4.2	L	1										
	1.5-1.75		5.2	L	4.0	L	1										
	1.75-2.0		5.0	L	4.3	L	1										
BH70	0.0-0.25		6.2	L	3.2	M	3										
	0.25-0.5		6.2	L	3.8	M	3	4.8	27	< 0.02	< 0.005	< 3	n/a	n/a	27	1.4	2.3
	0.5-0.75		6.5	L	4.8	L	1										
	0.75-1.0		6.2	L	5.0	L	1										
	1.0-1.25		6.0	L	4.4	L	1										
	1.25-1.5		5.8	L	4.7	L	1	5.1	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
	1.5-1.75		5.7	L	4.3	L	1										
	1.75-2.0		5.5	L	4.8	L	1										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH71	0.0-0.25		5.8	L	2.7	H	2										
	0.25-0.5		5.8	L	3.9	M	1	4.6	45	< 0.02	< 0.005	< 3	n/a	n/a	45	2.3	3.8
	0.5-0.75		5.7	L	4.3	L	1										
	0.75-1.0		5.7	L	4.8	L	1										
	1.0-1.25		5.6	L	4.6	L	1	4.8	81	< 0.02	< 0.005	< 3	n/a	n/a	81	4.1	6.9
	1.25-1.5		5.7	L	4.8	L	1										
	1.5-1.75		5.8	L	4.7	L	1										
	1.75-2.0		5.8	L	4.6	L	1										
BH72	0.0-0.25		6.0	L	3.7	M	1	5.8	3.6	< 0.02	< 0.005	< 3	n/a	n/a	3.6	0.2	0.3
	0.25-0.5		5.9	L	4.0	L	1										
	0.5-0.75		5.9	L	4.3	L	1										
	0.75-1.0		6.3	L	5.2	L	1										
	1.0-1.25		6.1	L	4.9	L	1	5.7	3.9	< 0.02	< 0.005	< 3	n/a	n/a	3.9	0.2	0.3
	1.25-1.5		5.9	L	4.8	L	1										
	1.5-1.75		6.3	L	3.9	M	1										
	1.75-2.0		6.5	L	3.4	M	2										
BH73	0.0-0.25		5.8	L	3.9	M	2										
	0.25-0.5		5.8	L	3.9	M	1										
	0.5-0.75		5.8	L	4.4	L	1	6.0	2.8	< 0.02	< 0.005	< 3	n/a	n/a	2.8	0.1	0.2
	0.75-1.0		5.9	L	4.6	L	1										
	1.0-1.25		6.0	L	4.7	L	1										
	1.25-1.5		5.9	L	4.6	L	1										
	1.5-1.75		6.0	L	4.4	L	1										
	1.75-2.0		5.6	L	4.9	L	2	4.6	52	< 0.02	< 0.005	< 3	n/a	n/a	52	2.6	4.4
BH74	0.0-0.25		5.9	L	3.1	M	3										
	0.25-0.5		6.4	L	4.1	M	1	5.6	5.5	< 0.02	< 0.005	< 3	n/a	n/a	5.5	0.3	0.5
	0.5-0.75		6.3	L	4.0	M	1										
	0.75-1.0		5.9	L	4.7	L	1										
	1.0-1.25		6.4	L	4.1	M	2	5.6	5.7	< 0.02	< 0.005	< 3	n/a	n/a	5.7	0.3	0.5
	1.25-1.5		5.9	L	4.4	L	2										
	1.5-1.75		5.4	L	4.4	L	2										
	1.75-2.0		5.0	L	4.2	L	4										
BH75	0.0-0.25		5.8	L	3.5	M	4										
	0.25-0.5		5.9	L	4.4	L	1										
	0.5-0.75		5.7	L	4.2	L	1	5.7	4.8	< 0.02	< 0.005	< 3	n/a	n/a	4.8	0.2	0.4
	0.75-1.0		5.8	L	4.4	L	1										
	1.0-1.25		6.0	L	4.5	L	1										
	1.25-1.5		6.0	L	4.3	L	2										
	1.5-1.75		5.9	L	4.9	L	1										
	1.75-2.0		6.0	L	4.8	L	1	6.2	2.7	< 0.02	< 0.005	< 3	n/a	n/a	2.7	0.1	0.2
BH76	0.0-0.25		6.1	L	3.7	M	3										
	0.25-0.5		6.3	L	3.8	M	2	5.1	14	< 0.02	< 0.005	< 3	n/a	n/a	14	0.7	1.2
	0.5-0.75		5.7	L	5.0	L	1										
	0.75-1.0		5.8	L	4.8	L	2										
	1.0-1.25		5.7	L	4.9	L	2										
	1.25-1.5		6.1	L	5.0	L	2	5.3	15	< 0.02	< 0.005	< 3	n/a	n/a	15	0.8	1.3
	1.5-1.75		6.0	L	5.0	L	1										
	1.75-2.0		6.0	L	5.0	L	2										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH77	0.0-0.25		5.8	L	3.6	M	4										
	0.25-0.5		5.8	L	4.2	L	4										
	0.5-0.75		5.7	L	4.1	L	2	4.5	34	< 0.02	< 0.005	< 3	n/a	n/a	34	1.7	2.9
	0.75-1.0		5.1	L	4.2	L	2										
	1.0-1.25		5.3	L	4.3	L	4										
	1.25-1.5		5.5	L	4.5	L	4										
	1.5-1.75		5.8	L	4.8	L	4										
	1.75-2.0		6.6	L	4.9	L	1	5.1	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
BH78	0.0-0.25		5.3	L	3.4	M	4	4.3	77	< 0.02	< 0.005	< 3	< 10	n/a	77	3.9	6.5
	0.25-0.5		5.0	L	3.8	M	2										
	0.5-0.75		-	-	-	-	-	4.1	70	< 0.02	< 0.005	< 3	13	n/a	83	4.2	7.1
	0.75-1.0		4.7	M	3.9	M	2										
	1.0-1.25		4.8	M	4.0	L	2										
	1.25-1.5		4.7	M	4.0	L	2										
	1.5-1.75		4.9	M	4.4	L	2										
	1.75-2.0		5.0	L	4.5	L	2										
BH79	0.0-0.25		5.8	L	2.7	H	4										
	0.25-0.5		5.7	L	4.0	L	3	4.3	81	< 0.02	< 0.005	< 3	17	n/a	98	4.9	8.3
	0.5-0.75		5.1	L	3.8	M	2										
	0.75-1.0		5.1	L	3.9	M	2										
	1.0-1.25		5.4	L	4.0	L	4	4.0	18	< 0.02	< 0.005	< 3	23	n/a	41	2.1	3.5
	1.25-1.5		5.4	L	4.1	L	4										
	1.5-1.75		5.0	L	4.3	L	4										
	1.75-2.0		5.2	L	4.5	L	4										
BH80	0.0-0.25		5.6	L	2.5	H	4	4.9	26	< 0.02	< 0.005	< 3	n/a	n/a	26	1.3	2.2
	0.25-0.5		6.0	L	3.2	M	4										
	0.5-0.75		5.8	L	3.4	M	4										
	0.75-1.0		5.7	L	4.2	L	4	3.9	14	< 0.02	< 0.005	< 3	< 10	n/a	14	0.7	1.2
	1.0-1.25		6.0	L	4.1	L	4										
	1.25-1.5		6.3	L	4.7	L	4										
BH81	0.0-0.25		5.4	L	2.9	M	3	5.3	11	< 0.02	< 0.005	< 3	n/a	n/a	11	0.6	0.9
	0.25-0.5		5.5	L	4.2	L	1										
	0.5-0.75		5.7	L	4.5	L	1										
	0.75-1.0		5.6	L	4.7	L	1	4.6	27	< 0.02	< 0.005	< 3	n/a	n/a	27	1.4	2.3
	1.0-1.25		5.6	L	4.6	L	1										
	1.25-1.5		5.6	L	4.8	L	3										
	1.5-1.75		5.6	L	4.3	L	1										
	1.75-2.0		5.6	L	4.3	L	1										
BH82	0.0-0.25		6.3	L	4.2	M	2										
	0.25-0.5		6.1	L	4.7	L	1	5.1	13	< 0.02	< 0.005	< 3	n/a	n/a	13	0.7	1.1
	0.5-0.75		5.9	L	4.8	L	2										
	0.75-1.0		5.8	L	4.8	L	1										
	1.0-1.25		5.8	L	4.7	L	1										
	1.25-1.5		5.8	L	4.7	L	1	4.8	23	< 0.02	< 0.005	< 3	n/a	n/a	23	1.2	2.0
	1.5-1.75		5.7	L	4.6	L	1										
	1.75-2.0		5.7	L	4.7	L	1										

Location & Depth (m)		Soil Type	pH_F	AASS liklihood[1]	pH_{FOX}	PASS likelihood[2]	Reaction	pH KCl	Titratable Actual Acidity	S_{KCl}	Chromium Reducible Sulfur		S_{NAS}	ANC_bt	Net Acidity (Existing + Potential)	Indicative Lime Rate	
			pH Unit		pH Unit		1 to 4	pH Unit	mole H+ / t	%S	%S	mole H+ / t	mole H+ / t	mole H+ / t	mole H+ / t	kg $CaCO_3$/t	kg $CaCO_3$/m^3
BH83	0.0-0.25		5.7	L	2.6	H	3										
	0.25-0.5		5.9	L	3.8	M	3	4.1	98	< 0.02	< 0.005	< 3	< 10	n/a	98	4.9	8.3
	0.5-0.75		5.0	L	4.1	L	2										
	0.75-1.0		4.9	M	4.2	L	2										
	1.0-1.25		4.8	M	4.3	L	1										
	1.25-1.5		5.2	L	4.2	L	4	4.1	88	< 0.02	< 0.005	< 3	23	n/a	111	5.6	9.4
	1.5-1.75		5.1	L	4.6	L	1										
	1.75-2.0		5.0	L	4.5	L	1										
BH84	0.0-0.25		6.0	L	3.1	M	4	4.5	46	< 0.02	< 0.005	< 3	< 10	n/a	46	2.3	3.9
	0.25-0.5		5.4	L	4.5	L	2										
	0.5-0.75		5.1	L	4.1	L	2										
	0.75-1.0		5.0	L	3.9	M	4	4.0	77	0.02	< 0.005	< 3	21	n/a	98	4.9	8.3
	1.0-1.25		4.8	M	4.4	L	1										
	1.25-1.5		4.7	M	4.3	L	1										
	1.5-1.75		4.9	M	4.7	L	1										
	1.75-2.0		4.8	M	4.2	L	1										
BH85	0.0-0.25		5.6	L	2.8	H	3										
	0.25-0.5		5.7	L	3.7	M	4										
	0.5-0.75		5.1	L	4.1	L	2	4.4	50	0.04	< 0.005	< 3	35	n/a	85	4.3	7.2
	0.75-1.0		5.2	L	4.2	L	1										
	1.0-1.25		5.3	L	4.5	L	1										
	1.25-1.5		5.5	L	4.5	L	4	4.6	23	0.03	< 0.005	< 3	n/a	n/a	23	1.2	2.0
	1.5-1.75		6.5	L	4.8	L	1										
	1.75-2.0		5.6	L	5.6	L	1										

Notes:

1. Actual Acid Sulfate Soil (AASS) liklihood is indicated by Low (L & no shading)(pHF > 5). Medium (M & yellow shade)(pHF 5 ≤ pHF <4) and High (H & red shade)(pHF ≤ 4).
2. Potential Acid Sulfate Soil (PASS) liklihood is indicated by Low (L & no shading, where pHFOX is > 4 and Δ pH from pHF to pHFOX is < 2 pH units). Medium (M & yellow shade, where Δ pH from pHF to pHFOX is ≥ 2 pH units OR pHFOX is <4)) and High (H and red shade)(change from pHF to pHFOX is ≥2 pH units AND pHFOX is <3)
3. Reaction 1 = Nil to slight reaction, 2 = Moderate reaction, 3 = Strong reaction (persistant froth), 4 = Extreme reaction.
4. Shaded TAA & SCR results are those exceeding the QASSIT action levels of 18 mol H+/t or 0.03 %S (SKCl < 0.03%S Yellow; SKCl >0.3%S Red; ANC >0.03%S Green).
5. Required Lime Rate is calculated from the net Acid-Base Account (utilising 50% of existing ANC), with a factor of safety = 1.5 for ASS material and bulk density of 1.7 t/m³. N/R = Not Required

Tectonic Geotechnical Pty Ltd
40A Glen Vista Place
Chevalum
Qld 4555

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **677330-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 16, 2019

Client Sample ID			BH001 - 0.0-0.25M	BH001 - 0.25-0.5M	BH001 - 0.5-0.75M	BH001 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24833	B19-Se24834	B19-Se24835	B19-Se24836
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	7.6	6.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	5.6	4.9	5.3
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	9.0	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	120	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	12	-	-

Client Sample ID			BH001 - 1.00-1.25M	BH001 - 1.25-1.5M	BH001 - 1.5-1.75M	BH002 - 0.0-0.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24837	B19-Se24838	B19-Se24839	B19-Se24840
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.8	6.9	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.5	6.0	6.1	3.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	6.1	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	48	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	8.8	-	-

Client Sample ID			BH002 - 0.25-0.5M	BH002 - 0.5-0.75M	BH002 - 0.75-1.00M	BH002 - 1.00-1.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24841	B19-Se24842	B19-Se24843	B19-Se24844
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.5	5.5	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	4.5	4.1	4.6
Reaction Ratings*[S05]		comment	3.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	35	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.060	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH002 - 0.25-0.5M	BH002 - 0.5-0.75M	BH002 - 0.75-1.00M	BH002 - 1.00-1.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24841	B19-Se24842	B19-Se24843	B19-Se24844
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	35	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.6	-	-
<2mm Fraction	0.005	g	-	69	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	19	-	-

Client Sample ID			BH002 - 1.25-1.5M	BH002 - 1.5-1.75M	BH002 - 1.75-2.0M	BH002 - 2.0-2.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24845	B19-Se24846	B19-Se24847	B19-Se24848
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.9	5.7	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	4.6	4.6	5.2
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	23	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.04	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	23	-

Client Sample ID			BH002 - 1.25-1.5M	BH002 - 1.5-1.75M	BH002 - 1.75-2.0M	BH002 - 2.0-2.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24845	B19-Se24846	B19-Se24847	B19-Se24848
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.7	-
<2mm Fraction	0.005	g	-	-	86	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	14	-

Client Sample ID			BH002 - 2.25-2.5M	BH003 - 0.0-0.25M	BH003 - 0.25-0.5M	BH003 - 0.5-0.75M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24849	B19-Se24850	B19-Se24851	B19-Se24852
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	7.1	5.2	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.4	4.5	4.1	4.2
Reaction Ratings*[S05]		comment	1.0	3.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	3.4	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	92	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	4.5	-	-

Client Sample ID			BH003 - 0.75-1.00M	BH003 - 1.00-1.25M	BH003 - 1.25-1.5M	BH003 - 1.5-1.75M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24853	B19-Se24854	B19-Se24855	B19-Se24856
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.4	5.4	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.2	4.6	4.6	4.8
Reaction Ratings*[S05]		comment	1.0	2.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	22	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.030	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.03	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	22	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.6	-	-
<2mm Fraction	0.005	g	-	130	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	14	-	-

Client Sample ID			BH003 - 1.75-2.0M	BH003 - 2.00-2.25M	BH003 - 2.25-2.5M	BH004 - 0.00-0.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24857	B19-Se24858	B19-Se24859	B19-Se24860
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.5	5.5	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	4.8	5.1	3.8
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	3.0

Client Sample ID			BH004 - 0.25-0.5M	BH004 - 0.5-0.75M	BH004 - 0.75-1.00M	BH004 - 1.00-1.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24861	B19-Se24862	B19-Se24863	B19-Se24864
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.9	3.8	3.9	4.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.9	2.9	2.8
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	3.9	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	37	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.060	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.04	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.21	-	-	-
Net Acid soluble sulfur	0.02	% S	0.17	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	79	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.13	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.18	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	120	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	8.7	-	-	-
<2mm Fraction	0.005	g	89	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	32	-	-	-

Client Sample ID			BH004 - 1.25-1.5M	BH004 - 1.5-1.75M	BH004 - 1.75-2.0M	BH005 - 0.0-0.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24865	B19-Se24866	B19-Se24867	B19-Se24868
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.0	4.2	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.9	3.2	3.2
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	110	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.17	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH004 - 1.25-1.5M	BH004 - 1.5-1.75M	BH004 - 1.75-2.0M	BH005 - 0.0-0.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24865	B19-Se24866	B19-Se24867	B19-Se24868
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	0.07	-	-	-
Net Acid soluble sulfur	0.02	% S	0.07	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	32	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.05	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.22	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	140	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	10	-	-	-
<2mm Fraction	0.005	g	96	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	26	-	-	-

Client Sample ID			BH005 - 0.25-0.5M	BH005 - 0.5-0.75M	BH005 - 0.75-1.00M	BH005 - 1.00-1.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24869	B19-Se24870	B19-Se24871	B19-Se24872
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	5.9	6.2	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	5.1	5.1	4.9
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.4	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	60	-	33	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.10	-	0.050	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.006	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.6	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	-
HCl Extractable Sulfur	0.02	% S	0.04	-	n/a	-
Net Acid soluble sulfur	0.02	% S	0.04	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	17	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.03	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.13	-	0.05	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	80	-	33	-

Client Sample ID			BH005 - 0.25-0.5M	BH005 - 0.5-0.75M	BH005 - 0.75-1.00M	BH005 - 1.00-1.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24869	B19-Se24870	B19-Se24871	B19-Se24872
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	6.0	-	2.5	-
<2mm Fraction	0.005	g	45	-	74	-
>2mm Fraction	0.005	g	23	-	< 0.005	-
Analysed Material	0.1	%	66	-	100	-
Extraneous Material	0.1	%	34	-	< 0.1	-
% Moisture	1	%	16	-	13	-

Client Sample ID			BH006 - 0.0-0.25	BH006 - 0.25-0.5M	BH006 - 0.5-0.75M	BH006 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24873	B19-Se24874	B19-Se24875	B19-Se24876
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.1	5.2	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.8	3.6	3.5
Reaction Ratings*[S05]		comment	4.0	3.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.4	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	57	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.090	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	0.03	-
Net Acid soluble sulfur	0.02	% S	-	-	0.03	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	13	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.11	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	69	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	5.2	-
<2mm Fraction	0.005	g	-	-	89	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	17	-

Client Sample ID			BH006 - 1.00-1.25M	BH006 - 1.25-1.5M	BH006 - 1.5-1.75M	BH006 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24877	B19-Se24878	B19-Se24879	B19-Se24880
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.5	5.0	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.8	3.7	4.0
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	46
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.070
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.03
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.07
Net Acid soluble sulfur	0.02	% S	-	-	-	0.04
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	21
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.03
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.11
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	67
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	5.0
<2mm Fraction	0.005	g	-	-	-	63
>2mm Fraction	0.005	g	-	-	-	35
Analysed Material	0.1	%	-	-	-	64
Extraneous Material	0.1	%	-	-	-	36
% Moisture	1	%	-	-	-	27

Client Sample ID			BH007 - 0.0-0.25M	BH007 - 0.25-0.5M	BH007 - 0.5-0.75M	BH007 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24881	B19-Se24882	B19-Se24883	B19-Se24884
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	4.9	4.9	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.7	3.5	3.3
Reaction Ratings*[S05]		comment	4.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.3	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	110	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.17	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.013	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	8.3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH007 - 0.0-0.25M	BH007 - 0.25-0.5M	BH007 - 0.5-0.75M	BH007 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24881	B19-Se24882	B19-Se24883	B19-Se24884
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	0.05	-	-	-
Net Acid soluble sulfur	0.02	% S	0.05	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	22	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.04	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.22	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	140	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	10	-	-	-
<2mm Fraction	0.005	g	62	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	40	-	-	-

Client Sample ID			BH007 - 1.00-1.25M	BH007 - 1.25-1.5M	BH007 - 1.5-1.75M	BH007 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24885	B19-Se24886	B19-Se24887	B19-Se24888
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.8	4.9	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	3.0	3.1
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	50	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.080	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.08	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	50	-	-

Client Sample ID			BH007 - 1.00-1.25M	BH007 - 1.25-1.5M	BH007 - 1.5-1.75M	BH007 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24885	B19-Se24886	B19-Se24887	B19-Se24888
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.7	-	-
<2mm Fraction	0.005	g	-	60	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	11	-	-

Client Sample ID			BH0021 - 0.0-0.25M	BH0021 - 0.25-0.5M	BH0021 - 0.5-0.75M	BH0021 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24889	B19-Se24890	B19-Se24891	B19-Se24892
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.0	3.8	3.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	2.9	2.8	2.9
Reaction Ratings*[S05]		comment	3.0	2.0	2.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	36	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.060	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	0.07	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	0.15	-
Net Acid soluble sulfur	0.02	% S	-	-	0.09	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	41	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	0.07	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.12	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	77	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	5.8	-
<2mm Fraction	0.005	g	-	-	68	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	23	-

Client Sample ID			BH0021 - 1.00-1.25M	BH0021 - 1.25-1.5M	BH0021 - 1.5-1.75M	BH0021 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24893	B19-Se24894	B19-Se24895	B19-Se24896
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.0	3.8	4.1	4.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.6	2.7	2.3	1.9
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.1	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	180	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.29	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.03	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.06	-	-	-
Net Acid soluble sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	15	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.31	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	200	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	15	-	-	-
<2mm Fraction	0.005	g	57	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	30	-	-	-

Client Sample ID			BH0021 - 2.00-2.25M	BH0021 - 2.25-2.5M	BH0021 - 2.5-2.75M	BH0021 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24897	B19-Se24898	B19-Se24899	B19-Se24900
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.6	6.0	7.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.8	1.8	2.0	5.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.1	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	190	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.30	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	3.9	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	2400	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.17	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH0021 - 2.00-2.25M	BH0021 - 2.25-2.5M	BH0021 - 2.5-2.75M	BH0021 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24897	B19-Se24898	B19-Se24899	B19-Se24900
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	0.34	-	-	-
Net Acid soluble sulfur	0.02	% S	0.16	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	75	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.12	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	4.3	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	2700	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	200	-	-	-
<2mm Fraction	0.005	g	50	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	45	-	-	-

Client Sample ID			BH0021 - 3.00-3.25M	BH0021 - 3.25-3.5M	BH0021 - 3.5-3.75M	BH0021 - 3.75-4.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24901	B19-Se24902	B19-Se24903	B19-Se24904
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	6.9	6.6	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	5.1	4.8	5.3
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	1.0

Client Sample ID			BH0022 - 0.0-0.25M	BH0022 - 0.25-0.5M	BH0022 - 0.5-0.75M	BH0022 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24905	B19-Se24906	B19-Se24907	B19-Se24908
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.1	5.3	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.2	3.1	3.2
Reaction Ratings*[S05]		comment	4.0	2.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	14
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	0.046
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	28
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02

Client Sample ID			BH0022 - 0.0-0.25M	BH0022 - 0.25-0.5M	BH0022 - 0.5-0.75M	BH0022 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24905	B19-Se24906	B19-Se24907	B19-Se24908
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.07
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	43
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.2
<2mm Fraction	0.005	g	-	-	-	79
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	19

Client Sample ID			BH0022 - 1.00-1.25M	BH0022 - 1.25-1.5M	BH0022 - 1.5-1.75M	BH0022 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se24909	B19-Se24910	B19-Se24911	B19-Se24912
Date Sampled			Sep 11, 2019	Sep 11, 2019	Sep 11, 2019	Sep 11, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.2	5.1	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.0	3.0	2.3
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.0
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	0.052
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	32
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.06

Client Sample ID			BH0022 - 1.00-1.25M	BH0022 - 1.25-1.5M	BH0022 - 1.5-1.75M	BH0022 - 1.75-2.00M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se24909**	**B19-Se24910**	**B19-Se24911**	**B19-Se24912**
Date Sampled			**Sep 11, 2019**	**Sep 11, 2019**	**Sep 11, 2019**	**Sep 11, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	36
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	2.7
<2mm Fraction	0.005	g	-	-	-	150
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	12

Client Sample ID			BH0022 - 2.0-2.25M	BH0022 - 2.25-2.5M
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**B19-Se24913**	**B19-Se24914**
Date Sampled			**Sep 11, 2019**	**Sep 11, 2019**
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	5.1	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.1	2.6
Reaction Ratings*[S05]		comment	2.0	3.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 17, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 24, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 16, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Project ID: 19210

Order No.:
Report #: 677330
Phone: 07 5478 9642
Fax:

Received: Sep 16, 2019 9:00 AM
Due: Sep 23, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH001 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24833	X		
2	BH001 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24834	X	X	X
3	BH001 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24835	X		
4	BH001 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se24836	X		
5	BH001 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se24837	X		
6	BH001 - 1.25-	Sep 11, 2019		Soil	B19-Se24838	X	X	X

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NATA # 1261 Site # 20794

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Site # 23736

Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 677330
Phone: 07 5478 9642
Fax:

Received: Sep 16, 2019 9:00 AM
Due: Sep 23, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH001 - 1.5-1.75M	Sep 11, 2019		Soil	B19-Se24839	X		
8	BH002 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24840	X		
9	BH002 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24841	X		
10	BH002 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24842	X	X	X
11	BH002 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se24843	X		
12	BH002 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se24844	X		
13	BH002 - 1.25-	Sep 11, 2019		Soil	B19-Se24845	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
14	BH002 - 1.5-1.75M	Sep 11, 2019		Soil	B19-Se24846	X		
15	BH002 - 1.75-2.0M	Sep 11, 2019		Soil	B19-Se24847	X	X	X
16	BH002 - 2.0-2.25M	Sep 11, 2019		Soil	B19-Se24848	X		
17	BH002 - 2.25-2.5M	Sep 11, 2019		Soil	B19-Se24849	X		
18	BH003 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24850	X	X	X
19	BH003 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24851	X		
20	BH003 - 0.5-	Sep 11, 2019		Soil	B19-Se24852	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
21	BH003 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se248453	X		
22	BH003 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se248454	X	X	X
23	BH003 - 1.25-1.5M	Sep 11, 2019		Soil	B19-Se248455	X		
24	BH003 - 1.5-1.75M	Sep 11, 2019		Soil	B19-Se248456	X		
25	BH003 - 1.75-2.0M	Sep 11, 2019		Soil	B19-Se248457	X		
26	BH003 - 2.00-2.25M	Sep 11, 2019		Soil	B19-Se248458	X		
27	BH003 - 2.25-	Sep 11, 2019		Soil	B19-Se248459	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.5M							
28	BH004 - 0.00-0.25M	Sep 11, 2019		Soil	B19-Se24860	X		
29	BH004 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24861	X	X	X
30	BH004 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24862	X		
31	BH004 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se24863	X		
32	BH004 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se24864	X		
33	BH004 - 1.25-1.5M	Sep 11, 2019		Soil	B19-Se24865	X	X	X
34	BH004 - 1.5-	Sep 11, 2019		Soil	B19-Se24866	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.75M							
35	BH004 - 1.75-2.0M	Sep 11, 2019		Soil	B19-Se24867	X		
36	BH005 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24868	X		
37	BH005 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24869	X	X	X
38	BH005 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24870	X		
39	BH005 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se24871	X	X	X
40	BH005 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se24872	X		
41	BH006 - 0.0-	Sep 11, 2019		Soil	B19-Se24873	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25							
42	BH006 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se248474	X		
43	BH006 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se248475	X	X	X
44	BH006 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se248476	X		
45	BH006 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se248477	X		
46	BH006 - 1.25-1.5M	Sep 11, 2019		Soil	B19-Se248478	X		
47	BH006 - 1.5-1.75M	Sep 11, 2019		Soil	B19-Se248479	X		
48	BH006 - 1.75-	Sep 11, 2019		Soil	B19-Se248480	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.00M							
49	BH007 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24881	X	X	X
50	BH007 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24882	X		
51	BH007 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24883	X		
52	BH007 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se24884	X		
53	BH007 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se24885	X		
54	BH007 - 1.25-1.5M	Sep 11, 2019		Soil	B19-Se24886	X	X	X
55	BH007 - 1.5-	Sep 11, 2019		Soil	B19-Se24887	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.75M							
56	BH007 - 1.75-2.00M	Sep 11, 2019		Soil	B19-Se24888	X		
57	BH0021 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24889	X		
58	BH0021 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24890	X		
59	BH0021 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24891	X	X	X
60	BH0021 - 0.75-1.00M	Sep 11, 2019		Soil	B19-Se24892	X		
61	BH0021 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se24893	X	X	X
62	BH0021 -	Sep 11, 2019		Soil	B19-Se24894	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25-1.5M							
63	BH0021 - 1.5-1.75M	Sep 11, 2019		Soil	B19-Se248995	X		
64	BH0021 - 1.75-2.0M	Sep 11, 2019		Soil	B19-Se248996	X		
65	BH0021 - 2.00-2.25M	Sep 11, 2019		Soil	B19-Se248997	X	X	X
66	BH0021 - 2.25-2.5M	Sep 11, 2019		Soil	B19-Se248998	X		
67	BH0021 - 2.5-2.75M	Sep 11, 2019		Soil	B19-Se248999	X		
68	BH0021 - 2.75-3.00M	Sep 11, 2019		Soil	B19-Se249000	X		
69	BH0021 -	Sep 11, 2019		Soil	B19-Se249001	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.00-3.25M							
70	BH0021 - 3.25-3.5M	Sep 11, 2019		Soil	B19-Se24902	X		
71	BH0021 - 3.5-3.75M	Sep 11, 2019		Soil	B19-Se24903	X		
72	BH0021 - 3.75-4.0M	Sep 11, 2019		Soil	B19-Se24904	X		
73	BH0022 - 0.0-0.25M	Sep 11, 2019		Soil	B19-Se24905	X		
74	BH0022 - 0.25-0.5M	Sep 11, 2019		Soil	B19-Se24906	X		
75	BH0022 - 0.5-0.75M	Sep 11, 2019		Soil	B19-Se24907	X		
76	BH0022 -	Sep 11, 2019		Soil	B19-Se24908	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75-1.00M							
77	BH0022 - 1.00-1.25M	Sep 11, 2019		Soil	B19-Se249 09	X		
78	BH0022 - 1.25-1.5M	Sep 11, 2019		Soil	B19-Se249 10	X		
79	BH0022 - 1.5-1.75M	Sep 11, 2019		Soil	B19-Se249 11	X		
80	BH0022 - 1.75-2.00M	Sep 11, 2019		Soil	B19-Se249 12	X	X	X
81	BH0022 - 2.0-2.25M	Sep 11, 2019		Soil	B19-Se249 13	X		
82	BH0022 - 2.25-2.5M	Sep 11, 2019		Soil	B19-Se249 14	X		
Test Counts						82	19	19

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	102			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se24834	CP	pH Units	5.5	5.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se24834	CP	mol H+/t	9.0	8.1	10	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se24834	CP	% pyrite S	0.010	0.010	10	30%	Pass	
Chromium Reducible Sulfur	B19-Se24834	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se24834	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se24834	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se24834	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se24834	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se24834	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se24834	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se24834	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se24834	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se24834	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se24834	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	B19-Se24834	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S19-Se23892	NCP	%	6.7	6.8	1.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24840	CP	pH Units	6.3	6.6	pass	30%	Pass	
Reaction Ratings*	B19-Se24840	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24850	CP	pH Units	7.1	7.2	pass	30%	Pass	
Reaction Ratings*	B19-Se24850	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24860	CP	pH Units	6.6	6.5	pass	30%	Pass	
Reaction Ratings*	B19-Se24860	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24870	CP	pH Units	5.9	5.9	pass	30%	Pass	
Reaction Ratings*	B19-Se24870	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se24875	CP	pH Units	4.4	4.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se24875	CP	mol H+/t	57	58	1.6	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se24875	CP	% pyrite S	0.090	0.090	2.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se24875	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se24875	CP	mol H+/t	< 3	< 3	<1	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	B19-Se24875	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se24875	CP	% S	0.03	0.03	18	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se24875	CP	mol H+/t	13	15	18	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se24875	CP	% S	0.02	0.02	18	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se24875	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se24875	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se24875	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se24875	CP	% S	0.11	0.12	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se24875	CP	mol H+/t	69	73	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se24875	CP	kg CaCO3/t	5.2	5.5	5.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24880	CP	pH Units	5.2	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se24880	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24890	CP	pH Units	4.0	4.0	pass	30%	Pass	
Reaction Ratings*	B19-Se24890	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24900	CP	pH Units	7.0	6.9	pass	30%	Pass	
Reaction Ratings*	B19-Se24900	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se24910	CP	pH Units	5.2	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se24910	CP	comment	1.0	1.0	pass	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **- ALL INV & STATEMENTS**

Report **677351-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 16, 2019

Client Sample ID			BH008 - 0.0-0.25M	BH008 - 0.25-0.5M	BH008 - 0.5-0.75M	BH008 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25107	B19-Se25108	B19-Se25109	B19-Se25110
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.6	4.9	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.4	3.5	3.7
Reaction Ratings*[S05]		comment	4.0	3.0	3.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	73	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.12	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.12	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	73	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	5.5	-	-
<2mm Fraction	0.005	g	-	110	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	17	-	-

Client Sample ID			BH008 - 1.00-1.25M	BH008 - 1.25-1.5M	BH008 - 1.5-1.75M	BH008 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25111	B19-Se25112	B19-Se25113	B19-Se25114
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.8	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.9	3.8	3.8
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.9	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	12	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	12	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	140	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	11	-	-	-

Client Sample ID			BH009 - 0.0-0.25M	BH009 - 0.25-0.5M	BH009 - 0.5-0.75M	BH009 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25115	B19-Se25116	B19-Se25117	B19-Se25118
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.6	4.4	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.3	3.4	3.4
Reaction Ratings*[S05]		comment	3.0	2.0	3.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.3	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	87	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.14	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH009 - 0.0-0.25M	BH009 - 0.25-0.5M	BH009 - 0.5-0.75M	BH009 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25115	B19-Se25116	B19-Se25117	B19-Se25118
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	16	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.03	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.17	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	100	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	7.7	-	-	-
<2mm Fraction	0.005	g	84	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	22	-	-	-

Client Sample ID			BH009 - 1.00-1.25M	BH009 - 1.25-1.5M	BH009 - 1.5-1.75M	BH009 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25119	B19-Se25120	B19-Se25121	B19-Se25122
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.8	4.7	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.7	3.6	3.7
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	32
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.050
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.05
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.09
Net Acid soluble sulfur	0.02	% S	-	-	-	0.04
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	18
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.03
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.08
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	50

Client Sample ID			BH009 - 1.00-1.25M	BH009 - 1.25-1.5M	BH009 - 1.5-1.75M	BH009 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25119	B19-Se25120	B19-Se25121	B19-Se25122
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.8
<2mm Fraction	0.005	g	-	-	-	150
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	14

Client Sample ID			BH010 - 0.00-0.25M	BH010 - 0.25-0.5M	BH010 - 0.5-0.75M	BH010 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25123	B19-Se25124	B19-Se25125	B19-Se25126
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.2	5.1	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.4	3.8	3.6
Reaction Ratings*[S05]		comment	4.0	4.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	57	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.090	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	19	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.03	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.12	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	76	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	5.7	-	-
<2mm Fraction	0.005	g	-	85	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	17	-	-

Client Sample ID			BH010 - 1.00-1.25M	BH010 - 1.25-1.5M	BH010 - 1.5-1.75M	BH010 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25127	B19-Se25128	B19-Se25129	B19-Se25130
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.9	5.0	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	3.9	4.4	4.6
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.9	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	20	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.04	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.03	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	20	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.5	-	-	-
<2mm Fraction	0.005	g	79	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	17	-	-	-

Client Sample ID			BH011 - 0.00-0.25M	BH011 - 0.25-0.5M	BH011 - 0.5-0.75M	BH011 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25131	B19-Se25132	B19-Se25133	B19-Se25134
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	4.5	4.1	4.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	2.8	3.2	3.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.6	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	58	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.090	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.006	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.7	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.03	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH011 - 0.00-0.25M	BH011 - 0.25-0.5M	BH011 - 0.5-0.75M	BH011 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25131	B19-Se25132	B19-Se25133	B19-Se25134
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.10	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	62	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	4.7	-	-	-
<2mm Fraction	0.005	g	39	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	17	-	-	-

Client Sample ID			BH011 - 1.00-1.25M	BH011 - 1.25-1.5M	BH011 - 1.5-1.75M	BH011 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25135	B19-Se25136	B19-Se25137	B19-Se25138
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.9	3.9	4.0	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.0	2.9	2.7
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.1	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	110	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.18	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	3.2	-
Sulfur - KCl Extractable	0.02	% S	-	-	0.07	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	0.13	-
Net Acid soluble sulfur	0.02	% S	-	-	0.06	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	28	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	0.04	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.23	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	140	-

Client Sample ID			BH011 - 1.00-1.25M	BH011 - 1.25-1.5M	BH011 - 1.5-1.75M	BH011 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25135	B19-Se25136	B19-Se25137	B19-Se25138
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	11	-
<2mm Fraction	0.005	g	-	-	89	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	27	-

Client Sample ID			BH011 - 2.00-2.25M	BH011 - 2.25-2.5M	BH011 - 2.5-2.75M	BH011 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25139	B19-Se25140	B19-Se25141	B19-Se25142
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.3	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.8	3.4	3.5
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	41
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.070
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.04
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.07
Net Acid soluble sulfur	0.02	% S	-	-	-	0.03
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	14
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.09
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	55
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	4.2
<2mm Fraction	0.005	g	-	-	-	100
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	21

Client Sample ID			BH012 - 0.00-0.25M	BH012 - 0.25-0.5M	BH012 - 0.5-0.75M	BH012 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25143	B19-Se25144	B19-Se25145	B19-Se25146
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	5.7	5.3	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	4.2	3.5	3.8
Reaction Ratings*[S05]		comment	4.0	2.0	3.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	27	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	3.3	-
Sulfur - KCl Extractable	0.02	% S	-	-	0.03	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.05	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	30	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	2.3	-
<2mm Fraction	0.005	g	-	-	170	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	13	-

Client Sample ID			BH012 - 1.00-1.25M	BH012 - 1.25-1.5M	BH012 - 1.5-1.75M	BH012 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25147	B19-Se25148	B19-Se25149	B19-Se25150
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.9	4.9	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.1	4.3	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	27
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.04
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH012 - 1.00-1.25M	BH012 - 1.25-1.5M	BH012 - 1.5-1.75M	BH012 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25147	B19-Se25148	B19-Se25149	B19-Se25150
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	0.08
Net Acid soluble sulfur	0.02	% S	-	-	-	0.04
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	21
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.03
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.08
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	47
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.6
<2mm Fraction	0.005	g	-	-	-	100
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	20

Client Sample ID			BH013 - 0.00-0.25M	BH013 - 0.25-0.5M	BH013 - 0.5-0.75M	BH013 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25151	B19-Se25152	B19-Se25153	B19-Se25154
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	5.9	6.2	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.1	3.1	4.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	40	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.060	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.06	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	40	-

Client Sample ID			BH013 - 0.00-0.25M	BH013 - 0.25-0.5M	BH013 - 0.5-0.75M	BH013 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25151	B19-Se25152	B19-Se25153	B19-Se25154
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	3.0	-
<2mm Fraction	0.005	g	-	-	84	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	16	-

Client Sample ID			BH013 - 1.00-1.25M	BH013 - 1.25-1.5M	BH013 - 1.5-1.75M	BH013 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25155	B19-Se25156	B19-Se25157	B19-Se25158
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.8	7.3	7.3	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	6.2	6.6	6.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.4
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.04
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	130
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	21

Client Sample ID			BH013 - 2.00-2.25M	BH013 - 2.25-2.5M	BH013 - 2.5-2.75M	BH013 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25159	B19-Se25160	B19-Se25161	B19-Se25162
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.4	7.3	7.4	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	6.2	6.6	6.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH013 - 3.00-3.25M	BH013 - 3.25-3.5M	BH023 - 0.00-0.25M	BH023 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25163	B19-Se25164	B19-Se25165	B19-Se25166
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	8.0	4.8	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	7.0	3.0	3.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	6.1	-	4.4	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	3.5	-	110	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	0.18	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	0.007	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	4.1	-
Sulfur - KCl Extractable	0.02	% S	0.03	-	0.03	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	-
HCl Extractable Sulfur	0.02	% S	n/a	-	0.09	-
Net Acid soluble sulfur	0.02	% S	n/a	-	0.06	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	26	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	0.04	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	0.23	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	140	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	11	-
<2mm Fraction	0.005	g	140	-	33	-
>2mm Fraction	0.005	g	< 0.005	-	< 0.005	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	1	%	19	-	19	-

Client Sample ID			BH023 - 0.5-0.75M	BH023 - 0.75-1.00M	BH023 - 1.00-1.25M	BH023 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25167	B19-Se25168	B19-Se25169	B19-Se25170
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.1	4.1	4.5	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.9	2.8	1.4
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	120
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.19
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	1.9
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	1200
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.14
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.22
Net Acid soluble sulfur	0.02	% S	-	-	-	0.08
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	37
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.06
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	2.2
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	1400
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	100
<2mm Fraction	0.005	g	-	-	-	44
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	44

Client Sample ID			BH023 - 1.5-1.75M	BH023 - 1.75-2.00M	BH023 - 2.00-2.25M	BH023 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25171	B19-Se25172	B19-Se25173	B19-Se25174
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.7	4.5	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.7	1.8	1.8	1.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	34
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.050
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	0.50
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	310
Sulfur - KCl Extractable	0.02	% S	-	-	-	0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH023 - 1.5-1.75M	BH023 - 1.75-2.00M	BH023 - 2.00-2.25M	BH023 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25171	B19-Se25172	B19-Se25173	B19-Se25174
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.55
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	340
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	26
<2mm Fraction	0.005	g	-	-	-	91
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	20

Client Sample ID			BH024 - 0.00-0.25M	BH024 - 0.25-0.5M	BH024 - 0.5-0.75M	BH024 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25175	B19-Se25176	B19-Se25177	B19-Se25178
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.4	4.2	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.3	2.8	3.0
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	87
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.14
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	0.006
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	3.8
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	-	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.14
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	90

Client Sample ID			BH024 - 0.00-0.25M	BH024 - 0.25-0.5M	BH024 - 0.5-0.75M	BH024 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25175	B19-Se25176	B19-Se25177	B19-Se25178
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	6.8
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	20

Client Sample ID			BH024 - 1.00-1.25M	BH024 - 1.25-1.5M	BH024 - 1.5-1.75M	BH024 - 2.00-2.25M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25179	B19-Se25180	B19-Se25181	B19-Se25183
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.1	4.4	4.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.2	2.6	2.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	120	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.19	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	0.044	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	28	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	0.03	-
Net Acid soluble sulfur	0.02	% S	-	-	0.03	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	16	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	0.03	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.26	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	160	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	12	-
<2mm Fraction	0.005	g	-	-	45	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	28	-

Client Sample ID			BH024 - 2.25-2.5M
Sample Matrix			**Soil**
Eurofins Sample No.			**B19-Se25184**
Date Sampled			**Sep 12, 2019**
Test/Reference	LOR	Unit	
Acid Sulfate Soils Field pH Test			
pH-F (Field pH test)*	0.1	pH Units	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3
Reaction Ratings*[S05]		comment	4.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 18, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 24, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 16, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 677351
Phone: 07 5478 9642
Fax:

Received: Sep 16, 2019 9:00 AM
Due: Sep 23, 2019
Priority: 5 Day
Contact Name: - ALL INV & STATEMENTS

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						CANCELLED	HOLD	Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	BH008 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se251107			X		
2	BH008 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se251108			X	X	X
3	BH008 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se251109			X		
4	BH008 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se251110			X		
5	BH008 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se251111			X	X	X
6	BH008 - 1.25-	Sep 12, 2019		Soil	B19-Se251112			X		

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NATA # 1261
Site # 23736

Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 677351
Phone: 07 5478 9642
Fax:

Received: Sep 16, 2019 9:00 AM
Due: Sep 23, 2019
Priority: 5 Day
Contact Name: - ALL INV & STATEMENTS

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						CANCELLED	HOLD	Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	1.5M									
7	BH008 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se251113			X		
8	BH008 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se251114			X		
9	BH009 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se251115			X	X	X
10	BH009 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se251116			X		
11	BH009 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se251117			X		
12	BH009 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se251118			X		
13	BH009 - 1.00-	Sep 12, 2019		Soil	B19-Se251119			X		

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Eurofins Analytical Services Manager : Ryan Gilbert

	Sample Detail					CANCELLED	HOLD	Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	1.25M									
14	BH009 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se251220			X		
15	BH009 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se251221			X		
16	BH009 - 1.75-2.0M	Sep 12, 2019		Soil	B19-Se251222			X	X	X
17	BH010 - 0.00-0.25M	Sep 12, 2019		Soil	B19-Se251223			X		
18	BH010 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se251224			X	X	X
19	BH010 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se251225			X		
20	BH010 - 0.75-	Sep 12, 2019		Soil	B19-Se251226			X		

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Company Name: Tectonic Geotechnical Pty Ltd
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Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	1.00M									
21	BH010 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se251127			X	X	X
22	BH010 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se251128			X		
23	BH010 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se251129			X		
24	BH010 - 1.75-2.0M	Sep 12, 2019		Soil	B19-Se251130			X		
25	BH011 - 0.00-0.25M	Sep 12, 2019		Soil	B19-Se251131			X	X	X
26	BH011 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se251132			X		
27	BH011 - 0.5-	Sep 12, 2019		Soil	B19-Se251133			X		

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Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	0.75M									
28	BH011 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se251134			X		
29	BH011 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se251135			X		
30	BH011 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se251136			X		
31	BH011 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se251137			X	X	X
32	BH011 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se251138			X		
33	BH011 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se251139			X		
34	BH011 - 2.25-	Sep 12, 2019		Soil	B19-Se251140			X		

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Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	2.5M									
35	BH011 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se25141			X		
36	BH011 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se25142			X	X	X
37	BH012 - 0.00-0.25M	Sep 12, 2019		Soil	B19-Se25143			X		
38	BH012 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se25144			X		
39	BH012 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se25145			X	X	X
40	BH012 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se25146			X		
41	BH012 - 1.00-	Sep 12, 2019		Soil	B19-Se25147			X		

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Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	1.25M									
42	BH012 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se251148			X		
43	BH012 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se251149			X		
44	BH012 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se251150			X	X	X
45	BH013 - 0.00-0.25M	Sep 12, 2019		Soil	B19-Se251151			X		
46	BH013 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se251152			X		
47	BH013 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se251153			X	X	X
48	BH013 - 0.75-	Sep 12, 2019		Soil	B19-Se251154			X		

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Melbourne Laboratory - NATA Site # 1254 & 14271										
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	1.00M									
49	BH013 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se251155			X		
50	BH013 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se251156			X		
51	BH013 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se251157			X		
52	BH013 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se251158			X	X	X
53	BH013 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se251159			X		
54	BH013 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se251160			X		
55	BH013 - 2.5-	Sep 12, 2019		Soil	B19-Se251161			X		

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Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	2.75M									
56	BH013 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se25162			X		
57	BH013 - 3.00-3.25M	Sep 12, 2019		Soil	B19-Se25163			X	X	X
58	BH013 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se25164			X		
59	BH023 - 0.00-0.25M	Sep 12, 2019		Soil	B19-Se25165			X	X	X
60	BH023 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se25166			X		
61	BH023 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se25167			X		
62	BH023 - 0.75-	Sep 12, 2019		Soil	B19-Se25168			X		

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Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	1.00M									
63	BH023 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se25169			X		
64	BH023 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se25170			X	X	X
65	BH023 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se25171			X		
66	BH023 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se25172			X		
67	BH023 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se25173			X		
68	BH023 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se25174			X	X	X
69	BH024 - 0.00-	Sep 12, 2019		Soil	B19-Se25175			X		

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Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	0.25M									
70	BH024 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se25176			X		
71	BH024 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se25177			X		
72	BH024 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se25178			X	X	X
73	BH024 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se25179			X		
74	BH024 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se25180			X		
75	BH024 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se25181			X	X	X
76	BH024 - 1.75-	Sep 12, 2019		Soil	B19-Se25182	X				

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Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794						X	X	X	X	X
Perth Laboratory - NATA Site # 23736										
	2.00M									
77	BH024 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se251183			X		
78	BH024 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se251184			X		
79	BH023 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se252237		X			
80	BH023 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se252238		X			
Test Counts						1	2	77	19	19

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	98			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se25108	CP	pH Units	4.3	4.3	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se25108	CP	mol H+/t	73	73	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se25108	CP	% pyrite S	0.12	0.12	<1	30%	Pass	
Chromium Reducible Sulfur	B19-Se25108	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se25108	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se25108	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se25108	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se25108	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se25108	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se25108	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se25108	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se25108	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se25108	CP	% S	0.12	0.12	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se25108	CP	mol H+/t	73	73	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se25108	CP	kg CaCO3/t	5.5	5.5	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25111	CP	pH Units	4.8	4.9	pass	30%	Pass	
Reaction Ratings*	B19-Se25111	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25121	CP	pH Units	4.7	4.6	pass	30%	Pass	
Reaction Ratings*	B19-Se25121	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25131	CP	pH Units	5.1	5.0	pass	30%	Pass	
Reaction Ratings*	B19-Se25131	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25141	CP	pH Units	4.5	4.6	pass	30%	Pass	
Reaction Ratings*	B19-Se25141	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se25150	CP	pH Units	4.5	4.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se25150	CP	mol H+/t	27	26	1.9	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se25150	CP	% pyrite S	0.040	0.040	2.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se25150	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se25150	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se25150	CP	% S	0.04	0.04	1.0	30%	Pass	
Net Acid soluble sulfur	B19-Se25150	CP	% S	0.04	0.05	2.0	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
Net Acid soluble sulfur - acidity units	B19-Se25150	CP	mol H+/t	21	21	2.0	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se25150	CP	% S	0.03	0.03	2.0	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se25150	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se25150	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se25150	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se25150	CP	% S	0.08	0.08	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se25150	CP	mol H+/t	47	47	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se25150	CP	kg CaCO3/t	3.6	3.6	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25151	CP	pH Units	6.0	6.0	pass	30%	Pass	
Reaction Ratings*	B19-Se25151	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25161	CP	pH Units	7.4	7.4	pass	30%	Pass	
Reaction Ratings*	B19-Se25161	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25171	CP	pH Units	4.4	4.6	pass	30%	Pass	
Reaction Ratings*	B19-Se25171	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25181	CP	pH Units	4.4	4.4	pass	30%	Pass	
Reaction Ratings*	B19-Se25181	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se25183	CP	%	22	21	1.0	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **677358-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 16, 2019

Client Sample ID			**BH014 - 0.0-0.25M**	**BH014 - 0.25-0.5M**	**BH014 - 0.5-0.75M**	**BH014 - 0.75-1.00M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se25023**	**B19-Se25024**	**B19-Se25025**	**B19-Se25026**
Date Sampled			**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	6.0	6.9	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	4.2	5.1	6.6
Reaction Ratings*[S05]		comment	3.0	3.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	39	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.060	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	39	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.9	-	-
<2mm Fraction	0.005	g	-	130	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	14	-	-

Client Sample ID			BH014 - 1.00-1.25M	BH014 - 1.25-1.5M	BH014 - 1.5-1.75M	BH014 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25027	B19-Se25028	B19-Se25029	B19-Se25030
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.3	7.8	7.8	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.6	7.4	8.2	7.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.4	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	2.1	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	83	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	12	-

Client Sample ID			BH014 - 2.00-2.25M	BH014 - 2.25-2.5M	BH014 - 2.5-2.75M	BH014 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25031	B19-Se25032	B19-Se25033	B19-Se25034
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	7.7	7.6	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.2	8.2	7.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH014 - 3.00-3.25M	BH014 - 3.25-3.5M	BH015 - 0.0-0.25M	BH015 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25035	B19-Se25036	B19-Se25037	B19-Se25038
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	7.5	5.1	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.2	2.5	3.0
Reaction Ratings*[S05]		comment	4.0	4.0	3.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	6.4	-	4.4	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	-	120	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	-	0.19	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	0.02	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	-
HCl Extractable Sulfur	0.02	% S	n/a	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	n/a	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	0.19	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	120	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	8.7	-
<2mm Fraction	0.005	g	120	-	23	-
>2mm Fraction	0.005	g	< 0.005	-	< 0.005	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	1	%	17	-	30	-

Client Sample ID			BH015 - 0.5-0.75M	BH015 - 0.75-1.00M	BH015 - 1.00-1.25M	BH015 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25039	B19-Se25040	B19-Se25041	B19-Se25042
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.9	7.8	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	5.9	6.3	8.0
Reaction Ratings*[S05]		comment	3.0	4.0	3.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.7	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	12	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.020	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH015 - 0.5-0.75M	BH015 - 0.75-1.00M	BH015 - 1.00-1.25M	BH015 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25039	B19-Se25040	B19-Se25041	B19-Se25042
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	12	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	92	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	21	-	-

Client Sample ID			BH015 - 1.5-1.75M	BH015 - 1.75-2.00M	BH015 - 2.00-2.25M	BH015 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25043	B19-Se25044	B19-Se25045	B19-Se25046
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	7.6	7.7	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	7.8	8.0	7.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	0.48	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	95	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	0.15	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-

Client Sample ID			BH015 - 1.5-1.75M	BH015 - 1.75-2.00M	BH015 - 2.00-2.25M	BH015 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25043	B19-Se25044	B19-Se25045	B19-Se25046
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	110	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	25	-

Client Sample ID			BH015 - 2.5-2.75M	BH015 - 2.75-3.00M	BH015 - 3.00-3.25M	BH015 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25047	B19-Se25048	B19-Se25049	B19-Se25050
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	8.1	8.1	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.6	8.5	8.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	2.3	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	87	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	27	-

Client Sample ID			BH016 - 0.0-0.25M	BH016 - 0.25-0.5M	BH016 - 0.5-0.75M	BH016 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25051	B19-Se25052	B19-Se25053	B19-Se25054
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	6.2	6.5	6.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.4	4.2	6.0
Reaction Ratings*[S05]		comment	3.0	3.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	25	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.04	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	25	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.9	-
<2mm Fraction	0.005	g	-	-	110	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	15	-

Client Sample ID			BH016 - 1.00-1.25M	BH016 - 1.25-1.5M	BH016 - 1.5-1.75M	BH016 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25055	B19-Se25056	B19-Se25057	B19-Se25058
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.4	7.5	8.0	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.4	6.5	8.6	8.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	< 0.003
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH016 - 1.00-1.25M	BH016 - 1.25-1.5M	BH016 - 1.5-1.75M	BH016 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25055	B19-Se25056	B19-Se25057	B19-Se25058
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	0.53
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	110
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	0.17
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	110
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	5.0

Client Sample ID			BH016 - 2.00-2.25M	BH016 - 2.25-2.5M	BH016 - 2.5-2.75M	BH016 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25059	B19-Se25060	B19-Se25061	B19-Se25062
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	8.1	8.3	8.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.1	8.2	8.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	0.90	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	180	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	0.29	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-

Client Sample ID			BH016 - 2.00-2.25M	BH016 - 2.25-2.5M	BH016 - 2.5-2.75M	BH016 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25059	B19-Se25060	B19-Se25061	B19-Se25062
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	140	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	28	-

Client Sample ID			BH016 - 3.00-3.25M	BH016 - 3.25-3.5M	BH017 - 0.0-0.25M	BH017 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25063	B19-Se25064	B19-Se25065	B19-Se25066
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.7	6.4	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.3	8.2	3.5	3.7
Reaction Ratings*[S05]		comment	4.0	4.0	3.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	22	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.030	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.03	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	22	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.6	-
<2mm Fraction	0.005	g	-	-	79	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	39	-

Client Sample ID			BH017 - 0.5-0.75M	BH017 - 0.75-1.00M	BH017 - 1.00-1.25M	BH017 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25067	B19-Se25068	B19-Se25069	B19-Se25070
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	7.0	7.1	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	6.3	7.0	6.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	13	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.020	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	13	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	110	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	43	-

Client Sample ID			BH017 - 1.5-1.75M	BH017 - 1.75-2.00M	BH017 - 2.00-2.25M	BH017 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25071	B19-Se25072	B19-Se25073	B19-Se25074
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.4	7.3	7.7	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.5	6.7	7.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	5.4
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH017 - 1.5-1.75M	BH017 - 1.75-2.00M	BH017 - 2.00-2.25M	BH017 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25071	B19-Se25072	B19-Se25073	B19-Se25074
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	100
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	27

Client Sample ID			BH017 - 2.5-2.75M	BH017 - 2.75-3.00M	BH017 - 3.00-3.25M	BH017 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25075	B19-Se25076	B19-Se25077	B19-Se25078
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	7.7	7.5	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	6.7	6.4	6.3
Reaction Ratings*[S05]		comment	2.0	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	5.8
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10

Client Sample ID			BH017 - 2.5-2.75M	BH017 - 2.75-3.00M	BH017 - 3.00-3.25M	BH017 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25075	B19-Se25076	B19-Se25077	B19-Se25078
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	130
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	22

Client Sample ID			BH019 - 0.00-0.25M	BH019 - 0.25-0.5M	BH019 - 0.5-0.75M	BH019 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25079	B19-Se25080	B19-Se25081	B19-Se25082
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	6.2	6.5	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.3	3.7	4.9
Reaction Ratings*[S05]		comment	3.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.8	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	38	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.060	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	38	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.9	-	-
<2mm Fraction	0.005	g	-	46	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	39	-	-

Client Sample ID			BH019 - 1.00-1.25M	BH019 - 1.25-1.5M	BH019 - 1.5-1.75M	BH019 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25083	B19-Se25084	B19-Se25085	B19-Se25086
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.0	6.8	7.5	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	6.0	6.8	6.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.6	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	8.0	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	60	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	33	-	-	-

Client Sample ID			BH019 - 2.00-2.25M	BH019 - 2.25-2.5M	BH019 - 2.5-2.75M	BH019 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25087	B19-Se25088	B19-Se25089	B19-Se25090
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	7.9	7.6	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.1	6.0	6.4	6.5
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.7	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	5.4	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH019 - 2.00-2.25M	BH019 - 2.25-2.5M	BH019 - 2.5-2.75M	BH019 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25087	B19-Se25088	B19-Se25089	B19-Se25090
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	120	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	35	-	-

Client Sample ID			BH019 - 3.00-3.25M	BH019 - 3.25-3.5M	BH020 - 0.0-0.25M	BH020 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25091	B19-Se25092	B19-Se25093	B19-Se25094
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	7.5	6.2	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	7.0	3.7	3.9
Reaction Ratings*[S05]		comment	4.0	4.0	3.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.6	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	7.9	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	-

Client Sample ID			BH019 - 3.00-3.25M	BH019 - 3.25-3.5M	BH020 - 0.0-0.25M	BH020 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25091	B19-Se25092	B19-Se25093	B19-Se25094
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	110	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	26	-	-	-

Client Sample ID			BH020 - 0.5-0.75M	BH020 - 0.75-1.00M	BH020 - 1.00-1.25M	BH020 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25095	B19-Se25096	B19-Se25097	B19-Se25098
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.0	6.3	6.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.4	4.5	4.4
Reaction Ratings*[S05]		comment	3.0	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.1	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	18	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.03	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	18	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.4	-	-	-
<2mm Fraction	0.005	g	59	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	48	-	-	-

Client Sample ID			BH020 - 1.5-1.75M	BH020 - 1.75-2.00M	BH020 - 2.00-2.25M	BH020 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25099	B19-Se25100	B19-Se25101	B19-Se25102
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.3	7.4	7.1	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.4	2.2	2.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.4	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	12	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.86	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	540	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.04	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.88	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	550	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	41	-	-	-
<2mm Fraction	0.005	g	85	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	35	-	-	-

Client Sample ID			BH020 - 2.5-2.75M	BH020 - 2.75-3.00M	BH020 - 3.00-3.25M	BH020 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se25103	B19-Se25104	B19-Se25105	B19-Se25106
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	6.5	6.3	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.6	2.5	2.7
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.5	-	-	5.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	5.9	-	-	3.4
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	0.40	-	-	0.070
Chromium Reducible Sulfur -acidity units	3	mol H+/t	250	-	-	44
Sulfur - KCl Extractable	0.02	% S	0.03	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0

Client Sample ID			BH020 - 2.5-2.75M	BH020 - 2.75-3.00M	BH020 - 3.00-3.25M	BH020 - 3.25-3.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se25103**	**B19-Se25104**	**B19-Se25105**	**B19-Se25106**
Date Sampled			**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.41	-	-	0.08
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	250	-	-	47
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	19	-	-	3.5
<2mm Fraction	0.005	g	90	-	-	97
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	23	-	-	19

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 19, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 24, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 16, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 677358
Phone: 07 5478 9642
Fax:

Received: Sep 16, 2019 9:00 AM
Due: Sep 23, 2019
Priority: 5 Day
Contact Name: - ALL INV & STATEMENTS

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH014 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se250223	X		
2	BH014 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se250224	X	X	X
3	BH014 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se250225	X		
4	BH014 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se250226	X		
5	BH014 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se250227	X		
6	BH014 - 1.25-	Sep 12, 2019		Soil	B19-Se250228	X		

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Site # 23736

Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 677358
Phone: 07 5478 9642
Fax:

Received: Sep 16, 2019 9:00 AM
Due: Sep 23, 2019
Priority: 5 Day
Contact Name: - ALL INV & STATEMENTS

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH014 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se250229	X	X	X
8	BH014 - 1.75-2.0M	Sep 12, 2019		Soil	B19-Se250230	X		
9	BH014 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se250231	X		
10	BH014 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se250232	X		
11	BH014 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se250233	X		
12	BH014 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se250234	X		
13	BH014 - 3.00-	Sep 12, 2019		Soil	B19-Se250235	X	X	X

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NATA # 1261 Site # 18217

Brisbane
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NATA # 1261 Site # 20794

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
14	BH014 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se250036	X		
15	BH015 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se250037	X	X	X
16	BH015 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se250038	X		
17	BH015 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se250039	X		
18	BH015 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se250040	X	X	X
19	BH015 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se250041	X		
20	BH015 - 1.25-	Sep 12, 2019		Soil	B19-Se250042	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
21	BH015 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se25043	X		
22	BH015 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se25044	X		
23	BH015 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se25045	X	X	X
24	BH015 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se25046	X		
25	BH015 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se25047	X		
26	BH015 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se25048	X		
27	BH015 - 3.00-	Sep 12, 2019		Soil	B19-Se25049	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
28	BH015 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se250550	X		
29	BH016 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se250551	X		
30	BH016 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se250552	X		
31	BH016 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se250553	X	X	X
32	BH016 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se250554	X		
33	BH016 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se250555	X		
34	BH016 - 1.25-	Sep 12, 2019		Soil	B19-Se250556	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
35	BH016 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se250557	X		
36	BH016 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se250558	X	X	X
37	BH016 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se250559	X		
38	BH016 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se250560	X		
39	BH016 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se250561	X	X	X
40	BH016 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se250562	X		
41	BH016 - 3.00-	Sep 12, 2019		Soil	B19-Se250563	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
42	BH016 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se25064	X		
43	BH017 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se25065	X	X	X
44	BH017 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se25066	X		
45	BH017 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se25067	X		
46	BH017 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se25068	X		
47	BH017 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se25069	X	X	X
48	BH017 - 1.25-	Sep 12, 2019		Soil	B19-Se25070	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
49	BH017 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se250171	X		
50	BH017 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se250172	X		
51	BH017 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se250173	X		
52	BH017 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se250174	X	X	X
53	BH017 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se250175	X		
54	BH017 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se250176	X		
55	BH017 - 3.00-	Sep 12, 2019		Soil	B19-Se250177	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
56	BH017 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se25078	X	X	X
57	BH019 - 0.00-0.25M	Sep 12, 2019		Soil	B19-Se25079	X		
58	BH019 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se25080	X	X	X
59	BH019 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se25081	X		
60	BH019 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se25082	X		
61	BH019 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se25083	X	X	X
62	BH019 - 1.25-	Sep 12, 2019		Soil	B19-Se25084	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
63	BH019 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se250185	X		
64	BH019 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se250186	X		
65	BH019 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se250187	X		
66	BH019 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se250188	X	X	X
67	BH019 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se250189	X		
68	BH019 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se250190	X		
69	BH019 - 3.00-	Sep 12, 2019		Soil	B19-Se250191	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
70	BH019 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se25092	X		
71	BH020 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se25093	X		
72	BH020 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se25094	X		
73	BH020 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se25095	X	X	X
74	BH020 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se25096	X		
75	BH020 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se25097	X		
76	BH020 - 1.25-	Sep 12, 2019		Soil	B19-Se25098	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
77	BH020 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se250 99	X	X	X
78	BH020 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se251 00	X		
79	BH020 - 2.00-2.25M	Sep 12, 2019		Soil	B19-Se251 01	X		
80	BH020 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se251 02	X		
81	BH020 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se251 03	X	X	X
82	BH020 - 2.75-3.00M	Sep 12, 2019		Soil	B19-Se251 04	X		
83	BH020 - 3.00-	Sep 12, 2019		Soil	B19-Se251 05	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
84	BH020 - 3.25-3.5M	Sep 12, 2019		Soil	B19-Se25106	X	X	X
Test Counts						84	22	22

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	101			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	91			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se25024	CP	pH Units	4.5	4.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se25024	CP	mol H+/t	39	40	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se25024	CP	% pyrite S	0.060	0.060	1.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se25024	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se25024	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se25024	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se25024	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se25024	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se25024	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se25024	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se25024	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se25024	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se25024	CP	% S	0.06	0.06	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se25024	CP	mol H+/t	39	40	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se25024	CP	kg CaCO3/t	2.9	3.0	1.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25029	CP	pH Units	7.8	7.8	pass	30%	Pass	
Reaction Ratings*	B19-Se25029	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25039	CP	pH Units	6.3	6.4	pass	30%	Pass	
Reaction Ratings*	B19-Se25039	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25049	CP	pH Units	8.1	8.1	pass	30%	Pass	
Reaction Ratings*	B19-Se25049	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25059	CP	pH Units	8.1	8.0	pass	30%	Pass	
Reaction Ratings*	B19-Se25059	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se25061	CP	%	28	35	21	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se25065	CP	pH Units	5.0	5.0	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se25065	CP	mol H+/t	22	23	4.2	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se25065	CP	% pyrite S	0.030	0.040	4.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se25065	CP	% S	< 0.005	< 0.005	<1	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
Chromium Reducible Sulfur -acidity units	B19-Se25065	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se25065	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se25065	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se25065	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se25065	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se25065	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se25065	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se25065	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se25065	CP	% S	0.03	0.04	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se25065	CP	mol H+/t	22	23	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se25065	CP	kg CaCO3/t	1.6	1.7	4.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25069	CP	pH Units	7.1	7.1	pass	30%	Pass	
Reaction Ratings*	B19-Se25069	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25079	CP	pH Units	5.8	5.9	pass	30%	Pass	
Reaction Ratings*	B19-Se25079	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25089	CP	pH Units	7.6	7.5	pass	30%	Pass	
Reaction Ratings*	B19-Se25089	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se25099	CP	pH Units	7.3	7.3	pass	30%	Pass	
Reaction Ratings*	B19-Se25099	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se25099	CP	%	35	37	5.0	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **678140-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 19, 2019

Client Sample ID			BH027 - 0.0-0.25M	BH027 - 0.25-0.5M	BH027 - 0.5-0.75M	BH027 - 0.75-1.00M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se31312**	**B19-Se31313**	**B19-Se31314**	**B19-Se31315**
Date Sampled			**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	5.0	5.3	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.5	3.0	3.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.2	-	4.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	98	-	97	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.16	-	0.16	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	-
HCl Extractable Sulfur	0.02	% S	0.04	-	0.02	-
Net Acid soluble sulfur	0.02	% S	0.04	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	17	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.03	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.18	-	0.16	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	110	-	110	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	8.6	-	7.9	-
<2mm Fraction	0.005	g	59	-	57	-
>2mm Fraction	0.005	g	< 0.005	-	25	-
Analysed Material	0.1	%	100	-	70	-
Extraneous Material	0.1	%	< 0.1	-	30	-
% Moisture	1	%	17	-	21	-

Client Sample ID			BH027 - 1.00-1.25M	BH027 - 1.25-1.5M	BH027 - 1.5-1.75M	BH027 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31316	B19-Se31317	B19-Se31318	B19-Se31319
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.7	4.6	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.4	3.6	3.4
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH027 - 2.0-2.25M	BH027 - 2.25-2.5M	BH027 - 2.5-2.75M	BH027 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31320	B19-Se31321	B19-Se31322	B19-Se31323
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.9	5.0	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	4.0	4.0	3.7
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.0	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	15	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.04	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.08	-	-	-
Net Acid soluble sulfur	0.02	% S	0.04	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	21	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.03	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.06	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	36	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.7	-	-	-
<2mm Fraction	0.005	g	160	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	25	-	-	-

Client Sample ID			BH028 - 0.0-0.25M	BH028 - 0.25-0.5M	BH028 - 0.5-0.75M	BH028 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31324	B19-Se31325	B19-Se31326	B19-Se31327
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.3	4.9	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.3	3.2	3.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	71
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.11
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.02
Net Acid soluble sulfur	0.02	% S	-	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.11
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	79
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	5.9
<2mm Fraction	0.005	g	-	-	-	77
>2mm Fraction	0.005	g	-	-	-	24
Analysed Material	0.1	%	-	-	-	77
Extraneous Material	0.1	%	-	-	-	23
% Moisture	1	%	-	-	-	14

Client Sample ID			BH028 - 1.00-1.25M	BH028 - 1.25-1.5M	BH028 - 1.5-1.75M	BH028 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31328	B19-Se31329	B19-Se31330	B19-Se31331
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.7	4.8	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.7	3.8	3.7
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	3.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	11	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.020	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH028 - 1.00-1.25M	BH028 - 1.25-1.5M	BH028 - 1.5-1.75M	BH028 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31328	B19-Se31329	B19-Se31330	B19-Se31331
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	11	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	22	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.7	-
<2mm Fraction	0.005	g	-	-	130	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	21	-

Client Sample ID			BH028 - 2.0-2.25M	BH028 - 2.25-2.5M	BH028 - 2.5-2.75M	BH028 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31332	B19-Se31333	B19-Se31334	B19-Se31335
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	5.0	5.1	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.1	4.5	4.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	29
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.050
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.03
Net Acid soluble sulfur	0.02	% S	-	-	-	0.03
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	15
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.07
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	43

Client Sample ID			BH028 - 2.0-2.25M	BH028 - 2.25-2.5M	BH028 - 2.5-2.75M	BH028 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31332	B19-Se31333	B19-Se31334	B19-Se31335
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.3
<2mm Fraction	0.005	g	-	-	-	110
>2mm Fraction	0.005	g	-	-	-	56
Analysed Material	0.1	%	-	-	-	66
Extraneous Material	0.1	%	-	-	-	34
% Moisture	1	%	-	-	-	19

Client Sample ID			BH029 - 0.0-0.25M	BH029 - 0.25-0.5M	BH029 - 0.5-0.75M	BH029 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31336	B19-Se31337	B19-Se31338	B19-Se31339
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.1	4.7	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.8	3.7	3.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	110	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.18	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.03	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.06	-	-
Net Acid soluble sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	13	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.20	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	120	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	9.3	-	-
<2mm Fraction	0.005	g	-	33	-	-
>2mm Fraction	0.005	g	-	6.5	-	-
Analysed Material	0.1	%	-	84	-	-
Extraneous Material	0.1	%	-	16	-	-
% Moisture	1	%	-	25	-	-

Client Sample ID			BH029 - 1.00-1.25M	BH029 - 1.25-1.5M	BH029 - 1.5-1.75M	BH029 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31340	B19-Se31341	B19-Se31342	B19-Se31343
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.7	4.8	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.0	3.8	4.4
Reaction Ratings*[S05]		comment	4.0	1.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	52	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.080	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.05	-	-
Net Acid soluble sulfur	0.02	% S	-	0.05	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	22	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.04	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.12	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	74	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	5.6	-	-
<2mm Fraction	0.005	g	-	69	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	25	-	-

Client Sample ID			BH029 - 2.0-2.25M	BH029 - 2.25-2.5M	BH029 - 2.5-2.75M	BH029 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31344	B19-Se31345	B19-Se31346	B19-Se31347
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	5.1	6.1	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.5	5.8	4.9
Reaction Ratings*[S05]		comment	4.0	1.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	24	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.040	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH029 - 2.0-2.25M	BH029 - 2.25-2.5M	BH029 - 2.5-2.75M	BH029 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31344	B19-Se31345	B19-Se31346	B19-Se31347
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	13	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	37	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.7	-	-
<2mm Fraction	0.005	g	-	90	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	27	-	-

Client Sample ID			BH030 - 0.0-0.25M	BH030 - 0.25-0.5M	BH030 - 0.5-0.75M	BH030 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31348	B19-Se31349	B19-Se31350	B19-Se31351
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	4.9	4.4	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.5	3.9	3.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	24
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	0.03
Net Acid soluble sulfur	0.02	% S	-	-	-	0.03
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	15
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.06
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	39

Client Sample ID			BH030 - 0.0-0.25M	BH030 - 0.25-0.5M	BH030 - 0.5-0.75M	BH030 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31348	B19-Se31349	B19-Se31350	B19-Se31351
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	2.9
<2mm Fraction	0.005	g	-	-	-	57
>2mm Fraction	0.005	g	-	-	-	29
Analysed Material	0.1	%	-	-	-	66
Extraneous Material	0.1	%	-	-	-	34
% Moisture	1	%	-	-	-	29

Client Sample ID			BH030 - 1.0-1.25M	BH030 - 1.25-1.5M	BH030 - 1.5-1.75M	BH030 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31352	B19-Se31353	B19-Se31354	B19-Se31355
Date Sampled			Sep 12, 2019	Sep 12, 2019	Sep 12, 2019	Sep 12, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.5	4.5	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.6	3.3	3.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	3.9	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	23	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.040	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	15	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	39	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.9	-	-
<2mm Fraction	0.005	g	-	72	-	-
>2mm Fraction	0.005	g	-	1.3	-	-
Analysed Material	0.1	%	-	98	-	-
Extraneous Material	0.1	%	-	1.8	-	-
% Moisture	1	%	-	27	-	-

Client Sample ID			BH030 - 2.0-2.25M	BH030 - 2.25-2.5M	BH030 - 2.5-2.75M	BH030 - 2.75-3.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se31356**	**B19-Se31357**	**B19-Se31358**	**B19-Se31359**
Date Sampled			**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**	**Sep 12, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.6	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.9	3.7	3.7
Reaction Ratings*[S05]		comment	1.0	2.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	91	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.15	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.03	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.05	-	-
Net Acid soluble sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	13	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.17	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	100	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	7.8	-	-
<2mm Fraction	0.005	g	-	48	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	25	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 20, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 24, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 20, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Address: 40A Glen Vista Place
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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 678140
Phone: 07 5478 9642
Fax:

Received: Sep 19, 2019 9:00 AM
Due: Sep 26, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH027 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se313112	X	X	X
2	BH027 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se313113	X		
3	BH027 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se313114	X	X	X
4	BH027 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se313115	X		
5	BH027 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se313116	X		
6	BH027 - 1.25-	Sep 12, 2019		Soil	B19-Se313117	X		

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Site # 23736

Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 678140
Phone: 07 5478 9642
Fax:

Received: Sep 19, 2019 9:00 AM
Due: Sep 26, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH027 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se313118	X		
8	BH027 - 1.75-2.00M	Sep 12, 2019		Soil	B19-Se313119	X		
9	BH027 - 2.0-2.25M	Sep 12, 2019		Soil	B19-Se313120	X	X	X
10	BH027 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se313121	X		
11	BH027 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se313122	X		
12	BH027 - 2.75-3.0M	Sep 12, 2019		Soil	B19-Se313123	X		
13	BH028 - 0.0-	Sep 12, 2019		Soil	B19-Se313124	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25M							
14	BH028 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se313125	X		
15	BH028 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se313126	X		
16	BH028 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se313127	X	X	X
17	BH028 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se313128	X		
18	BH028 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se313129	X		
19	BH028 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se313130	X	X	X
20	BH028 - 1.75-	Sep 12, 2019		Soil	B19-Se313131	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.0M							
21	BH028 - 2.0-2.25M	Sep 12, 2019		Soil	B19-Se31332	X		
22	BH028 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se31333	X		
23	BH028 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se31334	X		
24	BH028 - 2.75-3.0M	Sep 12, 2019		Soil	B19-Se31335	X	X	X
25	BH029 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se31336	X		
26	BH029 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se31337	X	X	X
27	BH029 - 0.5-	Sep 12, 2019		Soil	B19-Se31338	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
28	BH029 - 0.75-1.00M	Sep 12, 2019		Soil	B19-Se31339	X		
29	BH029 - 1.00-1.25M	Sep 12, 2019		Soil	B19-Se31340	X		
30	BH029 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se31341	X	X	X
31	BH029 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se31342	X		
32	BH029 - 1.75-2.0M	Sep 12, 2019		Soil	B19-Se31343	X		
33	BH029 - 2.0-2.25M	Sep 12, 2019		Soil	B19-Se31344	X		
34	BH029 - 2.25-	Sep 12, 2019		Soil	B19-Se31345	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.5M							
35	BH029 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se31346	X		
36	BH029 - 2.75-3.0M	Sep 12, 2019		Soil	B19-Se31347	X		
37	BH030 - 0.0-0.25M	Sep 12, 2019		Soil	B19-Se31348	X		
38	BH030 - 0.25-0.5M	Sep 12, 2019		Soil	B19-Se31349	X		
39	BH030 - 0.5-0.75M	Sep 12, 2019		Soil	B19-Se31350	X		
40	BH030 - 0.75-1.0M	Sep 12, 2019		Soil	B19-Se31351	X	X	X
41	BH030 - 1.0-	Sep 12, 2019		Soil	B19-Se31352	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
42	BH030 - 1.25-1.5M	Sep 12, 2019		Soil	B19-Se31353	X	X	X
43	BH030 - 1.5-1.75M	Sep 12, 2019		Soil	B19-Se31354	X		
44	BH030 - 1.75-2.0M	Sep 12, 2019		Soil	B19-Se31355	X		
45	BH030 - 2.0-2.25M	Sep 12, 2019		Soil	B19-Se31356	X		
46	BH030 - 2.25-2.5M	Sep 12, 2019		Soil	B19-Se31357	X	X	X
47	BH030 - 2.5-2.75M	Sep 12, 2019		Soil	B19-Se31358	X		
48	BH030 - 2.75-	Sep 12, 2019		Soil	B19-Se31359	X		

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Company Name:	Tectonic Geotechnical Pty Ltd	**Order No.:**		**Received:**	Sep 19, 2019 9:00 AM
Address:	40A Glen Vista Place Chevalum Qld 4555	**Report #:** **Phone:** **Fax:**	678140 07 5478 9642	**Due:** **Priority:** **Contact Name:**	Sep 26, 2019 5 Day Mark Thomson
Project Name:	MIBA - NORTH HARBOUR				
Project ID:	19210				

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail	Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271			
Sydney Laboratory - NATA Site # 18217			
Brisbane Laboratory - NATA Site # 20794	X	X	X
Perth Laboratory - NATA Site # 23736			
3.0M			
Test Counts	48	12	12

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	98			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31312	CP	pH Units	5.0	5.0	pass	30%	Pass	
Reaction Ratings*	B19-Se31312	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	M19-Se29049	NCP	pH Units	9.4	9.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	M19-Se29049	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	M19-Se29049	NCP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	M19-Se29049	NCP	% S	0.019	0.018	6.0	30%	Pass	
Chromium Reducible Sulfur -acidity units	M19-Se29049	NCP	mol H+/t	12	11	6.0	30%	Pass	
Sulfur - KCl Extractable	M19-Se29049	NCP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur	M19-Se29049	NCP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	M19-Se29049	NCP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	M19-Se29049	NCP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	M19-Se29049	NCP	% CaCO3	42	42	<1	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	M19-Se29049	NCP	% S	13	13	<1	30%	Pass	
ANC Fineness Factor	M19-Se29049	NCP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	M19-Se29049	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	M19-Se29049	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	M19-Se29049	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31322	CP	pH Units	5.0	4.9	pass	30%	Pass	
Reaction Ratings*	B19-Se31322	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se31327	CP	%	14	14	2.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31332	CP	pH Units	4.7	4.9	pass	30%	Pass	
Reaction Ratings*	B19-Se31332	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31336	CP	pH Units	5.2	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se31336	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31346	CP	pH Units	6.1	6.0	pass	30%	Pass	
Reaction Ratings*	B19-Se31346	CP	comment	4.0	4.0	pass	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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Accreditation Number 1261
Site Number 20794

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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **678154-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 19, 2019

Client Sample ID			**BH031 - 0.0-0.25M**	**BH031 - 0.25-0.5M**	**BH031 - 0.5-0.75M**	**BH031 - 0.75-1.00M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se31510**	**B19-Se31511**	**B19-Se31512**	**B19-Se31513**
Date Sampled			**Sep 13, 2019**	**Sep 13, 2019**	**Sep 13, 2019**	**Sep 13, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.6	5.3	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.4	3.8	3.7
Reaction Ratings*[S05]		comment	4.0	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	170	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.27	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.036	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	22	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	13	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.32	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	200	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	15	-	-	-
<2mm Fraction	0.005	g	86	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	35	-	-	-

Client Sample ID			BH031 - 1.00-1.25M	BH031 - 1.25-1.5M	BH031 - 1.5-1.75M	BH031 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31514	B19-Se31515	B19-Se31516	B19-Se31517
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.2	5.2	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.7	4.0	4.2
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.1	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	88	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.14	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.04	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.02	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.14	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	88	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	6.6	-	-	-
<2mm Fraction	0.005	g	55	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	28	-	-	-

Client Sample ID			BH031 - 2.0-2.25M	BH031 - 2.25-2.5M	BH031 - 2.5-2.75M	BH031 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31518	B19-Se31519	B19-Se31520	B19-Se31521
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.3	5.5	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.3	4.6	4.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.1	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	80	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.13	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH031 - 2.0-2.25M	BH031 - 2.25-2.5M	BH031 - 2.5-2.75M	BH031 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31518	B19-Se31519	B19-Se31520	B19-Se31521
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	0.05	-	-	-
Net Acid soluble sulfur	0.02	% S	0.05	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	23	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.04	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.17	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	100	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	7.7	-	-	-
<2mm Fraction	0.005	g	55	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	22	-	-	-

Client Sample ID			BH032 - 0.0-0.25M	BH032 - 0.25-0.5M	BH032 - 0.5-0.75M	BH032 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31522	B19-Se31523	B19-Se31524	B19-Se31525
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	6.6	6.5	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	4.4	5.7	6.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.7	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	25	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.040	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	25	-	-

Client Sample ID			BH032 - 0.0-0.25M	BH032 - 0.25-0.5M	BH032 - 0.5-0.75M	BH032 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31522	B19-Se31523	B19-Se31524	B19-Se31525
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.9	-	-
<2mm Fraction	0.005	g	-	95	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	14	-	-

Client Sample ID			BH032 - 1.00-1.25M	BH032 - 1.25-1.5M	BH032 - 1.5-1.75M	BH032 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31526	B19-Se31527	B19-Se31528	B19-Se31529
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.0	7.3	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.3	6.5	6.6	6.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.8	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	6.3	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	80	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	15	-	-

Client Sample ID			BH032 - 2.0-2.25M	BH032 - 2.25-2.5M	BH032 - 2.5-2.75M	BH032 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31530	B19-Se31531	B19-Se31532	B19-Se31533
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	7.5	7.4	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	8.3	8.2	8.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.3
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	91
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	14

Client Sample ID			BH033 - 0.0-0.25M	BH033 - 0.25-0.5M	BH033 - 0.5-0.75M	BH033 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31534	B19-Se31535	B19-Se31536	B19-Se31537
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.8	6.1	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.7	4.7	4.6
Reaction Ratings*[S05]		comment	4.0	3.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	19
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.030
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH033 - 0.0-0.25M	BH033 - 0.25-0.5M	BH033 - 0.5-0.75M	BH033 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31534	B19-Se31535	B19-Se31536	B19-Se31537
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.03
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	19
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.4
<2mm Fraction	0.005	g	-	-	-	89
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	23

Client Sample ID			BH033 - 1.0-1.25M	BH033 - 1.25-1.5M	BH033 - 1.5-1.75M	BH033 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31538	B19-Se31539	B19-Se31540	B19-Se31541
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.4	5.2	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.4	4.3	4.3
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	13
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	13

Client Sample ID			BH033 - 1.0-1.25M	BH033 - 1.25-1.5M	BH033 - 1.5-1.75M	BH033 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31538	B19-Se31539	B19-Se31540	B19-Se31541
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	100
>2mm Fraction	0.005	g	-	-	-	5.1
Analysed Material	0.1	%	-	-	-	95
Extraneous Material	0.1	%	-	-	-	4.8
% Moisture	1	%	-	-	-	9.5

Client Sample ID			BH033 - 2.0-2.25M	BH033 - 2.25-2.5M	BH033 - 2.5-2.75M	BH033 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31542	B19-Se31543	B19-Se31544	B19-Se31545
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.1	5.2	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.4	4.8	4.6
Reaction Ratings*[S05]		comment	2.0	4.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.4	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	22	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.04	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	32	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	2.4	-
<2mm Fraction	0.005	g	-	-	92	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	19	-

Client Sample ID			BH034 - 0.0-0.25M	BH034 - 0.25-0.5M	BH034 - 0.5-0.75M	BH034 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31546	B19-Se31547	B19-Se31548	B19-Se31549
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.4	7.1	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	4.6	5.9	7.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.8	4.8	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	33	32	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.050	0.050	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	-	-
HCl Extractable Sulfur	0.02	% S	n/a	n/a	-	-
Net Acid soluble sulfur	0.02	% S	n/a	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	n/a	-	-
ANC Fineness Factor		factor	1.5	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.05	0.05	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	33	32	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.4	2.4	-	-
<2mm Fraction	0.005	g	76	53	-	-
>2mm Fraction	0.005	g	< 0.005	< 0.005	-	-
Analysed Material	0.1	%	100	100	-	-
Extraneous Material	0.1	%	< 0.1	< 0.1	-	-
% Moisture	1	%	13	17	-	-

Client Sample ID			BH034 - 1.00-1.25M	BH034 - 1.25-1.5M	BH034 - 1.5-1.75M	BH034 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31550	B19-Se31551	B19-Se31552	B19-Se31553
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	7.8	7.9	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.8	7.7	7.0	6.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.8	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	6.2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH034 - 1.00-1.25M	BH034 - 1.25-1.5M	BH034 - 1.5-1.75M	BH034 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31550	B19-Se31551	B19-Se31552	B19-Se31553
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	50	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	24	-	-

Client Sample ID			BH034 - 2.0-2.25M	BH034 - 2.25-2.5M	BH034 - 2.5-2.75M	BH034 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31554	B19-Se31555	B19-Se31556	B19-Se31557
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.0	7.9	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	7.8	8.2	7.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH035 - 0.0-0.25M	BH035 - 0.25-0.5M	BH035 - 0.5-0.75M	BH035 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31558	B19-Se31559	B19-Se31560	B19-Se31561
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	5.9	5.5	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.6	4.1	4.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.3	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	95	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.15	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-

Client Sample ID			BH035 - 0.0-0.25M	BH035 - 0.25-0.5M	BH035 - 0.5-0.75M	BH035 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31558	B19-Se31559	B19-Se31560	B19-Se31561
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.15	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	95	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	7.2	-	-	-
<2mm Fraction	0.005	g	39	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	18	-	-	-

Client Sample ID			BH035 - 1.00-1.25M	BH035 - 1.25-1.5M	BH035 - 1.5-1.75M	BH035 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31562	B19-Se31563	B19-Se31564	B19-Se31565
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.5	5.9	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	4.5	4.7	4.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	36	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.060	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.04	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.08	-	-
Net Acid soluble sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	16	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.03	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.08	-	-

Client Sample ID			BH035 - 1.00-1.25M	BH035 - 1.25-1.5M	BH035 - 1.5-1.75M	BH035 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31562	B19-Se31563	B19-Se31564	B19-Se31565
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	52	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.9	-	-
<2mm Fraction	0.005	g	-	83	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	25	-	-

Client Sample ID			BH035 - 2.0-2.25M	BH035 - 2.25-2.5M	BH035 - 2.5-2.75M	BH035 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31566	B19-Se31567	B19-Se31568	B19-Se31569
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.2	6.2	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	5.2	5.3	5.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.0	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	13	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.020	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	13	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	84	-	-
>2mm Fraction	0.005	g	-	2.8	-	-
Analysed Material	0.1	%	-	97	-	-
Extraneous Material	0.1	%	-	3.2	-	-
% Moisture	1	%	-	16	-	-

Client Sample ID			BH036 - 0.0-0.25M	BH036 - 0.25-0.5M	BH036 - 0.5-0.75M	BH036 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31570	B19-Se31571	B19-Se31572	B19-Se31573
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.8	5.6	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	4.2	4.4	5.1
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.7	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	50	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.080	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.08	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	50	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	3.8	-	-	-
<2mm Fraction	0.005	g	26	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	15	-	-	-

Client Sample ID			BH036 - 1.00-1.25M	BH036 - 1.25-1.5M	BH036 - 1.5-1.75M	BH036 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31574	B19-Se31575	B19-Se31576	B19-Se31577
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.5	4.5	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	3.9	3.9	4.0
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.4	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	34	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.050	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH036 - 1.00-1.25M	BH036 - 1.25-1.5M	BH036 - 1.5-1.75M	BH036 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31574	B19-Se31575	B19-Se31576	B19-Se31577
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.05	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	34	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.6	-	-	-
<2mm Fraction	0.005	g	72	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	15	-	-	-

Client Sample ID			BH036 - 2.0-2.25M	BH036 - 2.25-2.5M	BH036 - 2.5-2.75M	BH036 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31578	B19-Se31579	B19-Se31580	B19-Se31581
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.7	4.8	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	4.1	4.3	4.3
Reaction Ratings*[S05]		comment	4.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	53	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.090	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.09	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	63	-	-

Client Sample ID			BH036 - 2.0-2.25M	BH036 - 2.25-2.5M	BH036 - 2.5-2.75M	BH036 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31578	B19-Se31579	B19-Se31580	B19-Se31581
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	4.8	-	-
<2mm Fraction	0.005	g	-	88	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	11	-	-

Client Sample ID			BH018 - 0.0-0.25M	BH018 - 0.25-0.5M	BH018 - 0.5-0.75M	BH018 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31733	B19-Se31734	B19-Se31735	B19-Se31736
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.6	7.8	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	4.7	7.7	8.4
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	4.9	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	27	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	14	-

Client Sample ID			BH018 - 1.00-1.25M	BH018 - 1.25-1.5M	BH018 - 1.5-1.75M	BH018 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31737	B19-Se31738	B19-Se31739	B19-Se31740
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.6	8.8	8.7	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.6	8.7	8.8	8.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	7.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	< 0.003
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	0.94
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	190
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	0.30
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	51
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	16

Client Sample ID			BH018 - 2.0-2.25M	BH018 - 2.25-2.5M	BH018 - 2.5-2.75M	BH018 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se31741	B19-Se31742	B19-Se31743	B19-Se31744
Date Sampled			Sep 13, 2019	Sep 13, 2019	Sep 13, 2019	Sep 13, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.9	9.0	8.9	8.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.9	9.0	8.9	8.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH018 - 3.00-3.25M	BH018 - 3.25-3.5M
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**B19-Se31745**	**B19-Se31746**
Date Sampled			**Sep 13, 2019**	**Sep 13, 2019**
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	9.0	8.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	9.2	9.0
Reaction Ratings*[S05]		comment	4.0	4.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 23, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 24, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 20, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 678154
Phone: 07 5478 9642
Fax:

Received: Sep 19, 2019 9:00 AM
Due: Sep 26, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH031 - 0.0-0.25M	Sep 13, 2019		Soil	B19-Se31510	X	X	X
2	BH031 - 0.25-0.5M	Sep 13, 2019		Soil	B19-Se31511	X		
3	BH031 - 0.5-0.75M	Sep 13, 2019		Soil	B19-Se31512	X		
4	BH031 - 0.75-1.00M	Sep 13, 2019		Soil	B19-Se31513	X		
5	BH031 - 1.00-1.25M	Sep 13, 2019		Soil	B19-Se31514	X	X	X
6	BH031 - 1.25-	Sep 13, 2019		Soil	B19-Se31515	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH031 - 1.5-1.75M	Sep 13, 2019		Soil	B19-Se315516	X		
8	BH031 - 1.75-2.0M	Sep 13, 2019		Soil	B19-Se315517	X		
9	BH031 - 2.0-2.25M	Sep 13, 2019		Soil	B19-Se315518	X	X	X
10	BH031 - 2.25-2.5M	Sep 13, 2019		Soil	B19-Se315519	X		
11	BH031 - 2.5-2.75M	Sep 13, 2019		Soil	B19-Se315520	X		
12	BH031 - 2.75-3.00M	Sep 13, 2019		Soil	B19-Se315521	X		
13	BH032 - 0.0-	Sep 13, 2019		Soil	B19-Se315522	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25M							
14	BH032 - 0.25-0.5M	Sep 13, 2019		Soil	B19-Se31523	X	X	X
15	BH032 - 0.5-0.75M	Sep 13, 2019		Soil	B19-Se31524	X		
16	BH032 - 0.75-1.00M	Sep 13, 2019		Soil	B19-Se31525	X		
17	BH032 - 1.00-1.25M	Sep 13, 2019		Soil	B19-Se31526	X		
18	BH032 - 1.25-1.5M	Sep 13, 2019		Soil	B19-Se31527	X	X	X
19	BH032 - 1.5-1.75M	Sep 13, 2019		Soil	B19-Se31528	X		
20	BH032 - 1.75-	Sep 13, 2019		Soil	B19-Se31529	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.0M							
21	BH032 - 2.0-2.25M	Sep 13, 2019		Soil	B19-Se31530	X		
22	BH032 - 2.25-2.5M	Sep 13, 2019		Soil	B19-Se31531	X		
23	BH032 - 2.5-2.75M	Sep 13, 2019		Soil	B19-Se31532	X		
24	BH032 - 2.75-3.00M	Sep 13, 2019		Soil	B19-Se31533	X	X	X
25	BH033 - 0.0-0.25M	Sep 13, 2019		Soil	B19-Se31534	X		
26	BH033 - 0.25-0.5M	Sep 13, 2019		Soil	B19-Se31535	X		
27	BH033 - 0.5-	Sep 13, 2019		Soil	B19-Se31536	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
28	BH033 - 0.75-1.0M	Sep 13, 2019		Soil	B19-Se31537	X	X	X
29	BH033 - 1.0-1.25M	Sep 13, 2019		Soil	B19-Se31538	X		
30	BH033 - 1.25-1.5M	Sep 13, 2019		Soil	B19-Se31539	X		
31	BH033 - 1.5-1.75M	Sep 13, 2019		Soil	B19-Se31540	X		
32	BH033 - 1.75-2.0M	Sep 13, 2019		Soil	B19-Se31541	X	X	X
33	BH033 - 2.0-2.25M	Sep 13, 2019		Soil	B19-Se31542	X		
34	BH033 - 2.25-	Sep 13, 2019		Soil	B19-Se31543	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.5M							
35	BH033 - 2.5-2.75M	Sep 13, 2019		Soil	B19-Se31544	X	X	X
36	BH033 - 2.75-3.00M	Sep 13, 2019		Soil	B19-Se31545	X		
37	BH034 - 0.0-0.25M	Sep 13, 2019		Soil	B19-Se31546	X	X	X
38	BH034 - 0.25-0.5M	Sep 13, 2019		Soil	B19-Se31547	X	X	X
39	BH034 - 0.5-0.75M	Sep 13, 2019		Soil	B19-Se31548	X		
40	BH034 - 0.75-1.00M	Sep 13, 2019		Soil	B19-Se31549	X		
41	BH034 - 1.00-	Sep 13, 2019		Soil	B19-Se31550	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
42	BH034 - 1.25-1.5M	Sep 13, 2019		Soil	B19-Se31551	X	X	X
43	BH034 - 1.5-1.75M	Sep 13, 2019		Soil	B19-Se31552	X		
44	BH034 - 1.75-2.0M	Sep 13, 2019		Soil	B19-Se31553	X		
45	BH034 - 2.0-2.25M	Sep 13, 2019		Soil	B19-Se31554	X		
46	BH034 - 2.25-2.5M	Sep 13, 2019		Soil	B19-Se31555	X		
47	BH034 - 2.5-2.75M	Sep 13, 2019		Soil	B19-Se31556	X		
48	BH034 - 2.75-	Sep 13, 2019		Soil	B19-Se31557	X		

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 678154
Phone: 07 5478 9642
Fax:

Received: Sep 19, 2019 9:00 AM
Due: Sep 26, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.0M							
49	BH035 - 0.0-0.25M	Sep 13, 2019		Soil	B19-Se31558	X	X	X
50	BH035 - 0.25-0.5M	Sep 13, 2019		Soil	B19-Se31559	X		
51	BH035 - 0.5-0.75M	Sep 13, 2019		Soil	B19-Se31560	X		
52	BH035 - 0.75-1.00M	Sep 13, 2019		Soil	B19-Se31561	X		
53	BH035 - 1.00-1.25M	Sep 13, 2019		Soil	B19-Se31562	X		
54	BH035 - 1.25-1.5M	Sep 13, 2019		Soil	B19-Se31563	X	X	X
55	BH035 - 1.5-	Sep 13, 2019		Soil	B19-Se31564	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.75M							
56	BH035 - 1.75-2.0M	Sep 13, 2019		Soil	B19-Se31565	X		
57	BH035 - 2.0-2.25M	Sep 13, 2019		Soil	B19-Se31566	X		
58	BH035 - 2.25-2.5M	Sep 13, 2019		Soil	B19-Se31567	X	X	X
59	BH035 - 2.5-2.75M	Sep 13, 2019		Soil	B19-Se31568	X		
60	BH035 - 2.75-3.0M	Sep 13, 2019		Soil	B19-Se31569	X		
61	BH036 - 0.0-0.25M	Sep 13, 2019		Soil	B19-Se31570	X	X	X
62	BH036 - 0.25-	Sep 13, 2019		Soil	B19-Se31571	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.5M							
63	BH036 - 0.5-0.75M	Sep 13, 2019		Soil	B19-Se31572	X		
64	BH036 - 0.75-1.00M	Sep 13, 2019		Soil	B19-Se31573	X		
65	BH036 - 1.00-1.25M	Sep 13, 2019		Soil	B19-Se31574	X	X	X
66	BH036 - 1.25-1.5M	Sep 13, 2019		Soil	B19-Se31575	X		
67	BH036 - 1.5-1.75M	Sep 13, 2019		Soil	B19-Se31576	X		
68	BH036 - 1.75-2.00M	Sep 13, 2019		Soil	B19-Se31577	X		
69	BH036 - 2.0-	Sep 13, 2019		Soil	B19-Se31578	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.25M							
70	BH036 - 2.25-2.5M	Sep 13, 2019		Soil	B19-Se31579	X	X	X
71	BH036 - 2.5-2.75M	Sep 13, 2019		Soil	B19-Se31580	X		
72	BH036 - 2.75-3.00M	Sep 13, 2019		Soil	B19-Se31581	X		
73	BH018 - 0.0-0.25M	Sep 13, 2019		Soil	B19-Se31733	X		
74	BH018 - 0.25-0.5M	Sep 13, 2019		Soil	B19-Se31734	X		
75	BH018 - 0.5-0.75M	Sep 13, 2019		Soil	B19-Se31735	X	X	X
76	BH018 - 0.75-	Sep 13, 2019		Soil	B19-Se31736	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.00M							
77	BH018 - 1.00-1.25M	Sep 13, 2019		Soil	B19-Se31737	X		
78	BH018 - 1.25-1.5M	Sep 13, 2019		Soil	B19-Se31738	X		
79	BH018 - 1.5-1.75M	Sep 13, 2019		Soil	B19-Se31739	X		
80	BH018 - 1.75-2.0M	Sep 13, 2019		Soil	B19-Se31740	X	X	X
81	BH018 - 2.0-2.25M	Sep 13, 2019		Soil	B19-Se31741	X		
82	BH018 - 2.25-2.5M	Sep 13, 2019		Soil	B19-Se31742	X		
83	BH018 - 2.5-	Sep 13, 2019		Soil	B19-Se31743	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.75M							
84	BH018 - 2.75-3.00M	Sep 13, 2019		Soil	B19-Se31744	X		
85	BH018 - 3.00-3.25M	Sep 13, 2019		Soil	B19-Se31745	X		
86	BH018 - 3.25-3.5M	Sep 13, 2019		Soil	B19-Se31746	X		
Test Counts						86	20	20

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	100			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	97			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se31510	CP	pH Units	4.2	4.2	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se31510	CP	mol H+/t	170	170	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se31510	CP	% pyrite S	0.27	0.27	1.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se31510	CP	% S	0.036	0.040	11	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se31510	CP	mol H+/t	22	25	11	30%	Pass	
Sulfur - KCl Extractable	B19-Se31510	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se31510	CP	% S	0.03	0.03	2.0	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se31510	CP	mol H+/t	13	13	2.0	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se31510	CP	% S	0.02	0.02	2.0	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se31510	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se31510	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se31510	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se31510	CP	% S	0.32	0.33	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se31510	CP	mol H+/t	200	200	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se31510	CP	kg CaCO3/t	15	15	2.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31512	CP	pH Units	5.3	5.4	pass	30%	Pass	
Reaction Ratings*	B19-Se31512	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se31514	CP	%	28	27	1.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31522	CP	pH Units	6.6	6.5	pass	30%	Pass	
Reaction Ratings*	B19-Se31522	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31532	CP	pH Units	7.4	7.5	pass	30%	Pass	
Reaction Ratings*	B19-Se31532	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se31541	CP	pH Units	5.0	5.0	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se31541	CP	mol H+/t	13	12	5.1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se31541	CP	% pyrite S	0.020	0.020	5.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se31541	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se31541	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se31541	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
ANC Fineness Factor	B19-Se31541	CP	factor	1.5	1.5	<1	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity (Sulfur Units)	B19-Se31541	CP	% S	0.02	0.02	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se31541	CP	mol H+/t	13	12	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se31541	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31542	CP	pH Units	5.1	5.1	pass	30%	Pass	
Reaction Ratings*	B19-Se31542	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se31551	CP	pH Units	5.8	5.8	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se31551	CP	mol H+/t	6.2	5.8	7.6	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se31551	CP	% pyrite S	0.010	0.010	8.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se31551	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se31551	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se31551	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se31551	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se31551	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se31551	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se31551	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se31551	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se31551	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se31551	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se31551	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	B19-Se31551	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31562	CP	pH Units	5.5	5.5	pass	30%	Pass	
Reaction Ratings*	B19-Se31562	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31572	CP	pH Units	5.6	5.6	pass	30%	Pass	
Reaction Ratings*	B19-Se31572	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31733	CP	pH Units	6.0	6.2	pass	30%	Pass	
Reaction Ratings*	B19-Se31733	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se31743	CP	pH Units	8.9	8.9	pass	30%	Pass	
Reaction Ratings*	B19-Se31743	CP	comment	4.0	4.0	pass	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **679492-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 27, 2019

Client Sample ID			**BH037 - 0.0-0.25M**	**BH037 - 0.25-0.5M**	**BH037 - 0.5-0.75M**	**BH037 - 0.75-1.00M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se41486**	**B19-Se41487**	**B19-Se41488**	**B19-Se41489**
Date Sampled			**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	5.9	5.5	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.9	4.0	3.9
Reaction Ratings*[S05]		comment	4.0	3.0	3.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	41	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.070	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.07	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	41	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	3.1	-
<2mm Fraction	0.005	g	-	-	40	-
>2mm Fraction	0.005	g	-	-	0.28	-
Analysed Material	0.1	%	-	-	99	-
Extraneous Material	0.1	%	-	-	0.7	-
% Moisture	1	%	-	-	11	-

Client Sample ID			BH037 - 1.00-1.25M	BH037 - 1.25-1.5M	BH037 - 1.5-1.75M	BH037 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41490	B19-Se41491	B19-Se41492	B19-Se41493
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	4.8	5.3	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.9	4.3	4.4
Reaction Ratings*[S05]		comment	1.0	2.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	45	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.070	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.07	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	45	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	3.3	-
<2mm Fraction	0.005	g	-	-	56	-
>2mm Fraction	0.005	g	-	-	0.55	-
Analysed Material	0.1	%	-	-	99	-
Extraneous Material	0.1	%	-	-	1.0	-
% Moisture	1	%	-	-	13	-

Client Sample ID			BH037 - 2.0-2.25M	BH037 - 2.25-2.5M	BH037 - 2.5-2.75M	BH037 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41494	B19-Se41495	B19-Se41496	B19-Se41497
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.2	5.2	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.3	4.5	4.4
Reaction Ratings*[S05]		comment	2.0	1.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	72	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.12	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH037 - 2.0-2.25M	BH037 - 2.25-2.5M	BH037 - 2.5-2.75M	BH037 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41494	B19-Se41495	B19-Se41496	B19-Se41497
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.12	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	72	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	5.4	-
<2mm Fraction	0.005	g	-	-	52	-
>2mm Fraction	0.005	g	-	-	0.74	-
Analysed Material	0.1	%	-	-	99	-
Extraneous Material	0.1	%	-	-	1.4	-
% Moisture	1	%	-	-	13	-

Client Sample ID			BH038 - 0.0-0.25M	BH038 - 0.25-0.5M	BH038 - 0.5-0.75M	BH038 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41498	B19-Se41499	B19-Se41500	B19-Se41501
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.7	4.9	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	4.0	4.1	3.9
Reaction Ratings*[S05]		comment	3.0	3.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	46	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.070	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	46	-	-

Client Sample ID			BH038 - 0.0-0.25M	BH038 - 0.25-0.5M	BH038 - 0.5-0.75M	BH038 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41498	B19-Se41499	B19-Se41500	B19-Se41501
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.5	-	-
<2mm Fraction	0.005	g	-	60	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	12	-	-

Client Sample ID			BH038 - 1.0-1.25M	BH038 - 1.25-1.5M	BH038 - 1.5-1.75M	BH038 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41502	B19-Se41503	B19-Se41504	B19-Se41505
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.6	4.8	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.7	3.9	4.0
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	47	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.070	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.05	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.11	-	-
Net Acid soluble sulfur	0.02	% S	-	0.06	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	27	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.04	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.12	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	74	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	5.6	-	-
<2mm Fraction	0.005	g	-	37	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	17	-	-

Client Sample ID			BH038 - 2.0-2.25M	BH038 - 2.25-2.5M	BH038 - 2.5-2.75M	BH038 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41506	B19-Se41507	B19-Se41508	B19-Se41509
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	5.0	5.0	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.6	4.3	4.7
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	28	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.04	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	28	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	2.1	-
<2mm Fraction	0.005	g	-	-	60	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	13	-

Client Sample ID			BH039 - 0.0-0.25M	BH039 - 0.25-0.5M	BH039 - 0.5-0.75M	BH039 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41510	B19-Se41511	B19-Se41512	B19-Se41513
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	6.3	5.7	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	4.1	4.4	4.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	43	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.070	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH039 - 0.0-0.25M	BH039 - 0.25-0.5M	BH039 - 0.5-0.75M	BH039 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41510	B19-Se41511	B19-Se41512	B19-Se41513
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	43	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.2	-	-
<2mm Fraction	0.005	g	-	79	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	20	-	-

Client Sample ID			BH039 - 1.00-1.25M	BH039 - 1.25-1.5M	BH039 - 1.5-1.75M	BH039 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41514	B19-Se41515	B19-Se41516	B19-Se41517
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.0	5.1	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6	4.6	4.5	4.4
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.2	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	49	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.080	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.07	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.15	-	-
Net Acid soluble sulfur	0.02	% S	-	0.08	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	38	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.06	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.14	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	87	-	-

Client Sample ID			BH039 - 1.00-1.25M	BH039 - 1.25-1.5M	BH039 - 1.5-1.75M	BH039 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41514	B19-Se41515	B19-Se41516	B19-Se41517
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	6.5	-	-
<2mm Fraction	0.005	g	-	91	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	20	-	-

Client Sample ID			BH039 - 2.0-2.25M	BH039 - 2.25-2.5M	BH039 - 2.5-2.75M	BH039 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41518	B19-Se41519	B19-Se41520	B19-Se41521
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.5	5.5	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.4	4.3	4.3
Reaction Ratings*[S05]		comment	4.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.5	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	17	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.03	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.03	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	17	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.3	-	-	-
<2mm Fraction	0.005	g	140	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	17	-	-	-

Client Sample ID			BH040 - 0.0-0.25M	BH040 - 0.25-0.5M	BH040 - 0.5-0.75M	BH040 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41522	B19-Se41523	B19-Se41524	B19-Se41525
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.8	7.5	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	4.3	5.7	6.0
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	7.7	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	63	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	10	-	-

Client Sample ID			BH040 - 1.00-1.25M	BH040 - 1.25-1.5M	BH040 - 1.5-1.75M	BH040 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41526	B19-Se41527	B19-Se41528	B19-Se41529
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	8.0	8.4	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.8	6.4	8.8	7.7
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH040 - 1.00-1.25M	BH040 - 1.25-1.5M	BH040 - 1.5-1.75M	BH040 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41526	B19-Se41527	B19-Se41528	B19-Se41529
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	91	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	19	-	-

Client Sample ID			BH040 - 2.0-2.25M	BH040 - 2.25-2.5M	BH040 - 2.5-2.75M	BH040 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41530	B19-Se41531	B19-Se41532	B19-Se41533
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	9.1	8.8	8.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	9.4	9.4	9.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	8.7	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	5.0	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	990	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	1.6	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-

Client Sample ID			BH040 - 2.0-2.25M	BH040 - 2.25-2.5M	BH040 - 2.5-2.75M	BH040 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41530	B19-Se41531	B19-Se41532	B19-Se41533
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	46	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	15	-	-

Client Sample ID			BH040 - 3.0-3.25M	BH040 - 3.25-3.5M	BH042 - 0.0-0.25M	BH042 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41534	B19-Se41535	B19-Se41536	B19-Se41537
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	9.0	8.9	5.7	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	9.6	3.1	4.6
Reaction Ratings*[S05]		comment	4.0	4.0	3.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	22	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.030	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.03	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	22	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.6	-
<2mm Fraction	0.005	g	-	-	22	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	11	-

Client Sample ID			BH042 - 0.5-0.75M	BH042 - 0.75-1.0M	BH042 - 1.0-1.25M	BH042 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41538	B19-Se41539	B19-Se41540	B19-Se41541
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	6.5	7.3	7.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	4.9	7.5	6.5
Reaction Ratings*[S05]		comment	4.0	2.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.1	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	2.9	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	52	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	15	-

Client Sample ID			BH042 - 1.5-1.75M	BH042 - 1.75-2.0M	BH042 - 2.0-2.25M	BH042 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41542	B19-Se41543	B19-Se41544	B19-Se41545
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.5	7.4	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.2	8.5	8.4
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH042 - 1.5-1.75M	BH042 - 1.75-2.0M	BH042 - 2.0-2.25M	BH042 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41542	B19-Se41543	B19-Se41544	B19-Se41545
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	36	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	17	-

Client Sample ID			BH042 - 2.5-2.75M	BH042 - 2.75-3.0M	BH042 - 3.0-3.25M	BH042 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41546	B19-Se41547	B19-Se41548	B19-Se41549
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	7.8	8.1	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	8.1	8.1	7.8
Reaction Ratings*[S05]		comment	2.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-

Client Sample ID			BH042 - 2.5-2.75M	BH042 - 2.75-3.0M	BH042 - 3.0-3.25M	BH042 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41546	B19-Se41547	B19-Se41548	B19-Se41549
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	50	-
>2mm Fraction	0.005	g	-	-	2.0	-
Analysed Material	0.1	%	-	-	96	-
Extraneous Material	0.1	%	-	-	3.8	-
% Moisture	1	%	-	-	13	-

Client Sample ID			BH043 - 0.0-0.25M	BH043 - 0.25-0.5M	BH043 - 0.5-0.75M	BH043 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41550	B19-Se41551	B19-Se41552	B19-Se41553
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	6.5	6.3	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.2	4.7	6.1
Reaction Ratings*[S05]		comment	4.0	4.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	20
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.030
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.03
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	20
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.5
<2mm Fraction	0.005	g	-	-	-	49
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	18

Client Sample ID			BH043 - 1.0-1.25M	BH043 - 1.25-1.5M	BH043 - 1.5-1.75M	BH043 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41554	B19-Se41555	B19-Se41556	B19-Se41557
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.8	7.6	7.4	7.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	7.1	7.1	8.3
Reaction Ratings*[S05]		comment	2.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	7.3
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	60
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	17

Client Sample ID			BH043 - 2.0-2.25M	BH043 - 2.25-2.5M	BH043 - 2.5-2.75M	BH043 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41558	B19-Se41559	B19-Se41560	B19-Se41561
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	8.1	8.2	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.5	8.3	8.4	7.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	< 0.003
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH043 - 2.0-2.25M	BH043 - 2.25-2.5M	BH043 - 2.5-2.75M	BH043 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41558	B19-Se41559	B19-Se41560	B19-Se41561
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	65
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	21

Client Sample ID			BH043 - 3.0-3.25M	BH043 - 3.25-3.5M	BH044 - 0.0-0.25M	BH044 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41562	B19-Se41563	B19-Se41564	B19-Se41565
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.3	6.5	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	7.6	3.6	4.4
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	26	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.04	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	26	-

Client Sample ID			BH043 - 3.0-3.25M	BH043 - 3.25-3.5M	BH044 - 0.0-0.25M	BH044 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41562	B19-Se41563	B19-Se41564	B19-Se41565
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	2.0	-
<2mm Fraction	0.005	g	-	-	70	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	10	-

Client Sample ID			BH044 - 0.5-0.75M	BH044 - 0.75-1.0M	BH044 - 1.0-1.25M	BH044 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41566	B19-Se41567	B19-Se41568	B19-Se41569
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.8	7.8	7.9	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.9	7.1	6.9	7.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	100	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	18	-	-

Client Sample ID			BH044 - 1.5-1.75M	BH044 - 1.75-2.0M	BH044 - 2.0-2.25M	BH044 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41570	B19-Se41571	B19-Se41572	B19-Se41573
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.1	8.4	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	8.0	8.1	7.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	59	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	17	-	-

Client Sample ID			BH044 - 2.5-2.75M	BH044 - 2.75-3.0M	BH044 - 3.0-3.25M	BH044 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se41574	B19-Se41575	B19-Se41576	B19-Se41577
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.4	8.2	8.5	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.1	7.3	7.1
Reaction Ratings*[S05]		comment	4.0	4.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH044 - 2.5-2.75M	BH044 - 2.75-3.0M	BH044 - 3.0-3.25M	BH044 - 3.25-3.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se41574**	**B19-Se41575**	**B19-Se41576**	**B19-Se41577**
Date Sampled			**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	94	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	18	-	-

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Oct 01, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Oct 01, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 27, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Site # 23736

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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679492
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH037 - 0.0-0.25M	Sep 23, 2019		Soil	B19-Se41486	X		
2	BH037 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41487	X		
3	BH037 - 0.5-0.75M	Sep 23, 2019		Soil	B19-Se41488	X	X	X
4	BH037 - 0.75-1.00M	Sep 23, 2019		Soil	B19-Se41489	X		
5	BH037 - 1.00-1.25M	Sep 23, 2019		Soil	B19-Se41490	X		
6	BH037 - 1.25-	Sep 23, 2019		Soil	B19-Se41491	X		

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679492
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH037 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se41492	X	X	X
8	BH037 - 1.75-2.0M	Sep 23, 2019		Soil	B19-Se41493	X		
9	BH037 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se41494	X		
10	BH037 - 2.25-2.5M	Sep 23, 2019		Soil	B19-Se41495	X		
11	BH037 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41496	X	X	X
12	BH037 - 2.75-3.00M	Sep 23, 2019		Soil	B19-Se41497	X		
13	BH038 - 0.0-	Sep 23, 2019		Soil	B19-Se41498	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25M							
14	BH038 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41499	X	X	X
15	BH038 - 0.5-0.75M	Sep 23, 2019		Soil	B19-Se41500	X		
16	BH038 - 0.75-1.0M	Sep 23, 2019		Soil	B19-Se41501	X		
17	BH038 - 1.0-1.25M	Sep 23, 2019		Soil	B19-Se41502	X		
18	BH038 - 1.25-1.5M	Sep 23, 2019		Soil	B19-Se41503	X	X	X
19	BH038 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se41504	X		
20	BH038 - 1.75-	Sep 23, 2019		Soil	B19-Se41505	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.0M							
21	BH038 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se41506	X		
22	BH038 - 2.25-2.5M	Sep 23, 2019		Soil	B19-Se41507	X		
23	BH038 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41508	X	X	X
24	BH038 - 2.75-3.0M	Sep 23, 2019		Soil	B19-Se41509	X		
25	BH039 - 0.0-0.25M	Sep 23, 2019		Soil	B19-Se41510	X		
26	BH039 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41511	X	X	X
27	BH039 - 0.5-	Sep 23, 2019		Soil	B19-Se41512	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
28	BH039 - 0.75-1.00M	Sep 23, 2019		Soil	B19-Se415513	X		
29	BH039 - 1.00-1.25M	Sep 23, 2019		Soil	B19-Se415514	X		
30	BH039 - 1.25-1.5M	Sep 23, 2019		Soil	B19-Se415515	X	X	X
31	BH039 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se415516	X		
32	BH039 - 1.75-2.0M	Sep 23, 2019		Soil	B19-Se415517	X		
33	BH039 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se415518	X	X	X
34	BH039 - 2.25-	Sep 23, 2019		Soil	B19-Se415519	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.5M							
35	BH039 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41520	X		
36	BH039 - 2.75-3.00M	Sep 23, 2019		Soil	B19-Se41521	X		
37	BH040 - 0.0-0.25M	Sep 23, 2019		Soil	B19-Se41522	X		
38	BH040 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41523	X	X	X
39	BH040 - 0.5-0.75M	Sep 23, 2019		Soil	B19-Se41524	X		
40	BH040 - 0.75-1.00M	Sep 23, 2019		Soil	B19-Se41525	X		
41	BH040 - 1.00-	Sep 23, 2019		Soil	B19-Se41526	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
42	BH040 - 1.25-1.5M	Sep 23, 2019		Soil	B19-Se41527	X	X	X
43	BH040 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se41528	X		
44	BH040 - 1.75-2.0M	Sep 23, 2019		Soil	B19-Se41529	X		
45	BH040 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se41530	X		
46	BH040 - 2.25-2.5M	Sep 23, 2019		Soil	B19-Se41531	X	X	X
47	BH040 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41532	X		
48	BH040 - 2.75-	Sep 23, 2019		Soil	B19-Se41533	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.0M							
49	BH040 - 3.0-3.25M	Sep 23, 2019		Soil	B19-Se41534	X		
50	BH040 - 3.25-3.5M	Sep 23, 2019		Soil	B19-Se41535	X		
51	BH042 - 0.0-0.25M	Sep 23, 2019		Soil	B19-Se41536	X	X	X
52	BH042 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41537	X		
53	BH042 - 0.5-0.75M	Sep 23, 2019		Soil	B19-Se41538	X		
54	BH042 - 0.75-1.0M	Sep 23, 2019		Soil	B19-Se41539	X		
55	BH042 - 1.0-	Sep 23, 2019		Soil	B19-Se41540	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
56	BH042 - 1.25-1.5M	Sep 23, 2019		Soil	B19-Se41541	X		
57	BH042 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se41542	X		
58	BH042 - 1.75-2.0M	Sep 23, 2019		Soil	B19-Se41543	X		
59	BH042 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se41544	X	X	X
60	BH042 - 2.25-2.5M	Sep 23, 2019		Soil	B19-Se41545	X		
61	BH042 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41546	X		
62	BH042 - 2.75-	Sep 23, 2019		Soil	B19-Se41547	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.0M							
63	BH042 - 3.0-3.25M	Sep 23, 2019		Soil	B19-Se41548	X	X	X
64	BH042 - 3.25-3.5M	Sep 23, 2019		Soil	B19-Se41549	X		
65	BH043 - 0.0-0.25M	Sep 23, 2019		Soil	B19-Se41550	X		
66	BH043 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41551	X		
67	BH043 - 0.5-0.75M	Sep 23, 2019		Soil	B19-Se41552	X		
68	BH043 - 0.75-1.0M	Sep 23, 2019		Soil	B19-Se41553	X	X	X
69	BH043 - 1.0-	Sep 23, 2019		Soil	B19-Se41554	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
70	BH043 - 1.25-1.5M	Sep 23, 2019		Soil	B19-Se41555	X		
71	BH043 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se41556	X		
72	BH043 - 1.75-2.0M	Sep 23, 2019		Soil	B19-Se41557	X	X	X
73	BH043 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se41558	X		
74	BH043 - 2.25-2.5M	Sep 23, 2019		Soil	B19-Se41559	X		
75	BH043 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41560	X		
76	BH043 - 2.75-	Sep 23, 2019		Soil	B19-Se41561	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.0M							
77	BH043 - 3.0-3.25M	Sep 23, 2019		Soil	B19-Se41562	X		
78	BH043 - 3.25-3.5M	Sep 23, 2019		Soil	B19-Se41563	X		
79	BH044 - 0.0-0.25M	Sep 23, 2019		Soil	B19-Se41564	X	X	X
80	BH044 - 0.25-0.5M	Sep 23, 2019		Soil	B19-Se41565	X		
81	BH044 - 0.5-0.75M	Sep 23, 2019		Soil	B19-Se41566	X		
82	BH044 - 0.75-1.0M	Sep 23, 2019		Soil	B19-Se41567	X	X	X
83	BH044 - 1.0-	Sep 23, 2019		Soil	B19-Se41568	X		

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679492
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
84	BH044 - 1.25-1.5M	Sep 23, 2019		Soil	B19-Se41569	X		
85	BH044 - 1.5-1.75M	Sep 23, 2019		Soil	B19-Se41570	X		
86	BH044 - 1.75-2.0M	Sep 23, 2019		Soil	B19-Se41571	X	X	X
87	BH044 - 2.0-2.25M	Sep 23, 2019		Soil	B19-Se41572	X		
88	BH044 - 2.25-2.5M	Sep 23, 2019		Soil	B19-Se41573	X		
89	BH044 - 2.5-2.75M	Sep 23, 2019		Soil	B19-Se41574	X		
90	BH044 - 2.75-	Sep 23, 2019		Soil	B19-Se41575	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.0M							
91	BH044 - 3.0-3.25M	Sep 23, 2019		Soil	B19-Se41576	X		
92	BH044 - 3.25-3.5M	Sep 23, 2019		Soil	B19-Se41577	X		
Test Counts						92	23	23

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	99			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se42800	NCP	%	20	16	19	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41489	CP	pH Units	5.1	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se41489	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41499	CP	pH Units	5.7	5.6	pass	30%	Pass	
Reaction Ratings*	B19-Se41499	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41509	CP	pH Units	5.1	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se41509	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se41518	CP	pH Units	4.5	4.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se41518	CP	mol H+/t	17	16	3.6	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se41518	CP	% pyrite S	0.030	0.030	4.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se41518	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se41518	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se41518	CP	% S	0.03	0.03	4.0	30%	Pass	
Net Acid soluble sulfur	B19-Se41518	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se41518	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se41518	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se41518	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se41518	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se41518	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se41518	CP	% S	0.03	0.03	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se41518	CP	mol H+/t	17	16	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se41518	CP	kg CaCO3/t	1.3	1.2	4.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41519	CP	pH Units	5.5	5.4	pass	30%	Pass	
Reaction Ratings*	B19-Se41519	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41539	CP	pH Units	6.5	6.3	pass	30%	Pass	
Reaction Ratings*	B19-Se41539	CP	comment	2.0	2.0	pass	30%	Pass	

Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41549	CP	pH Units	8.2	8.0	pass	30%	Pass	
Reaction Ratings*	B19-Se41549	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41559	CP	pH Units	8.1	8.0	pass	30%	Pass	
Reaction Ratings*	B19-Se41559	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41561	CP	pH Units	8.5	8.4	pass	30%	Pass	
Reaction Ratings*	B19-Se41561	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se41561	CP	pH Units	6.5	6.5	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se41561	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se41561	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	B19-Se41561	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se41561	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se41561	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se41561	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se41561	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se41561	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se41561	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se41561	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se41561	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se41561	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se41561	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	B19-Se41561	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41562	CP	pH Units	8.3	8.3	pass	30%	Pass	
Reaction Ratings*	B19-Se41562	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41563	CP	pH Units	8.3	8.2	pass	30%	Pass	
Reaction Ratings*	B19-Se41563	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41564	CP	pH Units	6.5	6.5	pass	30%	Pass	
Reaction Ratings*	B19-Se41564	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41575	CP	pH Units	8.2	8.3	pass	30%	Pass	
Reaction Ratings*	B19-Se41575	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se41577	CP	pH Units	8.5	8.6	pass	30%	Pass	
Reaction Ratings*	B19-Se41577	CP	comment	1.0	1.0	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
Sample correctly preserved	No
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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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Tectonic Geotechnical Pty Ltd
40A Glen Vista Place
Chevalum
Qld 4555

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **679662-S**
Project name MIBA- NORTH HARBOUR
Project ID 19210
Received Date Sep 27, 2019

Client Sample ID			**BH46_0.0-0.25M**	**BH46_0.25-0.5M**	**BH46_0.5-0.75M**	**BH46_0.75-1.00M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se42991**	**B19-Se42992**	**B19-Se42993**	**B19-Se42994**
Date Sampled			**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	-	6.6	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	-	4.5	4.9
Reaction Ratings*[S05]		comment	2.0	-	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.2	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	14	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.020	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	14	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.1	-	-
<2mm Fraction	0.005	g	-	62	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	9.9	-	-

Client Sample ID			BH46_1.00-1.25M	BH46_1.25-1.5M	BH46_1.5-1.75M	BH46_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42995	B19-Se42996	B19-Se42997	B19-Se42998
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.4	7.4	-	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.1	7.7	-	7.9
Reaction Ratings*[S05]		comment	4.0	4.0	-	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	6.8	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	87	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	15	-

Client Sample ID			BH46_2.0-2.25M	BH46_2.25-2.5M	BH46_2.5-2.75M	BH46_2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42999	B19-Se43000	B19-Se43001	B19-Se43002
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	8.2	8.0	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.0	7.7	7.8	-
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.0
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH46_2.0-2.25M	BH46_2.25-2.5M	BH46_2.5-2.75M	BH46_2.75-3.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se42999**	**B19-Se43000**	**B19-Se43001**	**B19-Se43002**
Date Sampled			**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	86
>2mm Fraction	0.005	g	-	-	-	5.3
Analysed Material	0.1	%	-	-	-	94
Extraneous Material	0.1	%	-	-	-	5.8
% Moisture	1	%	-	-	-	15

Client Sample ID			BH46_3.0-3.25M	BH46_3.25-3.5M	BH47_0.0-0.25M	BH47_0.25-0.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se43003**	**B19-Se43004**	**B19-Se43005**	**B19-Se43006**
Date Sampled			**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**	**Sep 23, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.7	8.8	-	6.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	8.4	-	5.7
Reaction Ratings*[S05]		comment	2.0	4.0	-	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	17	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.030	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.03	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	17	-

Client Sample ID			BH46_3.0-3.25M	BH46_3.25-3.5M	BH47_0.0-0.25M	BH47_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43003	B19-Se43004	B19-Se43005	B19-Se43006
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.3	-
<2mm Fraction	0.005	g	-	-	53	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	11	-

Client Sample ID			BH47_0.5-0.75M	BH47_0.75-1.00M	BH47_1.00-1.25M	BH47_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43007	B19-Se43008	B19-Se43009	B19-Se43010
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.2	7.4	-	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.7	5.8	-	7.9
Reaction Ratings*[S05]		comment	4.0	4.0	-	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.1	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	6.1	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	74	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	19	-

Client Sample ID			BH47_1.5-1.75M	BH47_1.75-2.0M	BH47_2.0-2.25M	BH47_2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43011	B19-Se43012	B19-Se43013	B19-Se43014
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	8.1	-	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.3	8.4	-	8.3
Reaction Ratings*[S05]		comment	4.0	4.0	-	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	6.9	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	82	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	18	-

Client Sample ID			BH47_2.5-2.75M	BH47_2.75-3.0M	BH47_3.0-3.25M	BH47_3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43015	B19-Se43016	B19-Se43017	B19-Se43018
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.7	7.8	7.6	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	8.2	8.2	-
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	6.9
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH47_2.5-2.75M	BH47_2.75-3.0M	BH47_3.0-3.25M	BH47_3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43015	B19-Se43016	B19-Se43017	B19-Se43018
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	79
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	17

Client Sample ID			BH67_0.0-0.25M	BH67_0.25-0.5M	BH67_0.5-0.75M	BH67_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43019	B19-Se43020	B19-Se43021	B19-Se43022
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	4.7	4.9	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.2	3.8	-
Reaction Ratings*[S05]		comment	-	4.0	4.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.9	-	-	3.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	23	-	-	19
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.040	-	-	0.030
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0
HCl Extractable Sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.04	-	-	0.03
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	23	-	-	19

Client Sample ID			BH67_0.0-0.25M	BH67_0.25-0.5M	BH67_0.5-0.75M	BH67_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43019	B19-Se43020	B19-Se43021	B19-Se43022
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.7	-	-	1.4
<2mm Fraction	0.005	g	73	-	-	130
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	6.9	-	-	22

Client Sample ID			BH67_1.00-1.25M	BH67_1.25-1.5M	BH67_1.5-1.75M	BH67_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43023	B19-Se43024	B19-Se43025	B19-Se43026
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.5	5.7	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	4.7	4.9	4.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH68_0.0-0.25M	BH68_0.25-0.5M	BH68_0.5-0.75M	BH68_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43027	B19-Se43028	B19-Se43029	B19-Se43030
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	-	5.1	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	-	4.6	4.4
Reaction Ratings*[S05]		comment	4.0	-	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	49	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.080	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.03	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.08	-	-

Client Sample ID			BH68_0.0-0.25M	BH68_0.25-0.5M	BH68_0.5-0.75M	BH68_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43027	B19-Se43028	B19-Se43029	B19-Se43030
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	49	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.7	-	-
<2mm Fraction	0.005	g	-	72	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	12	-	-

Client Sample ID			BH68_1.00-1.25M	BH68_1.25-1.5M	BH68_1.5-1.75M	BH68_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43031	B19-Se43032	B19-Se43033	B19-Se43034
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	-	5.5	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	-	4.7	4.9
Reaction Ratings*[S05]		comment	4.0	-	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	22	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.030	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.06	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.03	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	22	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.6	-	-
<2mm Fraction	0.005	g	-	98	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	25	-	-

Client Sample ID			BH69_0.0-0.25M	BH69_0.25-0.5M	BH69_0.5-0.75M	BH69_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43035	B19-Se43036	B19-Se43037	B19-Se43038
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.9	5.0	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	4.4	4.3	-
Reaction Ratings*[S05]		comment	-	4.0	2.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.5	-	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	51	-	-	42
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.080	-	-	0.070
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	0.07
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0
HCl Extractable Sulfur	0.02	% S	n/a	-	-	0.14
Net Acid soluble sulfur	0.02	% S	n/a	-	-	0.07
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	34
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	0.05
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.08	-	-	0.12
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	51	-	-	76
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	3.8	-	-	5.7
<2mm Fraction	0.005	g	59	-	-	100
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	16	-	-	17

Client Sample ID			BH69_1.00-1.25M	BH69_1.25-1.5M	BH69_1.5-1.75M	BH69_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43039	B19-Se43040	B19-Se43041	B19-Se43042
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	5.0	5.2	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.2	4.0	4.3
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0

Client Sample ID			BH76_0.0-0.25M	BH76_0.25-0.5M	BH76_0.5-0.75M	BH76_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43043	B19-Se43044	B19-Se43045	B19-Se43046
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	-	5.7	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	-	5.0	4.8
Reaction Ratings*[S05]		comment	3.0	-	1.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	14	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.020	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	14	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.1	-	-
<2mm Fraction	0.005	g	-	51	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	6.8	-	-

Client Sample ID			BH76_1.00-1.25M	BH76_1.25-1.5M	BH76_1.5-1.75M	BH76_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43047	B19-Se43048	B19-Se43049	B19-Se43050
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	-	6.0	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	-	5.0	5.0
Reaction Ratings*[S05]		comment	2.0	-	1.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	15	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.020	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH76_1.00-1.25M	BH76_1.25-1.5M	BH76_1.5-1.75M	BH76_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43047	B19-Se43048	B19-Se43049	B19-Se43050
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	15	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.2	-	-
<2mm Fraction	0.005	g	-	69	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	16	-	-

Client Sample ID			BH77_0.0-0.25M	BH77_0.25-0.5M	BH77_0.5-0.75M	BH77_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43051	B19-Se43052	B19-Se43053	B19-Se43054
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.8	-	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.2	-	4.2
Reaction Ratings*[S05]		comment	4.0	4.0	-	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	34	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.050	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.05	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	34	-

Client Sample ID			BH77_0.0-0.25M	BH77_0.25-0.5M	BH77_0.5-0.75M	BH77_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43051	B19-Se43052	B19-Se43053	B19-Se43054
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	2.6	-
<2mm Fraction	0.005	g	-	-	72	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	15	-

Client Sample ID			BH77_1.00-1.25M	BH77_1.25-1.5M	BH77_1.5-1.75M	BH77_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43055	B19-Se43056	B19-Se43057	B19-Se43058
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.5	5.8	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.5	4.8	-
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	11
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	11
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	65
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	20

Client Sample ID			BH78_0.0-0.25M	BH78_0.25-0.5M	BH78_0.5-0.75M	BH78_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43059	B19-Se43060	B19-Se43061	B19-Se43062
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.0	-	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.8	-	3.9
Reaction Ratings*[S05]		comment	-	2.0	-	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.3	-	4.1	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	77	-	70	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.12	-	0.11	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	0.03	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	0.03	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	13	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.12	-	0.13	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	77	-	83	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	5.7	-	6.2	-
<2mm Fraction	0.005	g	48	-	88	-
>2mm Fraction	0.005	g	< 0.005	-	< 0.005	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	1	%	16	-	21	-

Client Sample ID			BH78_1.00-1.25M	BH78_1.25-1.5M	BH78_1.5-1.75M	BH78_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se43063	B19-Se43064	B19-Se43065	B19-Se43066
Date Sampled			Sep 23, 2019	Sep 23, 2019	Sep 23, 2019	Sep 23, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.7	4.9	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.0	4.4	4.5
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	2.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 30, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 30, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 30, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Address: 40A Glen Vista Place
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Project Name: MIBA- NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679662
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH46_0.0-0.25M	Sep 23, 2019		Soil	B19-Se42991	X		
2	BH46_0.25-0.5M	Sep 23, 2019		Soil	B19-Se42992		X	X
3	BH46_0.5-0.75M	Sep 23, 2019		Soil	B19-Se42993	X		
4	BH46_0.75-1.00M	Sep 23, 2019		Soil	B19-Se42994	X		
5	BH46_1.00-1.25M	Sep 23, 2019		Soil	B19-Se42995	X		
6	BH46_1.25-	Sep 23, 2019		Soil	B19-Se42996	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH46_1.5-1.75M	Sep 23, 2019		Soil	B19-Se42997		X	X
8	BH46_1.75-2.0M	Sep 23, 2019		Soil	B19-Se42998	X		
9	BH46_2.0-2.25M	Sep 23, 2019		Soil	B19-Se42999	X		
10	BH46_2.25-2.5M	Sep 23, 2019		Soil	B19-Se43000	X		
11	BH46_2.5-2.75M	Sep 23, 2019		Soil	B19-Se43001	X		
12	BH46_2.75-3.0M	Sep 23, 2019		Soil	B19-Se43002		X	X
13	BH46_3.0-	Sep 23, 2019		Soil	B19-Se43003	X		

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Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
14	BH46_3.25-3.5M	Sep 23, 2019		Soil	B19-Se43004	X		
15	BH47_0.0-0.25M	Sep 23, 2019		Soil	B19-Se43005		X	X
16	BH47_0.25-0.5M	Sep 23, 2019		Soil	B19-Se43006	X		
17	BH47_0.5-0.75M	Sep 23, 2019		Soil	B19-Se43007	X		
18	BH47_0.75-1.00M	Sep 23, 2019		Soil	B19-Se43008	X		
19	BH47_1.00-1.25M	Sep 23, 2019		Soil	B19-Se43009		X	X
20	BH47_1.25-	Sep 23, 2019		Soil	B19-Se43010	X		

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA- NORTH HARBOUR
Project ID: 19210

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
21	BH47_1.5-1.75M	Sep 23, 2019		Soil	B19-Se430111	X		
22	BH47_1.75-2.0M	Sep 23, 2019		Soil	B19-Se430112	X		
23	BH47_2.0-2.25M	Sep 23, 2019		Soil	B19-Se430113		X	X
24	BH47_2.25-2.5M	Sep 23, 2019		Soil	B19-Se430114	X		
25	BH47_2.5-2.75M	Sep 23, 2019		Soil	B19-Se430115	X		
26	BH47_2.75-3.0M	Sep 23, 2019		Soil	B19-Se430116	X		
27	BH47_3.0-	Sep 23, 2019		Soil	B19-Se430117	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
28	BH47_3.25-3.5M	Sep 23, 2019		Soil	B19-Se430 18		X	X
29	BH67_0.0-0.25M	Sep 23, 2019		Soil	B19-Se430 19		X	X
30	BH67_0.25-0.5M	Sep 23, 2019		Soil	B19-Se430 20	X		
31	BH67_0.5-0.75M	Sep 23, 2019		Soil	B19-Se430 21	X		
32	BH67_0.75-1.00M	Sep 23, 2019		Soil	B19-Se430 22		X	X
33	BH67_1.00-1.25M	Sep 23, 2019		Soil	B19-Se430 23	X		
34	BH67_1.25-	Sep 23, 2019		Soil	B19-Se430 24	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
35	BH67_1.5-1.75M	Sep 23, 2019		Soil	B19-Se430325	X		
36	BH67_1.75-2.0M	Sep 23, 2019		Soil	B19-Se430326	X		
37	BH68_0.0-0.25M	Sep 23, 2019		Soil	B19-Se430327	X		
38	BH68_0.25-0.5M	Sep 23, 2019		Soil	B19-Se430328		X	X
39	BH68_0.5-0.75M	Sep 23, 2019		Soil	B19-Se430329	X		
40	BH68_0.75-1.00M	Sep 23, 2019		Soil	B19-Se430330	X		
41	BH68_1.00-	Sep 23, 2019		Soil	B19-Se430331	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
42	BH68_1.25-1.5M	Sep 23, 2019		Soil	B19-Se430332		X	X
43	BH68_1.5-1.75M	Sep 23, 2019		Soil	B19-Se430333	X		
44	BH68_1.75-2.0M	Sep 23, 2019		Soil	B19-Se430334	X		
45	BH69_0.0-0.25M	Sep 23, 2019		Soil	B19-Se430335		X	X
46	BH69_0.25-0.5M	Sep 23, 2019		Soil	B19-Se430336	X		
47	BH69_0.5-0.75M	Sep 23, 2019		Soil	B19-Se430337	X		
48	BH69_0.75-	Sep 23, 2019		Soil	B19-Se430338		X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.00M							
49	BH69_1.00-1.25M	Sep 23, 2019		Soil	B19-Se43039	X		
50	BH69_1.25-1.5M	Sep 23, 2019		Soil	B19-Se43040	X		
51	BH69_1.5-1.75M	Sep 23, 2019		Soil	B19-Se43041	X		
52	BH69_1.75-2.0M	Sep 23, 2019		Soil	B19-Se43042	X		
53	BH76_0.0-0.25M	Sep 23, 2019		Soil	B19-Se43043	X		
54	BH76_0.25-0.5M	Sep 23, 2019		Soil	B19-Se43044		X	X
55	BH76_0.5-	Sep 23, 2019		Soil	B19-Se43045	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
56	BH76_0.75-1.00M	Sep 23, 2019		Soil	B19-Se43046	X		
57	BH76_1.00-1.25M	Sep 23, 2019		Soil	B19-Se43047	X		
58	BH76_1.25-1.5M	Sep 23, 2019		Soil	B19-Se43048		X	X
59	BH76_1.5-1.75M	Sep 23, 2019		Soil	B19-Se43049	X		
60	BH76_1.75-2.0M	Sep 23, 2019		Soil	B19-Se43050	X		
61	BH77_0.0-0.25M	Sep 23, 2019		Soil	B19-Se43051	X		
62	BH77_0.25-	Sep 23, 2019		Soil	B19-Se43052	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.5M							
63	BH77_0.5-0.75M	Sep 23, 2019		Soil	B19-Se43053		X	X
64	BH77_0.75-1.00M	Sep 23, 2019		Soil	B19-Se43054	X		
65	BH77_1.00-1.25M	Sep 23, 2019		Soil	B19-Se43055	X		
66	BH77_1.25-1.5M	Sep 23, 2019		Soil	B19-Se43056	X		
67	BH77_1.5-1.75M	Sep 23, 2019		Soil	B19-Se43057	X		
68	BH77_1.75-2.0M	Sep 23, 2019		Soil	B19-Se43058		X	X
69	BH78_0.0-	Sep 23, 2019		Soil	B19-Se43059		X	X

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25M							
70	BH78_0.25-0.5M	Sep 23, 2019		Soil	B19-Se43060	X		
71	BH78_0.5-0.75M	Sep 23, 2019		Soil	B19-Se43061		X	X
72	BH78_0.75-1.00M	Sep 23, 2019		Soil	B19-Se43062	X		
73	BH78_1.00-1.25M	Sep 23, 2019		Soil	B19-Se43063	X		
74	BH78_1.25-1.5M	Sep 23, 2019		Soil	B19-Se43064	X		
75	BH78_1.5-1.75M	Sep 23, 2019		Soil	B19-Se43065	X		
76	BH78_1.75-	Sep 23, 2019		Soil	B19-Se43066	X		

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Sydney Laboratory - NATA Site # 18217			
Brisbane Laboratory - NATA Site # 20794	X	X	X
Perth Laboratory - NATA Site # 23736			
2.0M			
Test Counts	57	19	19

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	99			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42998	CP	pH Units	7.9	8.0	pass	30%	Pass	
Reaction Ratings*	B19-Se42998	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se43018	CP	%	17	18	5.0	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se43022	CP	pH Units	3.9	3.9	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se43022	CP	mol H+/t	19	19	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se43022	CP	% pyrite S	0.030	0.030	1.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se43022	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se43022	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se43022	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se43022	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se43022	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se43022	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se43022	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se43022	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se43022	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se43022	CP	% S	0.03	0.03	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se43022	CP	mol H+/t	19	19	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se43022	CP	kg CaCO3/t	1.4	1.4	1.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se43025	CP	pH Units	5.7	5.7	pass	30%	Pass	
Reaction Ratings*	B19-Se43025	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se43032	CP	pH Units	4.6	4.6	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se43032	CP	mol H+/t	22	22	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se43032	CP	% pyrite S	0.030	0.030	<1	30%	Pass	
Chromium Reducible Sulfur	B19-Se43032	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se43032	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se43032	CP	% S	0.06	0.06	3.0	30%	Pass	
Net Acid soluble sulfur	B19-Se43032	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se43032	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se43032	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se43032	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se43032	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se43032	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se43032	CP	% S	0.03	0.03	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se43032	CP	mol H+/t	22	22	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se43032	CP	kg CaCO3/t	1.6	1.6	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se43039	CP	pH Units	4.9	4.8	pass	30%	Pass	
Reaction Ratings*	B19-Se43039	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se43051	CP	pH Units	5.8	5.8	pass	30%	Pass	
Reaction Ratings*	B19-Se43051	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se43058	CP	%	20	18	7.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se43065	CP	pH Units	4.9	5.1	pass	30%	Pass	
Reaction Ratings*	B19-Se43065	CP	comment	2.0	2.0	pass	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **679658-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 27, 2019

Client Sample ID			**BH025_0.0-0.25M**	**BH025_0.25-0.5M**	**BH025_0.5-0.75M**	**BH025_0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se42799**	**B19-Se42800**	**B19-Se42801**	**B19-Se42802**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	-	5.4	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	-	4.0	4.1
Reaction Ratings*[S05]		comment	4.0	-	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	64	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.10	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.10	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	73	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	5.5	-	-
<2mm Fraction	0.005	g	-	89	-	-
>2mm Fraction	0.005	g	-	16	-	-
Analysed Material	0.1	%	-	85	-	-
Extraneous Material	0.1	%	-	15	-	-
% Moisture	1	%	-	20	-	-

Client Sample ID			BH025_1.0-1.25M	BH025_1.25-1.5M	BH025_1.5-1.75M	BH025_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42803	B19-Se42804	B19-Se42805	B19-Se42806
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	-	6.7	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	-	4.1	5.0
Reaction Ratings*[S05]		comment	4.0	-	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	37	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.060	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	18	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.03	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.09	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	56	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	4.2	-	-
<2mm Fraction	0.005	g	-	29	-	-
>2mm Fraction	0.005	g	-	15	-	-
Analysed Material	0.1	%	-	66	-	-
Extraneous Material	0.1	%	-	34	-	-
% Moisture	1	%	-	27	-	-

Client Sample ID			BH026_0.0-0.25M	BH026_0.25-0.5M	BH026_0.5-0.75M	BH026_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42807	B19-Se42808	B19-Se42809	B19-Se42810
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	6.0	5.6	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.0	3.5	3.9
Reaction Ratings*[S05]		comment	-	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.5	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	52	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.080	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-

Client Sample ID			BH026_0.0-0.25M	BH026_0.25-0.5M	BH026_0.5-0.75M	BH026_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42807	B19-Se42808	B19-Se42809	B19-Se42810
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.08	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	52	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	3.9	-	-	-
<2mm Fraction	0.005	g	52	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	14	-	-	-

Client Sample ID			BH026_1.00-1.25M	BH026_1.25-1.5M	BH026_1.5-1.75M	BH026_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42811	B19-Se42812	B19-Se42813	B19-Se42814
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	-	5.3	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	-	3.8	4.1
Reaction Ratings*[S05]		comment	1.0	-	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.0	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	17	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.030	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur	0.02	% S	-	0.03	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	13	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.05	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	30	-	-

Client Sample ID			BH026_1.00-1.25M	BH026_1.25-1.5M	BH026_1.5-1.75M	BH026_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42811	B19-Se42812	B19-Se42813	B19-Se42814
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.2	-	-
<2mm Fraction	0.005	g	-	59	-	-
>2mm Fraction	0.005	g	-	27	-	-
Analysed Material	0.1	%	-	68	-	-
Extraneous Material	0.1	%	-	32	-	-
% Moisture	1	%	-	24	-	-

Client Sample ID			BH041_0.0-0.25M	BH041_0.25-0.5M	BH041_0.5-0.75M	BH041_0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42815	B19-Se42816	B19-Se42817	B19-Se42818
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	6.5	7.1	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	4.0	5.2	5.8
Reaction Ratings*[S05]		comment	-	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.6	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	38	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.060	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.06	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	38	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.9	-	-	-
<2mm Fraction	0.005	g	45	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	9.5	-	-	-

Client Sample ID			BH041_1.00-1.25M	BH041_1.25-1.5M	BH041_1.5-1.75M	BH041_1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42819	B19-Se42820	B19-Se42821	B19-Se42822
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	8.1	8.3	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	7.6	8.0	6.3
Reaction Ratings*[S05]		comment	-	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	6.0	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	6.1	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	53	-	-	-
>2mm Fraction	0.005	g	6.6	-	-	-
Analysed Material	0.1	%	89	-	-	-
Extraneous Material	0.1	%	11	-	-	-
% Moisture	1	%	17	-	-	-

Client Sample ID			BH041_2.0-2.25M	BH041_2.25-2.5M	BH041_2.5-2.75M	BH041_2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42823	B19-Se42824	B19-Se42825	B19-Se42826
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.6	-	8.5	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.4	-	7.1	7.1
Reaction Ratings*[S05]		comment	4.0	-	4.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.2	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.0	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH041_2.0-2.25M	BH041_2.25-2.5M	BH041_2.5-2.75M	BH041_2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42823	B19-Se42824	B19-Se42825	B19-Se42826
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	62	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	18	-	-

Client Sample ID			BH041_3.0-3.25M	BH041_3.25-3.5M	BH063_0.0-0.25M	BH063_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42827	B19-Se42828	B19-Se42829	B19-Se42830
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	-	5.6	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.0	-	2.5	4.2
Reaction Ratings*[S05]		comment	4.0	-	4.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.1	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-

Client Sample ID			BH041_3.0-3.25M	BH041_3.25-3.5M	BH063_0.0-0.25M	BH063_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42827	B19-Se42828	B19-Se42829	B19-Se42830
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	80	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	15	-	-

Client Sample ID			BH063_0.5-0.75M	BH063_0.75-1.0M	BH063_1.0-1.25M	BH063_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42831	B19-Se42832	B19-Se42833	B19-Se42834
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.4	5.6	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	4.7	5.0	5.1
Reaction Ratings*[S05]		comment	-	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.5	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	31	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.050	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.05	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	31	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.4	-	-	-
<2mm Fraction	0.005	g	62	-	-	-
>2mm Fraction	0.005	g	3.6	-	-	-
Analysed Material	0.1	%	94	-	-	-
Extraneous Material	0.1	%	5.5	-	-	-
% Moisture	1	%	12	-	-	-

Client Sample ID			BH063_1.5-1.75M	BH063_1.75-2.0M	BH064_0.0-0.25M	BH064_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42835	B19-Se42836	B19-Se42837	B19-Se42838
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	-	-	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.6	-	-	4.3
Reaction Ratings*[S05]		comment	1.0	-	-	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.7	5.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	20	11	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.030	0.020	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	2.0	-
HCl Extractable Sulfur	0.02	% S	-	n/a	n/a	-
Net Acid soluble sulfur	0.02	% S	-	n/a	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	n/a	-
ANC Fineness Factor		factor	-	1.5	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.03	0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	20	11	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.5	< 1	-
<2mm Fraction	0.005	g	-	36	49	-
>2mm Fraction	0.005	g	-	< 0.005	< 0.005	-
Analysed Material	0.1	%	-	100	100	-
Extraneous Material	0.1	%	-	< 0.1	< 0.1	-
% Moisture	1	%	-	23	5.9	-

Client Sample ID			BH064_0.5-0.75M	BH064_0.75-1.00M	BH064_1.00-1.25M	BH064_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42839	B19-Se42840	B19-Se42841	B19-Se42842
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	-	5.8	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.5	-	4.7	4.6
Reaction Ratings*[S05]		comment	4.0	-	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.2	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	11	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.020	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH064_0.5-0.75M	BH064_0.75-1.00M	BH064_1.00-1.25M	BH064_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42839	B19-Se42840	B19-Se42841	B19-Se42842
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	11	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	84	-	-
>2mm Fraction	0.005	g	-	11	-	-
Analysed Material	0.1	%	-	88	-	-
Extraneous Material	0.1	%	-	12	-	-
% Moisture	1	%	-	12	-	-

Client Sample ID			BH064_1.5-1.75M	BH064_1.75-2.0M	BH065_0.0-0.25M	BH065_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42843	B19-Se42844	B19-Se42845	B19-Se42846
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.9	5.4	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.6	2.6	2.8
Reaction Ratings*[S05]		comment	2.0	1.0	4.0	4.0

Client Sample ID			BH065_0.5-0.75M	BH065_0.75-1.00M	BH065_1.00-1.25M	BH065_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42847	B19-Se42848	B19-Se42849	B19-Se42850
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	-	5.9	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	-	4.7	4.8
Reaction Ratings*[S05]		comment	4.0	-	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	40	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.060	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-

Client Sample ID			BH065_0.5-0.75M	BH065_0.75-1.00M	BH065_1.00-1.25M	BH065_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42847	B19-Se42848	B19-Se42849	B19-Se42850
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.06	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	44	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.3	-	-
<2mm Fraction	0.005	g	-	84	-	-
>2mm Fraction	0.005	g	-	1.2	-	-
Analysed Material	0.1	%	-	99	-	-
Extraneous Material	0.1	%	-	1.4	-	-
% Moisture	1	%	-	14	-	-

Client Sample ID			BH065_1.5-1.75M	BH065_1.75-2.0M	BH066_0.0-0.25M	BH066_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42851	B19-Se42852	B19-Se42853	B19-Se42854
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	-	5.4	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	-	3.9	3.6
Reaction Ratings*[S05]		comment	1.0	-	3.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	33	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.050	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.05	-	-

Client Sample ID			BH065_1.5-1.75M	BH065_1.75-2.0M	BH066_0.0-0.25M	BH066_0.25-0.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se42851**	**B19-Se42852**	**B19-Se42853**	**B19-Se42854**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	43	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.2	-	-
<2mm Fraction	0.005	g	-	40	-	-
>2mm Fraction	0.005	g	-	21	-	-
Analysed Material	0.1	%	-	65	-	-
Extraneous Material	0.1	%	-	35	-	-
% Moisture	1	%	-	18	-	-

Client Sample ID			BH066_0.5-0.75M	BH066_0.75-1.00M	BH066_1.00-1.25M	BH066_1.25-1.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se42855**	**B19-Se42856**	**B19-Se42857**	**B19-Se42858**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.2	5.2	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	3.6	3.7	3.9
Reaction Ratings*[S05]		comment	-	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	130	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.20	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.025	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	16	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	12	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.23	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	150	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	12	-	-	-
<2mm Fraction	0.005	g	35	-	-	-
>2mm Fraction	0.005	g	21	-	-	-
Analysed Material	0.1	%	63	-	-	-
Extraneous Material	0.1	%	37	-	-	-
% Moisture	1	%	29	-	-	-

Client Sample ID			BH066_1.5-1.75M	BH066_1.75-2.0M	BH083_0.0-0.25M	BH083_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42859	B19-Se42860	B19-Se42861	B19-Se42862
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.0	5.7	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	4.1	2.6	-
Reaction Ratings*[S05]		comment	-	1.0	3.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.3	-	-	4.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	44	-	-	98
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.070	-	-	0.16
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	0.02	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0
HCl Extractable Sulfur	0.02	% S	0.04	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	0.02	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	11	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.07	-	-	0.16
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	55	-	-	98
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	4.1	-	-	7.3
<2mm Fraction	0.005	g	100	-	-	85
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	18	-	-	15

Client Sample ID			BH083_0.5-0.75M	BH083_0.75-1.00M	BH083_1.00-1.25M	BH083_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42863	B19-Se42864	B19-Se42865	B19-Se42866
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.9	4.8	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.2	4.3	-
Reaction Ratings*[S05]		comment	2.0	2.0	1.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	88
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.14
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH083_0.5-0.75M	BH083_0.75-1.00M	BH083_1.00-1.25M	BH083_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42863	B19-Se42864	B19-Se42865	B19-Se42866
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	0.05
Net Acid soluble sulfur	0.02	% S	-	-	-	0.05
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	23
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	0.04
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.18
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	110
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	8.3
<2mm Fraction	0.005	g	-	-	-	42
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	23

Client Sample ID			BH083_1.5-1.75M	BH083_1.75-2.0M	BH084_0.0-0.25M	BH084_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42867	B19-Se42868	B19-Se42869	B19-Se42870
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.0	-	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6	4.5	-	4.5
Reaction Ratings*[S05]		comment	1.0	1.0	-	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	46	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.070	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.07	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	46	-

Client Sample ID			BH083_1.5-1.75M	BH083_1.75-2.0M	BH084_0.0-0.25M	BH084_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42867	B19-Se42868	B19-Se42869	B19-Se42870
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	3.5	-
<2mm Fraction	0.005	g	-	-	59	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	8.5	-

Client Sample ID			BH084_0.5-0.75M	BH084_0.75-1.00M	BH084_1.00-1.25M	BH084_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42871	B19-Se42872	B19-Se42873	B19-Se42874
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	-	4.8	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	-	4.4	4.3
Reaction Ratings*[S05]		comment	2.0	-	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.0	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	77	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.12	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.07	-	-
Net Acid soluble sulfur	0.02	% S	-	0.05	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	21	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.03	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.16	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	99	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	7.4	-	-
<2mm Fraction	0.005	g	-	75	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	20	-	-

Client Sample ID			BH084_1.5-1.75M	BH084_1.75-2.0M	BH085_0.0-0.25M	BH085_0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42875	B19-Se42876	B19-Se42877	B19-Se42878
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.8	5.6	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.2	2.8	3.7
Reaction Ratings*[S05]		comment	1.0	1.0	3.0	4.0

Client Sample ID			BH085_0.5-0.75M	BH085_0.75-1.00M	BH085_1.00-1.25M	BH085_1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se42879	B19-Se42880	B19-Se42881	B19-Se42882
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	-	5.2	5.3	-
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	-	4.2	4.5	-
Reaction Ratings*[S05]		comment	-	1.0	1.0	-
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.4	-	-	4.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	50	-	-	23
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.080	-	-	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	0.04	-	-	0.03
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0
HCl Extractable Sulfur	0.02	% S	0.11	-	-	n/a
Net Acid soluble sulfur	0.02	% S	0.07	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	35	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.06	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.14	-	-	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	85	-	-	23
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	6.4	-	-	1.7
<2mm Fraction	0.005	g	42	-	-	36
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	17	-	-	23

Client Sample ID			BH085_1.5-1.75M	BH085_1.75-2.0M
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**B19-Se42883**	**B19-Se42884**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	6.5	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	5.6
Reaction Ratings*[S05]		comment	1.0	1.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Sep 30, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Sep 30, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 29, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679658
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 4, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH025_0.0-0.25M	Sep 24, 2019		Soil	B19-Se42799	X		
2	BH025_0.25-0.5M	Sep 24, 2019		Soil	B19-Se42800		X	X
3	BH025_0.5-0.75M	Sep 24, 2019		Soil	B19-Se42801	X		
4	BH025_0.75-1.0M	Sep 24, 2019		Soil	B19-Se42802	X		
5	BH025_1.0-1.25M	Sep 24, 2019		Soil	B19-Se42803	X		
6	BH025_1.25-	Sep 24, 2019		Soil	B19-Se42804		X	X

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Project ID: 19210

Order No.:
Report #: 679658
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 4, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH025_1.5-1.75M	Sep 24, 2019		Soil	B19-Se42805	X		
8	BH025_1.75-2.0M	Sep 24, 2019		Soil	B19-Se42806	X		
9	BH026_0.0-0.25M	Sep 24, 2019		Soil	B19-Se42807		X	X
10	BH026_0.25-0.5M	Sep 24, 2019		Soil	B19-Se42808	X		
11	BH026_0.5-0.75M	Sep 24, 2019		Soil	B19-Se42809	X		
12	BH026_0.75-1.00M	Sep 24, 2019		Soil	B19-Se42810	X		
13	BH026_1.00-	Sep 24, 2019		Soil	B19-Se42811	X		

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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679658
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 4, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
14	BH026_1.25-1.5M	Sep 24, 2019		Soil	B19-Se428 12		X	X
15	BH026_1.5-1.75M	Sep 24, 2019		Soil	B19-Se428 13	X		
16	BH026_1.75-2.0M	Sep 24, 2019		Soil	B19-Se428 14	X		
17	BH041_0.0-0.25M	Sep 24, 2019		Soil	B19-Se428 15		X	X
18	BH041_0.25-0.5M	Sep 24, 2019		Soil	B19-Se428 16	X		
19	BH041_0.5-0.75M	Sep 24, 2019		Soil	B19-Se428 17	X		
20	BH041_0.75-	Sep 24, 2019		Soil	B19-Se428 18	X		

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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679658
Phone: 07 5478 9642
Fax:

Received: Sep 27, 2019 9:00 AM
Due: Oct 4, 2019
Priority: 5 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.00M							
21	BH041_1.00-1.25M	Sep 24, 2019		Soil	B19-Se428 19		X	X
22	BH041_1.25-1.5M	Sep 24, 2019		Soil	B19-Se428 20	X		
23	BH041_1.5-1.75M	Sep 24, 2019		Soil	B19-Se428 21	X		
24	BH041_1.75-2.0M	Sep 24, 2019		Soil	B19-Se428 22	X		
25	BH041_2.0-2.25M	Sep 24, 2019		Soil	B19-Se428 23	X		
26	BH041_2.25-2.5M	Sep 24, 2019		Soil	B19-Se428 24		X	X
27	BH041_2.5-	Sep 24, 2019		Soil	B19-Se428 25	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.75M							
28	BH041_2.75-3.00M	Sep 24, 2019		Soil	B19-Se428226	X		
29	BH041_3.0-3.25M	Sep 24, 2019		Soil	B19-Se428227	X		
30	BH041_3.25-3.5M	Sep 24, 2019		Soil	B19-Se428228		X	X
31	BH063_0.0-0.25M	Sep 24, 2019		Soil	B19-Se428229	X		
32	BH063_0.25-0.5M	Sep 24, 2019		Soil	B19-Se428230	X		
33	BH063_0.5-0.75M	Sep 24, 2019		Soil	B19-Se428231		X	X
34	BH063_0.75-	Sep 24, 2019		Soil	B19-Se428232	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.0M							
35	BH063_1.0-1.25M	Sep 24, 2019		Soil	B19-Se428433	X		
36	BH063_1.25-1.5M	Sep 24, 2019		Soil	B19-Se428434	X		
37	BH063_1.5-1.75M	Sep 24, 2019		Soil	B19-Se428435	X		
38	BH063_1.75-2.0M	Sep 24, 2019		Soil	B19-Se428436		X	X
39	BH064_0.0-0.25M	Sep 24, 2019		Soil	B19-Se428437		X	X
40	BH064_0.25-0.5M	Sep 24, 2019		Soil	B19-Se428438	X		
41	BH064_0.5-	Sep 24, 2019		Soil	B19-Se428439	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
42	BH064_0.75-1.00M	Sep 24, 2019		Soil	B19-Se42840		X	X
43	BH064_1.00-1.25M	Sep 24, 2019		Soil	B19-Se42841	X		
44	BH064_1.25-1.5M	Sep 24, 2019		Soil	B19-Se42842	X		
45	BH064_1.5-1.75M	Sep 24, 2019		Soil	B19-Se42843	X		
46	BH064_1.75-2.0M	Sep 24, 2019		Soil	B19-Se42844	X		
47	BH065_0.0-0.25M	Sep 24, 2019		Soil	B19-Se42845	X		
48	BH065_0.25-	Sep 24, 2019		Soil	B19-Se42846	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.5M							
49	BH065_0.5-0.75M	Sep 24, 2019		Soil	B19-Se42847	X		
50	BH065_0.75-1.00M	Sep 24, 2019		Soil	B19-Se42848		X	X
51	BH065_1.00-1.25M	Sep 24, 2019		Soil	B19-Se42849	X		
52	BH065_1.25-1.5M	Sep 24, 2019		Soil	B19-Se42850	X		
53	BH065_1.5-1.75M	Sep 24, 2019		Soil	B19-Se42851	X		
54	BH065_1.75-2.0M	Sep 24, 2019		Soil	B19-Se42852		X	X
55	BH066_0.0-	Sep 24, 2019		Soil	B19-Se42853	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25M							
56	BH066_0.25-0.5M	Sep 24, 2019		Soil	B19-Se428554	X		
57	BH066_0.5-0.75M	Sep 24, 2019		Soil	B19-Se428555		X	X
58	BH066_0.75-1.00M	Sep 24, 2019		Soil	B19-Se428556	X		
59	BH066_1.00-1.25M	Sep 24, 2019		Soil	B19-Se428557	X		
60	BH066_1.25-1.5M	Sep 24, 2019		Soil	B19-Se428558	X		
61	BH066_1.5-1.75M	Sep 24, 2019		Soil	B19-Se428559		X	X
62	BH066_1.75-	Sep 24, 2019		Soil	B19-Se428560	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.0M							
63	BH083_0.0-0.25M	Sep 24, 2019		Soil	B19-Se42861	X		
64	BH083_0.25-0.5M	Sep 24, 2019		Soil	B19-Se42862		X	X
65	BH083_0.5-0.75M	Sep 24, 2019		Soil	B19-Se42863	X		
66	BH083_0.75-1.00M	Sep 24, 2019		Soil	B19-Se42864	X		
67	BH083_1.00-1.25M	Sep 24, 2019		Soil	B19-Se42865	X		
68	BH083_1.25-1.5M	Sep 24, 2019		Soil	B19-Se42866		X	X
69	BH083_1.5-	Sep 24, 2019		Soil	B19-Se42867	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.75M							
70	BH083_1.75-2.0M	Sep 24, 2019		Soil	B19-Se42868	X		
71	BH084_0.0-0.25M	Sep 24, 2019		Soil	B19-Se42869		X	X
72	BH084_0.25-0.5M	Sep 24, 2019		Soil	B19-Se42870	X		
73	BH084_0.5-0.75M	Sep 24, 2019		Soil	B19-Se42871	X		
74	BH084_0.75-1.00M	Sep 24, 2019		Soil	B19-Se42872		X	X
75	BH084_1.00-1.25M	Sep 24, 2019		Soil	B19-Se42873	X		
76	BH084_1.25-	Sep 24, 2019		Soil	B19-Se42874	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
77	BH084_1.5-1.75M	Sep 24, 2019		Soil	B19-Se42875	X		
78	BH084_1.75-2.0M	Sep 24, 2019		Soil	B19-Se42876	X		
79	BH085_0.0-0.25M	Sep 24, 2019		Soil	B19-Se42877	X		
80	BH085_0.25-0.5M	Sep 24, 2019		Soil	B19-Se42878	X		
81	BH085_0.5-0.75M	Sep 24, 2019		Soil	B19-Se42879		X	X
82	BH085_0.75-1.00M	Sep 24, 2019		Soil	B19-Se42880	X		
83	BH085_1.00-	Sep 24, 2019		Soil	B19-Se42881	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
84	BH085_1.25-1.5M	Sep 24, 2019		Soil	B19-Se42882		X	X
85	BH085_1.5-1.75M	Sep 24, 2019		Soil	B19-Se42883	X		
86	BH085_1.75-2.0M	Sep 24, 2019		Soil	B19-Se42884	X		
Test Counts						64	22	22

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	99			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42799	CP	pH Units	5.7	5.7	pass	30%	Pass	
Reaction Ratings*	B19-Se42799	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se42800	CP	pH Units	4.1	4.1	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se42800	CP	mol H+/t	64	64	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se42800	CP	% pyrite S	0.10	0.10	<1	30%	Pass	
Chromium Reducible Sulfur	B19-Se42800	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se42800	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se42800	CP	% S	0.02	0.02	7.0	30%	Pass	
Net Acid soluble sulfur	B19-Se42800	CP	% S	< 0.02	0.02	200	30%	Fail	Q15
Net Acid soluble sulfur - acidity units	B19-Se42800	CP	mol H+/t	< 10	11	200	30%	Fail	Q15
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se42800	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se42800	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se42800	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se42800	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se42800	CP	% S	0.10	0.10	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se42800	CP	mol H+/t	73	75	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se42800	CP	kg CaCO3/t	5.5	5.6	3.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se42800	CP	%	20	16	19	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42813	CP	pH Units	5.3	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se42813	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42826	CP	pH Units	8.5	8.7	pass	30%	Pass	
Reaction Ratings*	B19-Se42826	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se42837	CP	pH Units	5.2	5.2	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se42837	CP	mol H+/t	11	11	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se42837	CP	% pyrite S	0.020	0.020	<1	30%	Pass	
Chromium Reducible Sulfur	B19-Se42837	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se42837	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se42837	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se42837	CP	% S	n/a	n/a	n/a	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
Net Acid soluble sulfur - acidity units	B19-Se42837	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se42837	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se42837	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se42837	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se42837	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se42837	CP	% S	0.02	0.02	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se42837	CP	mol H+/t	11	11	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se42837	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se42837	CP	%	5.9	5.7	3.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42841	CP	pH Units	5.8	5.8	pass	30%	Pass	
Reaction Ratings*	B19-Se42841	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42853	CP	pH Units	5.4	5.3	pass	30%	Pass	
Reaction Ratings*	B19-Se42853	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42867	CP	pH Units	5.1	5.0	pass	30%	Pass	
Reaction Ratings*	B19-Se42867	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se42879	CP	%	17	16	6.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se42880	CP	pH Units	5.2	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se42880	CP	comment	1.0	1.0	pass	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
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **679878-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 30, 2019

Client Sample ID			**BH045 - 0.0-0.25M**	**BH045 - 0.25-0.5M**	**BH045 - 0.5-0.75M**	**BH045 - 0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44439**	**B19-Se44440**	**B19-Se44441**	**B19-Se44442**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.9	6.4	6.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.4	3.8	4.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.9	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	20	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.030	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.03	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	20	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	1.5	-	-
<2mm Fraction	0.005	g	-	66	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	5.5	-	-

Client Sample ID			BH045 - 1.0-1.25M	BH045 - 1.25-1.5M	BH045 - 1.5-1.75M	BH045 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44443	B19-Se44444	B19-Se44445	B19-Se44446
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	7.1	7.5	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	6.7	8.2	8.3
Reaction Ratings*[S05]		comment	3.0	2.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.8	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	8.1	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	43	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	13	-	-

Client Sample ID			BH045 - 2.0-2.25M	BH045 - 2.25-2.5M	BH045 - 2.5-2.75M	BH045 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44447	B19-Se44448	B19-Se44449	B19-Se44450
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	8.1	8.3	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.0	7.3	7.3	8.2
Reaction Ratings*[S05]		comment	4.0	2.0	2.0	4.0

Client Sample ID			BH045 - 3.0-3.25M	BH045 - 3.25-3.5M	BH050 - 0.0-0.25M	BH050 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44451	B19-Se44452	B19-Se44453	B19-Se44454
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.6	5.8	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.3	7.2	3.2	4.2
Reaction Ratings*[S05]		comment	2.0	2.0	3.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	6.7	-	4.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	< 2	-	28	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	-	0.050	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	2.0	-
HCl Extractable Sulfur	0.02	% S	n/a	-	n/a	-
Net Acid soluble sulfur	0.02	% S	n/a	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	0.37	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	73	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	0.12	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	0.05	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	28	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	2.1	-
<2mm Fraction	0.005	g	91	-	40	-
>2mm Fraction	0.005	g	< 0.005	-	< 0.005	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	1	%	19	-	11	-

Client Sample ID			BH050 - 0.5-0.75M	BH050 - 0.75-1.0M	BH050 - 1.0-1.25M	BH050 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44455	B19-Se44456	B19-Se44457	B19-Se44458
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	6.8	7.2	7.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.8	5.5	6.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	8.5	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH050 - 0.5-0.75M	BH050 - 0.75-1.0M	BH050 - 1.0-1.25M	BH050 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44455	B19-Se44456	B19-Se44457	B19-Se44458
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	79	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	20	-

Client Sample ID			BH050 - 1.5-1.75M	BH050 - 1.75-2.0M	BH050 - 2.00-2.25M	BH050 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44459	B19-Se44460	B19-Se44461	B19-Se44462
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.8	8.0	8.2	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.6	7.2	7.0
Reaction Ratings*[S05]		comment	2.0	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	3.1	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-

Client Sample ID			BH050 - 1.5-1.75M	BH050 - 1.75-2.0M	BH050 - 2.00-2.25M	BH050 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44459	B19-Se44460	B19-Se44461	B19-Se44462
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	56	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	20	-

Client Sample ID			BH050 - 2.5-2.75M	BH050 - 2.75-3.0M	BH050 - 3.0-3.25M	BH050 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44463	B19-Se44464	B19-Se44465	B19-Se44466
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.2	8.3	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	7.0	7.1	7.0
Reaction Ratings*[S05]		comment	4.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	120	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	18	-

Client Sample ID			BH051 - 0.0-0.25M	BH051 - 0.25-0.5M	BH051 - 0.5-0.75M	BH051 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44467	B19-Se44468	B19-Se44469	B19-Se44470
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.9	5.7	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	4.6	4.5	4.5
Reaction Ratings*[S05]		comment	3.0	3.0	3.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	37	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.060	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.06	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	37	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	2.8	-
<2mm Fraction	0.005	g	-	-	63	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	20	-

Client Sample ID			BH051 - 1.0-1.25M	BH051 - 1.25-1.5M	BH051 - 1.5-1.75M	BH051 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44471	B19-Se44472	B19-Se44473	B19-Se44474
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.7	6.5	7.5	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	4.8	6.2	5.8
Reaction Ratings*[S05]		comment	2.0	2.0	1.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	7.3	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH051 - 1.0-1.25M	BH051 - 1.25-1.5M	BH051 - 1.5-1.75M	BH051 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44471	B19-Se44472	B19-Se44473	B19-Se44474
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	96	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	27	-

Client Sample ID			BH051 - 2.0-2.25M	BH051 - 2.25-2.5M	BH051 - 2.5-2.75M	BH051 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44475	B19-Se44476	B19-Se44477	B19-Se44478
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.3	7.6	7.8	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.3	6.4	6.5	6.5
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	4.5	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-

Client Sample ID			BH051 - 2.0-2.25M	BH051 - 2.25-2.5M	BH051 - 2.5-2.75M	BH051 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44475	B19-Se44476	B19-Se44477	B19-Se44478
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	98	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	23	-

Client Sample ID			BH051 - 3.0-3.25M	BH051 - 3.25-3.5M	BH052 - 0.0-0.25M	BH052 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44479	B19-Se44480	B19-Se44481	B19-Se44482
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	7.5	6.1	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.4	5.7	4.0	3.9
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	22	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.040	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.04	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	22	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.7	-
<2mm Fraction	0.005	g	-	-	61	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	10	-

Client Sample ID			BH052 - 0.5-0.75M	BH052 - 0.75-1.0M	BH052 - 1.0-1.25M	BH052 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44483	B19-Se44484	B19-Se44485	B19-Se44486
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.7	6.9	7.8	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	5.1	6.4	6.8
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	5.6
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	20

Client Sample ID			BH052 - 1.5-1.75M	BH052 - 1.75-2.0M	BH052 - 2.0-2.25M	BH052 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44487	B19-Se44488	B19-Se44489	B19-Se44490
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.1	8.1	7.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.6	7.4	7.2	6.5
Reaction Ratings*[S05]		comment	4.0	4.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.9
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH052 - 1.5-1.75M	BH052 - 1.75-2.0M	BH052 - 2.0-2.25M	BH052 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44487	B19-Se44488	B19-Se44489	B19-Se44490
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	77
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	22

Client Sample ID			BH052 - 2.5-2.75M	BH052 - 2.75-3.0M	BH052 - 3.0-3.25M	BH052 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44491	B19-Se44492	B19-Se44493	B19-Se44494
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.1	8.0	8.2	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	6.9	6.9	6.8
Reaction Ratings*[S05]		comment	1.0	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.1
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10

Client Sample ID			BH052 - 2.5-2.75M	BH052 - 2.75-3.0M	BH052 - 3.0-3.25M	BH052 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44491	B19-Se44492	B19-Se44493	B19-Se44494
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	60
>2mm Fraction	0.005	g	-	-	-	2.0
Analysed Material	0.1	%	-	-	-	97
Extraneous Material	0.1	%	-	-	-	3.2
% Moisture	1	%	-	-	-	18

Client Sample ID			BH054 - 0.0-0.25M	BH054 - 0.25-0.5M	BH054 - 0.5-0.75M	BH054 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44495	B19-Se44496	B19-Se44497	B19-Se44498
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.5	6.6	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	4.0	4.9	5.2
Reaction Ratings*[S05]		comment	3.0	4.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.9	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	30	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.050	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	3.4	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.05	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	34	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.5	-	-	-
<2mm Fraction	0.005	g	41	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	13	-	-	-

Client Sample ID			BH054 - 1.0-1.25M	BH054 - 1.25-1.5M	BH054 - 1.5-1.75M	BH054 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44499	B19-Se44500	B19-Se44501	B19-Se44502
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.5	7.6	7.6	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.0	7.6	7.1	6.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	6.5	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	72	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	19	-	-

Client Sample ID			BH054 - 2.0-2.25M	BH054 - 2.25-2.5M	BH054 - 2.5-2.75M	BH054 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44503	B19-Se44504	B19-Se44505	B19-Se44506
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.2	8.3	8.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	6.6	6.8	6.5
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	3.6
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH054 - 2.0-2.25M	BH054 - 2.25-2.5M	BH054 - 2.5-2.75M	BH054 - 2.75-3.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44503	B19-Se44504	B19-Se44505	B19-Se44506
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	120
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	20

Client Sample ID			BH054 - 3.0-3.25M	BH054 - 3.25-3.5M	BH062 - 0.0-0.25M	BH062 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44507	B19-Se44508	B19-Se44509	B19-Se44510
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	8.4	6.1	6.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.7	6.7	3.1	4.2
Reaction Ratings*[S05]		comment	1.0	2.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	10
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	10

Client Sample ID			BH054 - 3.0-3.25M	BH054 - 3.25-3.5M	BH062 - 0.0-0.25M	BH062 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44507	B19-Se44508	B19-Se44509	B19-Se44510
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	60
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	11

Client Sample ID			BH062 - 0.5-0.75M	BH062 - 0.75-1.0M	BH062 - 1.0-1.25M	BH062 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44511	B19-Se44512	B19-Se44513	B19-Se44514
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.9	6.1	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.5	4.2	4.4
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	3.5	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	63	-
>2mm Fraction	0.005	g	-	-	0.28	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	0.4	-
% Moisture	1	%	-	-	12	-

Client Sample ID			BH062 - 1.5-1.75M	BH062 - 1.75-2.0M	BH070 - 0.0-0.25M	BH070 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44515	B19-Se44516	B19-Se44517	B19-Se44518
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.4	6.2	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	3.9	3.2	3.8
Reaction Ratings*[S05]		comment	1.0	2.0	3.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.5	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	5.4	-	27
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	2.0
HCl Extractable Sulfur	0.02	% S	-	n/a	-	n/a
Net Acid soluble sulfur	0.02	% S	-	n/a	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	27
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	2.0
<2mm Fraction	0.005	g	-	95	-	87
>2mm Fraction	0.005	g	-	0.16	-	0.89
Analysed Material	0.1	%	-	100	-	99
Extraneous Material	0.1	%	-	0.2	-	1.0
% Moisture	1	%	-	11	-	17

Client Sample ID			BH070 - 0.5-0.75M	BH070 - 0.75-1.0M	BH070 - 1.0-1.25M	BH070 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44519	B19-Se44520	B19-Se44521	B19-Se44522
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	6.2	6.0	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	5.0	4.4	4.7
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	11
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH070 - 0.5-0.75M	BH070 - 0.75-1.0M	BH070 - 1.0-1.25M	BH070 - 1.25-1.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44519**	**B19-Se44520**	**B19-Se44521**	**B19-Se44522**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	11
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	83
>2mm Fraction	0.005	g	-	-	-	0.59
Analysed Material	0.1	%	-	-	-	99
Extraneous Material	0.1	%	-	-	-	0.7
% Moisture	1	%	-	-	-	9.5

Client Sample ID			BH070 - 1.5-1.75M	BH070 - 1.75-2.0M	BH071 - 0.0-0.25M	BH071 - 0.25-0.5M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44523**	**B19-Se44524**	**B19-Se44525**	**B19-Se44526**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.5	5.8	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.8	2.7	3.9
Reaction Ratings*[S05]		comment	1.0	1.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	45
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.070
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.07
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	45

Client Sample ID			BH070 - 1.5-1.75M	BH070 - 1.75-2.0M	BH071 - 0.0-0.25M	BH071 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44523	B19-Se44524	B19-Se44525	B19-Se44526
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.4
<2mm Fraction	0.005	g	-	-	-	99
>2mm Fraction	0.005	g	-	-	-	3.7
Analysed Material	0.1	%	-	-	-	96
Extraneous Material	0.1	%	-	-	-	3.6
% Moisture	1	%	-	-	-	16

Client Sample ID			BH071 - 0.5-0.75M	BH071 - 0.75-1.00M	BH071 - 1.000-1.25M	BH071 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44527	B19-Se44528	B19-Se44529	B19-Se44530
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.7	5.6	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.8	4.6	4.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	4.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	81	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.13	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.13	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	81	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	6.1	-
<2mm Fraction	0.005	g	-	-	45	-
>2mm Fraction	0.005	g	-	-	3.3	-
Analysed Material	0.1	%	-	-	93	-
Extraneous Material	0.1	%	-	-	6.8	-
% Moisture	1	%	-	-	22	-

Client Sample ID			BH071 - 1.5-1.75M	BH071 - 1.75-2.0M	BH072 - 0.0-0.25M	BH072 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44531	B19-Se44532	B19-Se44533	B19-Se44534
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.8	6.0	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	4.6	3.7	4.0
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	3.6	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	98	-
>2mm Fraction	0.005	g	-	-	0.43	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	0.4	-
% Moisture	1	%	-	-	< 1	-

Client Sample ID			BH072 - 0.5-0.75M	BH072 - 0.75-1.0M	BH072 - 1.0-1.25M	BH072 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44535	B19-Se44536	B19-Se44537	B19-Se44538
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	6.3	6.1	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	5.2	4.9	4.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.7	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	3.9	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH072 - 0.5-0.75M	BH072 - 0.75-1.0M	BH072 - 1.0-1.25M	BH072 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44535	B19-Se44536	B19-Se44537	B19-Se44538
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	42	-
>2mm Fraction	0.005	g	-	-	1.1	-
Analysed Material	0.1	%	-	-	97	-
Extraneous Material	0.1	%	-	-	2.6	-
% Moisture	1	%	-	-	7.3	-

Client Sample ID			BH072 - 1.5-1.75M	BH072 - 1.75-2.0M	BH073 - 0.0-0.25M	BH073 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44539	B19-Se44540	B19-Se44541	B19-Se44542
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.5	5.8	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	3.4	3.9	3.9
Reaction Ratings*[S05]		comment	1.0	2.0	2.0	1.0

Client Sample ID			BH073 - 0.5-0.75M	BH073 - 0.75-1.0M	BH073 - 1.0-1.25M	BH073 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44543	B19-Se44544	B19-Se44545	B19-Se44546
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.9	6.0	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.6	4.7	4.6
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	6.0	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	2.8	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	< 0.003	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-

Client Sample ID			BH073 - 0.5-0.75M	BH073 - 0.75-1.0M	BH073 - 1.0-1.25M	BH073 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44543	B19-Se44544	B19-Se44545	B19-Se44546
Date Sampled			Sep 24, 2019	Sep 24, 2019	Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	55	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	< 1	-	-	-

Client Sample ID			BH073 - 1.5-1.75M	BH073 - 1.75-2.0M
Sample Matrix			Soil	Soil
Eurofins Sample No.			B19-Se44547	B19-Se44548
Date Sampled			Sep 24, 2019	Sep 24, 2019
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	6.0	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.9
Reaction Ratings*[S05]		comment	1.0	2.0
Chromium Suite (SKCl)				
pH-KCL	0.1	pH Units	-	4.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	52
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.080
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0
HCl Extractable Sulfur	0.02	% S	-	n/a
Net Acid soluble sulfur	0.02	% S	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a
ANC Fineness Factor		factor	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.08

Client Sample ID			BH073 - 1.5-1.75M	BH073 - 1.75-2.0M
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44547**	**B19-Se44548**
Date Sampled			**Sep 24, 2019**	**Sep 24, 2019**
Test/Reference	LOR	Unit		
Chromium Suite (SKCl)				
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	52
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.9
<2mm Fraction	0.005	g	-	66
>2mm Fraction	0.005	g	-	< 0.005
Analysed Material	0.1	%	-	100
Extraneous Material	0.1	%	-	< 0.1
% Moisture	1	%	-	5.3

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Oct 02, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Oct 02, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 30, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679878
Phone: 07 5478 9642
Fax:

Received: Sep 30, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH045 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44439	X		
2	BH045 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44440	X	X	X
3	BH045 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44441	X		
4	BH045 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44442	X		
5	BH045 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44443	X		
6	BH045 - 1.25-	Sep 24, 2019		Soil	B19-Se44444	X	X	X

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH045 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44445	X		
8	BH045 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44446	X		
9	BH045 - 2.0-2.25M	Sep 24, 2019		Soil	B19-Se44447	X		
10	BH045 - 2.25-2.5M	Sep 24, 2019		Soil	B19-Se44448	X		
11	BH045 - 2.5-2.75M	Sep 24, 2019		Soil	B19-Se44449	X		
12	BH045 - 2.75-3.0M	Sep 24, 2019		Soil	B19-Se44450	X		
13	BH045 - 3.0-	Sep 24, 2019		Soil	B19-Se44451	X	X	X

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	Sample Detail					Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
14	BH045 - 3.25-3.5M	Sep 24, 2019		Soil	B19-Se444452	X		
15	BH050 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se444453	X	X	X
16	BH050 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se444454	X		
17	BH050 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se444455	X		
18	BH050 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se444456	X		
19	BH050 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se444457	X	X	X
20	BH050 - 1.25-	Sep 24, 2019		Soil	B19-Se444458	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
21	BH050 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44459	X		
22	BH050 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44460	X		
23	BH050 - 2.00-2.25M	Sep 24, 2019		Soil	B19-Se44461	X	X	X
24	BH050 - 2.25-2.5M	Sep 24, 2019		Soil	B19-Se44462	X		
25	BH050 - 2.5-2.75M	Sep 24, 2019		Soil	B19-Se44463	X		
26	BH050 - 2.75-3.0M	Sep 24, 2019		Soil	B19-Se44464	X		
27	BH050 - 3.0-	Sep 24, 2019		Soil	B19-Se44465	X	X	X

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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679878
Phone: 07 5478 9642
Fax:

Received: Sep 30, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
28	BH050 - 3.25-3.5M	Sep 24, 2019		Soil	B19-Se44466	X		
29	BH051 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44467	X		
30	BH051 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44468	X		
31	BH051 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44469	X	X	X
32	BH051 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44470	X		
33	BH051 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44471	X		
34	BH051 - 1.25-	Sep 24, 2019		Soil	B19-Se44472	X		

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NATA # 1261 Site # 18217

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NATA # 1261 Site # 20794

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Company Name: Tectonic Geotechnical Pty Ltd
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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
35	BH051 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44473	X	X	X
36	BH051 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44474	X		
37	BH051 - 2.0-2.25M	Sep 24, 2019		Soil	B19-Se44475	X		
38	BH051 - 2.25-2.5M	Sep 24, 2019		Soil	B19-Se44476	X		
39	BH051 - 2.5-2.75M	Sep 24, 2019		Soil	B19-Se44477	X	X	X
40	BH051 - 2.75-3.0M	Sep 24, 2019		Soil	B19-Se44478	X		
41	BH051 - 3.0-	Sep 24, 2019		Soil	B19-Se44479	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
42	BH051 - 3.25-3.5M	Sep 24, 2019		Soil	B19-Se44480	X		
43	BH052 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44481	X	X	X
44	BH052 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44482	X		
45	BH052 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44483	X		
46	BH052 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44484	X		
47	BH052 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44485	X		
48	BH052 - 1.25-	Sep 24, 2019		Soil	B19-Se44486	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
49	BH052 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44487	X		
50	BH052 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44488	X		
51	BH052 - 2.0-2.25M	Sep 24, 2019		Soil	B19-Se44489	X		
52	BH052 - 2.25-2.5M	Sep 24, 2019		Soil	B19-Se44490	X	X	X
53	BH052 - 2.5-2.75M	Sep 24, 2019		Soil	B19-Se44491	X		
54	BH052 - 2.75-3.0M	Sep 24, 2019		Soil	B19-Se44492	X		
55	BH052 - 3.0-	Sep 24, 2019		Soil	B19-Se44493	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
56	BH052 - 3.25-3.5M	Sep 24, 2019		Soil	B19-Se44494	X	X	X
57	BH054 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44495	X	X	X
58	BH054 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44496	X		
59	BH054 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44497	X		
60	BH054 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44498	X		
61	BH054 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44499	X		
62	BH054 - 1.25-	Sep 24, 2019		Soil	B19-Se44500	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
63	BH054 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44501	X		
64	BH054 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44502	X		
65	BH054 - 2.0-2.25M	Sep 24, 2019		Soil	B19-Se44503	X		
66	BH054 - 2.25-2.5M	Sep 24, 2019		Soil	B19-Se44504	X		
67	BH054 - 2.5-2.75M	Sep 24, 2019		Soil	B19-Se44505	X		
68	BH054 - 2.75-3.0M	Sep 24, 2019		Soil	B19-Se44506	X	X	X
69	BH054 - 3.0-	Sep 24, 2019		Soil	B19-Se44507	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
70	BH054 - 3.25-3.5M	Sep 24, 2019		Soil	B19-Se44508	X		
71	BH062 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44509	X		
72	BH062 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44510	X	X	X
73	BH062 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44511	X		
74	BH062 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44512	X		
75	BH062 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44513	X	X	X
76	BH062 - 1.25-	Sep 24, 2019		Soil	B19-Se44514	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
77	BH062 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se445 15	X		
78	BH062 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se445 16	X	X	X
79	BH070 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se445 17	X		
80	BH070 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se445 18	X	X	X
81	BH070 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se445 19	X		
82	BH070 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se445 20	X		
83	BH070 - 1.0-	Sep 24, 2019		Soil	B19-Se445 21	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
84	BH070 - 1.25-1.5M	Sep 24, 2019		Soil	B19-Se44522	X	X	X
85	BH070 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44523	X		
86	BH070 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44524	X		
87	BH071 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44525	X		
88	BH071 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44526	X	X	X
89	BH071 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44527	X		
90	BH071 - 0.75-	Sep 24, 2019		Soil	B19-Se44528	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.00M							
91	BH071 - 1.000-1.25M	Sep 24, 2019		Soil	B19-Se44529	X	X	X
92	BH071 - 1.25-1.5M	Sep 24, 2019		Soil	B19-Se44530	X		
93	BH071 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44531	X		
94	BH071 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44532	X		
95	BH072 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44533	X	X	X
96	BH072 - 0.25-0.5M	Sep 24, 2019		Soil	B19-Se44534	X		
97	BH072 - 0.5-	Sep 24, 2019		Soil	B19-Se44535	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
98	BH072 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44536	X		
99	BH072 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44537	X	X	X
100	BH072 - 1.25-1.5M	Sep 24, 2019		Soil	B19-Se44538	X		
101	BH072 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44539	X		
102	BH072 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44540	X		
103	BH073 - 0.0-0.25M	Sep 24, 2019		Soil	B19-Se44541	X		
104	BH073 - 0.25-	Sep 24, 2019		Soil	B19-Se44542	X		

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Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.5M							
105	BH073 - 0.5-0.75M	Sep 24, 2019		Soil	B19-Se44543	X	X	X
106	BH073 - 0.75-1.0M	Sep 24, 2019		Soil	B19-Se44544	X		
107	BH073 - 1.0-1.25M	Sep 24, 2019		Soil	B19-Se44545	X		
108	BH073 - 1.25-1.5M	Sep 24, 2019		Soil	B19-Se44546	X		
109	BH073 - 1.5-1.75M	Sep 24, 2019		Soil	B19-Se44547	X		
110	BH073 - 1.75-2.0M	Sep 24, 2019		Soil	B19-Se44548	X	X	X
Test Counts						110	28	28

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	97			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	95			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se44440	CP	%	5.5	5.6	2.0	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44469	CP	pH Units	4.6	4.6	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44469	CP	mol H+/t	37	37	1.6	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44469	CP	% pyrite S	0.060	0.060	2.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se44469	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44469	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44469	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44469	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se44469	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44469	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44469	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44469	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se44469	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44469	CP	% S	0.06	0.06	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44469	CP	mol H+/t	37	37	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se44469	CP	kg CaCO3/t	2.8	2.8	2.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44475	CP	pH Units	7.3	7.4	pass	30%	Pass	
Reaction Ratings*	B19-Se44475	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se44481	CP	%	10	11	3.0	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44510	CP	pH Units	5.4	5.4	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44510	CP	mol H+/t	10	10	1.1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44510	CP	% pyrite S	0.020	0.020	1.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se44510	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44510	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44510	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44510	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se44510	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44510	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44510	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44510	CP	% S	n/a	n/a	n/a	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
ANC Fineness Factor	B19-Se44510	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44510	CP	% S	0.02	0.02	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44510	CP	mol H+/t	10	10	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se44510	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se44518	CP	%	17	16	5.0	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44525	CP	pH Units	5.8	5.8	pass	30%	Pass	
Reaction Ratings*	B19-Se44525	CP	comment	2.0	2.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44545	CP	pH Units	6.0	5.9	pass	30%	Pass	
Reaction Ratings*	B19-Se44545	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44548	CP	pH Units	4.6	4.7	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44548	CP	mol H+/t	52	51	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44548	CP	% pyrite S	0.080	0.080	1.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se44548	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44548	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44548	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44548	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se44548	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44548	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44548	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44548	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se44548	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44548	CP	% S	0.08	0.08	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44548	CP	mol H+/t	52	51	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se44548	CP	kg CaCO3/t	3.9	3.8	1.0	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **679867-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 30, 2019

Client Sample ID			**BH048 - 0.0-0.25M**	**BH048 - 0.25-0.5M**	**BH048 - 0.5-0.75M**	**BH048 - 0.75-1.00M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44230**	**B19-Se44231**	**B19-Se44232**	**B19-Se44233**
Date Sampled			**Sep 26, 2019**	**Sep 26, 2019**	**Sep 26, 2019**	**Sep 26, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	6.6	6.9	7.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.3	3.9	5.0	5.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.1	-	-	5.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	20	-	-	12
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	n/a	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.03	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	20	-	-	12
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.5	-	-	< 1
<2mm Fraction	0.005	g	26	-	-	33
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	11	-	-	19

Client Sample ID			BH048 - 1.00-1.25M	BH048 - 1.25-1.5M	BH048 - 1.5-1.75M	BH048 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44234	B19-Se44235	B19-Se44236	B19-Se44237
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.3	7.6	7.3	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.6	7.5	7.3
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	4.0
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.010
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	59
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	15

Client Sample ID			BH048 - 2.00-2.25M	BH048 - 2.25-2.5M	BH048 - 2.5-2.75M	BH048 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44238	B19-Se44239	B19-Se44240	B19-Se44241
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.6	8.0	8.1	8.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.4	8.3	8.2	7.0
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH048 - 3.00-3.25M	BH048 - 3.25-3.5M	BH049 - 0.0-0.25M	BH049 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44242	B19-Se44243	B19-Se44244	B19-Se44245
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.3	6.3	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	6.9	3.5	3.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	17
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.030
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.03
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	17
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.3
<2mm Fraction	0.005	g	-	-	-	31
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	11

Client Sample ID			BH049 - 0.5-0.75M	BH049 - 0.75-1.00M	BH049 - 1.00-1.25M	BH049 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44246	B19-Se44247	B19-Se44248	B19-Se44249
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.9	6.9	7.3	7.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	5.4	6.4	6.6
Reaction Ratings*[S05]		comment	3.0	4.0	4.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	3.1
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	< 0.003
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH049 - 0.5-0.75M	BH049 - 0.75-1.00M	BH049 - 1.00-1.25M	BH049 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44246	B19-Se44247	B19-Se44248	B19-Se44249
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	77
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	14

Client Sample ID			BH049 - 1.5-1.75M	BH049 - 1.75-2.00M	BH049 - 2.00-2.25M	BH049 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44250	B19-Se44251	B19-Se44252	B19-Se44253
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	7.9	7.9	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.2	7.5	7.8	7.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH049 - 2.5-2.75M	BH049 - 2.75-3.00M	BH049 - 3.00-3.25M	BH049 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44254	B19-Se44255	B19-Se44256	B19-Se44257
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	8.1	8.1	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.9	7.0	7.1	8.1
Reaction Ratings*[S05]		comment	2.0	2.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	3.3	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-

Client Sample ID			BH049 - 2.5-2.75M	BH049 - 2.75-3.00M	BH049 - 3.00-3.25M	BH049 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44254	B19-Se44255	B19-Se44256	B19-Se44257
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	66	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	21	-	-

Client Sample ID			BH053 - 0.0-0.25M	BH053 - 0.25-0.5M	BH053 - 0.5-0.75M	BH053 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44258	B19-Se44259	B19-Se44260	B19-Se44261
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.4	6.8	7.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.7	4.7	5.1
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.1	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	20	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.03	-	-	-

Client Sample ID			BH053 - 0.0-0.25M	BH053 - 0.25-0.5M	BH053 - 0.5-0.75M	BH053 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44258	B19-Se44259	B19-Se44260	B19-Se44261
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	20	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.5	-	-	-
<2mm Fraction	0.005	g	36	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	12	-	-	-

Client Sample ID			BH053 - 1.00-1.25M	BH053 - 1.25-1.5M	BH053 - 1.5-1.75M	BH053 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44262	B19-Se44263	B19-Se44264	B19-Se44265
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.9	8.0	8.1	8.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	7.3	8.0	8.1
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	6.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	< 2	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	< 0.003	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	72	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	17	-	-

Client Sample ID			BH053 - 2.00-2.25M	BH053 - 2.25-2.5M	BH053 - 2.5-2.75M	BH053 - 2.75-3.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44266	B19-Se44267	B19-Se44268	B19-Se44269
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.3	8.2	8.4	8.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.1	7.8	7.7	7.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	< 2
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	< 0.003
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	0.48
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	95
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	0.15
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	74
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	18

Client Sample ID			BH053 - 3.00-3.25M	BH053 - 3.25-3.5M	BH055 - 0.0-0.25M	BH055 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44270	B19-Se44271	B19-Se44272	B19-Se44273
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.2	8.3	6.2	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	7.1	7.2	3.4	3.7
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.1	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	21	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.030	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH053 - 3.00-3.25M	BH053 - 3.25-3.5M	BH055 - 0.0-0.25M	BH055 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44270	B19-Se44271	B19-Se44272	B19-Se44273
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.03	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	21	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	1.6	-
<2mm Fraction	0.005	g	-	-	34	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	12	-

Client Sample ID			BH055 - 0.5-0.75M	BH055 - 0.75-1.00M	BH055 - 1.00-1.25M	BH055 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44274	B19-Se44275	B19-Se44276	B19-Se44277
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	7.0	7.8	7.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	6.1	6.5	6.6
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	4.2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-

Client Sample ID			BH055 - 0.5-0.75M	BH055 - 0.75-1.00M	BH055 - 1.00-1.25M	BH055 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44274	B19-Se44275	B19-Se44276	B19-Se44277
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	110	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	21	-

Client Sample ID			BH055 - 1.5-1.75M	BH055 - 1.75-2.00M	BH055 - 2.00-2.25M	BH055 - 2.25-2.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44278	B19-Se44279	B19-Se44280	B19-Se44281
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	7.5	8.2	8.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.1	7.9	8.9
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.6	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	0.70	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	140	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	0.22	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	53	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	17	-

Client Sample ID			BH055 - 2.5-2.75M	BH055 - 2.75-3.00M	BH055 - 3.00-3.25M	BH055 - 3.25-3.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44282	B19-Se44283	B19-Se44284	B19-Se44285
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.5	8.4	8.4	8.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	8.2	8.5	8.6	8.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	6.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	< 2	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	< 0.003	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	0.38	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	76	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	0.12	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	47	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	17	-

Client Sample ID			BH079 - 0.0-0.25M	BH079 - 0.25-0.5M	BH079 - 0.5-0.75M	BH079 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44286	B19-Se44287	B19-Se44288	B19-Se44289
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.7	5.1	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	4.0	3.8	3.9
Reaction Ratings*[S05]		comment	4.0	3.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.3	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	81	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.13	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH079 - 0.0-0.25M	BH079 - 0.25-0.5M	BH079 - 0.5-0.75M	BH079 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44286	B19-Se44287	B19-Se44288	B19-Se44289
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	17	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.03	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.16	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	98	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	7.4	-	-
<2mm Fraction	0.005	g	-	72	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	17	-	-

Client Sample ID			BH079 - 1.00-1.25M	BH079 - 1.25-1.5M	BH079 - 1.5-1.75M	BH079 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44290	B19-Se44291	B19-Se44292	B19-Se44293
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.4	5.0	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.0	4.1	4.3	4.5
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.0	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	18	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.030	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.05	-	-	-
Net Acid soluble sulfur	0.02	% S	0.05	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	23	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.04	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.07	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	41	-	-	-

Client Sample ID			BH079 - 1.00-1.25M	BH079 - 1.25-1.5M	BH079 - 1.5-1.75M	BH079 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44290	B19-Se44291	B19-Se44292	B19-Se44293
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	3.1	-	-	-
<2mm Fraction	0.005	g	66	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	25	-	-	-

Client Sample ID			BH080 - 0.0-0.25M	BH080 - 0.25-0.5M	BH080 - 0.5-0.75M	BH080 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44294	B19-Se44295	B19-Se44296	B19-Se44297
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	6.0	5.8	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.5	3.2	3.4	4.2
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.9	-	-	3.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	26	-	-	14
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.040	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	2.0
HCl Extractable Sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.04	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	26	-	-	14
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	2.0	-	-	1.0
<2mm Fraction	0.005	g	38	-	-	140
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	5.9	-	-	15

Client Sample ID			BH080 - 1.0-1.25M	BH080 - 1.25-1.5M	BH081 - 0.0-0.25M	BH081 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44298	B19-Se44299	B19-Se44302	B19-Se44303
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.3	5.4	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.7	2.9	4.2
Reaction Ratings*[S05]		comment	4.0	4.0	3.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.3	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	11	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.020	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	11	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	47	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	14	-

Client Sample ID			BH081 - 0.5-0.75M	BH081 - 0.75-1.0M	BH081 - 1.0-1.25M	BH081 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44304	B19-Se44305	B19-Se44306	B19-Se44307
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.6	5.6	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.7	4.6	4.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	3.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	27	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.040	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH081 - 0.5-0.75M	BH081 - 0.75-1.0M	BH081 - 1.0-1.25M	BH081 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44304	B19-Se44305	B19-Se44306	B19-Se44307
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.04	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	27	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	2.0	-	-
<2mm Fraction	0.005	g	-	94	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	11	-	-

Client Sample ID			BH081 - 1.5-1.75M	BH081 - 1.75-2.0M	BH082 - 0.0-0.25M	BH082 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44308	B19-Se44309	B19-Se44310	B19-Se44311
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.6	6.3	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.3	4.2	4.7
Reaction Ratings*[S05]		comment	1.0	1.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	13
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	13

Client Sample ID			BH081 - 1.5-1.75M	BH081 - 1.75-2.0M	BH082 - 0.0-0.25M	BH082 - 0.25-0.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44308	B19-Se44309	B19-Se44310	B19-Se44311
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.0
<2mm Fraction	0.005	g	-	-	-	71
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	5.1

Client Sample ID			BH082 - 0.5-0.75M	BH082 - 0.75-1.0M	BH082 - 1.0-1.25M	BH082 - 1.25-1.5M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44312	B19-Se44313	B19-Se44314	B19-Se44315
Date Sampled			Sep 26, 2019	Sep 26, 2019	Sep 26, 2019	Sep 26, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	5.8	5.8	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	4.8	4.7	4.7
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	23
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	23
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.7
<2mm Fraction	0.005	g	-	-	-	97
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	17

Client Sample ID			BH082 - 1.5-1.75M	BH082 - 1.75-2.0M
Sample Matrix			**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44316**	**B19-Se44317**
Date Sampled			**Sep 26, 2019**	**Sep 26, 2019**
Test/Reference	LOR	Unit		
Acid Sulfate Soils Field pH Test				
pH-F (Field pH test)*	0.1	pH Units	5.7	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6	4.7
Reaction Ratings*[S05]		comment	1.0	1.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Oct 08, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Oct 08, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 30, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
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Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679867
Phone: 07 5478 9642
Fax:

Received: Sep 30, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH048 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44230	X	X	X
2	BH048 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44231	X		
3	BH048 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44232	X		
4	BH048 - 0.75-1.00M	Sep 26, 2019		Soil	B19-Se44233	X	X	X
5	BH048 - 1.00-1.25M	Sep 26, 2019		Soil	B19-Se44234	X		
6	BH048 - 1.25-	Sep 26, 2019		Soil	B19-Se44235	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH048 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se44236	X		
8	BH048 - 1.75-2.00M	Sep 26, 2019		Soil	B19-Se44237	X	X	X
9	BH048 - 2.00-2.25M	Sep 26, 2019		Soil	B19-Se44238	X		
10	BH048 - 2.25-2.5M	Sep 26, 2019		Soil	B19-Se44239	X		
11	BH048 - 2.5-2.75M	Sep 26, 2019		Soil	B19-Se44240	X		
12	BH048 - 2.75-3.00M	Sep 26, 2019		Soil	B19-Se44241	X		
13	BH048 - 3.00-	Sep 26, 2019		Soil	B19-Se44242	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
14	BH048 - 3.25-3.5M	Sep 26, 2019		Soil	B19-Se44243	X		
15	BH049 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44244	X		
16	BH049 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44245	X	X	X
17	BH049 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44246	X		
18	BH049 - 0.75-1.00M	Sep 26, 2019		Soil	B19-Se44247	X		
19	BH049 - 1.00-1.25M	Sep 26, 2019		Soil	B19-Se44248	X		
20	BH049 - 1.25-	Sep 26, 2019		Soil	B19-Se44249	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
21	BH049 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se44250	X		
22	BH049 - 1.75-2.00M	Sep 26, 2019		Soil	B19-Se44251	X		
23	BH049 - 2.00-2.25M	Sep 26, 2019		Soil	B19-Se44252	X		
24	BH049 - 2.25-2.5M	Sep 26, 2019		Soil	B19-Se44253	X		
25	BH049 - 2.5-2.75M	Sep 26, 2019		Soil	B19-Se44254	X		
26	BH049 - 2.75-3.00M	Sep 26, 2019		Soil	B19-Se44255	X	X	X
27	BH049 - 3.00-	Sep 26, 2019		Soil	B19-Se44256	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
28	BH049 - 3.25-3.5M	Sep 26, 2019		Soil	B19-Se44257	X		
29	BH053 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44258	X	X	X
30	BH053 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44259	X		
31	BH053 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44260	X		
32	BH053 - 0.75-1.00M	Sep 26, 2019		Soil	B19-Se44261	X		
33	BH053 - 1.00-1.25M	Sep 26, 2019		Soil	B19-Se44262	X		
34	BH053 - 1.25-	Sep 26, 2019		Soil	B19-Se44263	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
35	BH053 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se44264	X		
36	BH053 - 1.75-2.00M	Sep 26, 2019		Soil	B19-Se44265	X		
37	BH053 - 2.00-2.25M	Sep 26, 2019		Soil	B19-Se44266	X		
38	BH053 - 2.25-2.5M	Sep 26, 2019		Soil	B19-Se44267	X		
39	BH053 - 2.5-2.75M	Sep 26, 2019		Soil	B19-Se44268	X		
40	BH053 - 2.75-3.00M	Sep 26, 2019		Soil	B19-Se44269	X	X	X
41	BH053 - 3.00-	Sep 26, 2019		Soil	B19-Se44270	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
42	BH053 - 3.25-3.5M	Sep 26, 2019		Soil	B19-Se44271	X		
43	BH055 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44272	X	X	X
44	BH055 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44273	X		
45	BH055 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44274	X		
46	BH055 - 0.75-1.00M	Sep 26, 2019		Soil	B19-Se44275	X		
47	BH055 - 1.00-1.25M	Sep 26, 2019		Soil	B19-Se44276	X	X	X
48	BH055 - 1.25-	Sep 26, 2019		Soil	B19-Se44277	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
49	BH055 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se44278	X		
50	BH055 - 1.75-2.00M	Sep 26, 2019		Soil	B19-Se44279	X		
51	BH055 - 2.00-2.25M	Sep 26, 2019		Soil	B19-Se44280	X	X	X
52	BH055 - 2.25-2.5M	Sep 26, 2019		Soil	B19-Se44281	X		
53	BH055 - 2.5-2.75M	Sep 26, 2019		Soil	B19-Se44282	X		
54	BH055 - 2.75-3.00M	Sep 26, 2019		Soil	B19-Se44283	X		
55	BH055 - 3.00-	Sep 26, 2019		Soil	B19-Se44284	X	X	X

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	3.25M							
56	BH055 - 3.25-3.5M	Sep 26, 2019		Soil	B19-Se44285	X		
57	BH079 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44286	X		
58	BH079 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44287	X	X	X
59	BH079 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44288	X		
60	BH079 - 0.75-1.00M	Sep 26, 2019		Soil	B19-Se44289	X		
61	BH079 - 1.00-1.25M	Sep 26, 2019		Soil	B19-Se44290	X	X	X
62	BH079 - 1.25-	Sep 26, 2019		Soil	B19-Se44291	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
63	BH079 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se44292	X		
64	BH079 - 1.75-2.0M	Sep 26, 2019		Soil	B19-Se44293	X		
65	BH080 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44294	X	X	X
66	BH080 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44295	X		
67	BH080 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44296	X		
68	BH080 - 0.75-1.0M	Sep 26, 2019		Soil	B19-Se44297	X	X	X
69	BH080 - 1.0-	Sep 26, 2019		Soil	B19-Se44298	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
70	BH080 - 1.25-1.5M	Sep 26, 2019		Soil	B19-Se44299	X		
71	BH080 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se44300	X		
72	BH080 - 1.75-2.0M	Sep 26, 2019		Soil	B19-Se44301	X		
73	BH081 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se44302	X	X	X
74	BH081 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se44303	X		
75	BH081 - 0.5-0.75M	Sep 26, 2019		Soil	B19-Se44304	X		
76	BH081 - 0.75-	Sep 26, 2019		Soil	B19-Se44305	X	X	X

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.0M							
77	BH081 - 1.0-1.25M	Sep 26, 2019		Soil	B19-Se443 06	X		
78	BH081 - 1.25-1.5M	Sep 26, 2019		Soil	B19-Se443 07	X		
79	BH081 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se443 08	X		
80	BH081 - 1.75-2.0M	Sep 26, 2019		Soil	B19-Se443 09	X		
81	BH082 - 0.0-0.25M	Sep 26, 2019		Soil	B19-Se443 10	X		
82	BH082 - 0.25-0.5M	Sep 26, 2019		Soil	B19-Se443 11	X	X	X
83	BH082 - 0.5-	Sep 26, 2019		Soil	B19-Se443 12	X		

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Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679867
Phone: 07 5478 9642
Fax:

Received: Sep 30, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
84	BH082 - 0.75-1.0M	Sep 26, 2019		Soil	B19-Se443 13	X		
85	BH082 - 1.0-1.25M	Sep 26, 2019		Soil	B19-Se443 14	X		
86	BH082 - 1.25-1.5M	Sep 26, 2019		Soil	B19-Se443 15	X	X	X
87	BH082 - 1.5-1.75M	Sep 26, 2019		Soil	B19-Se443 16	X		
88	BH082 - 1.75-2.0M	Sep 26, 2019		Soil	B19-Se443 17	X		
Test Counts						88	21	21

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	99			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	96			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44230	CP	pH Units	6.4	6.4	pass	30%	Pass	
Reaction Ratings*	B19-Se44230	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se44409	NCP	%	16	17	7.0	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44233	CP	pH Units	5.6	5.6	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44233	CP	mol H+/t	12	12	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44233	CP	% pyrite S	0.020	0.020	1.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se44233	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44233	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44233	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44233	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se44233	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44233	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44233	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44233	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se44233	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44233	CP	% S	0.02	0.02	n/a	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44233	CP	mol H+/t	12	12	n/a	30%	Pass	
CRS Suite - Liming Rate	B19-Se44233	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44240	CP	pH Units	8.1	8.2	pass	30%	Pass	
Reaction Ratings*	B19-Se44240	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44250	CP	pH Units	8.0	8.0	pass	30%	Pass	
Reaction Ratings*	B19-Se44250	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44260	CP	pH Units	6.8	6.7	pass	30%	Pass	
Reaction Ratings*	B19-Se44260	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44270	CP	pH Units	8.2	8.3	pass	30%	Pass	
Reaction Ratings*	B19-Se44270	CP	comment	4.0	4.0	pass	30%	Pass	

Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44280	CP	pH Units	8.2	8.3	pass	30%	Pass	
Reaction Ratings*	B19-Se44280	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44280	CP	pH Units	6.6	6.7	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44280	CP	mol H+/t	< 2	< 2	<1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44280	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Chromium Reducible Sulfur	B19-Se44280	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44280	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44280	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44280	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se44280	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44280	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44280	CP	% CaCO3	0.70	0.73	4.0	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44280	CP	% S	0.22	0.23	4.0	30%	Pass	
ANC Fineness Factor	B19-Se44280	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44280	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44280	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	B19-Se44280	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44290	CP	pH Units	5.4	5.2	pass	30%	Pass	
Reaction Ratings*	B19-Se44290	CP	comment	4.0	4.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44310	CP	pH Units	6.3	6.3	pass	30%	Pass	
Reaction Ratings*	B19-Se44310	CP	comment	2.0	2.0	pass	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **679874-S**
Project name MIBA - NORTH HARBOUR
Project ID 19210
Received Date Sep 30, 2019

Client Sample ID			**BH056 - 0.0-0.25M**	**BH056 - 0.25-0.5M**	**BH056 - 0.5-0.75M**	**BH056 - 0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44368**	**B19-Se44369**	**B19-Se44370**	**B19-Se44371**
Date Sampled			**Sep 27, 2019**	**Sep 27, 2019**	**Sep 27, 2019**	**Sep 27, 2019**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.4	6.4	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.6	4.8	4.8
Reaction Ratings*[S05]		comment	3.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.4	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	15	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	15	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	1.1	-	-	-
<2mm Fraction	0.005	g	44	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	12	-	-	-

Client Sample ID			BH056 - 1.0-1.25M	BH056 - 1.25-1.5M	BH056 - 1.5-1.75M	BH056 - 1.75-2.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44372	B19-Se44373	B19-Se44374	B19-Se44375
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.6	5.7	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	4.7	4.8	4.6
Reaction Ratings*[S05]		comment	1.0	1.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.5	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	8.5	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	68	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	11	-	-	-

Client Sample ID			BH057 - 0.0-0.25M	BH057 - 0.25-0.5M	BH057 - 0.5-0.75M	BH057 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44376	B19-Se44377	B19-Se44378	B19-Se44379
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.4	6.5	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	4.7	5.0	5.1
Reaction Ratings*[S05]		comment	3.0	3.0	3.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	7.5	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH057 - 0.0-0.25M	BH057 - 0.25-0.5M	BH057 - 0.5-0.75M	BH057 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44376	B19-Se44377	B19-Se44378	B19-Se44379
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	85	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	11	-	-

Client Sample ID			BH057 - 1.0-1.25M	BH057 - 1.25-1.5M	BH057 - 1.5-1.75M	BH057 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44380	B19-Se44381	B19-Se44382	B19-Se44383
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	5.6	5.3	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.5	5.0	4.5	4.5
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	8.3	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-

Client Sample ID			BH057 - 1.0-1.25M	BH057 - 1.25-1.5M	BH057 - 1.5-1.75M	BH057 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44380	B19-Se44381	B19-Se44382	B19-Se44383
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	75	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	11	-	-

Client Sample ID			BH058 - 0.0-0.25M	BH058 - 0.25-0.5M	BH058 - 0.5-0.75M	BH058 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44384	B19-Se44385	B19-Se44386	B19-Se44387
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.6	5.6	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.6	3.9	4.5
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.7	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	4.8	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	82	-
>2mm Fraction	0.005	g	-	-	3.7	-
Analysed Material	0.1	%	-	-	96	-
Extraneous Material	0.1	%	-	-	4.3	-
% Moisture	1	%	-	-	2.5	-

Client Sample ID			BH058 - 1.0-1.25M	BH058 - 1.25-1.5M	BH058 - 1.5-1.75M	BH058 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44388	B19-Se44389	B19-Se44390	B19-Se44391
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.3	5.7	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	4.3	5.2	5.4
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.1	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	11	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.020	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	11	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	91	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	18	-

Client Sample ID			BH059 - 0.0-0.25M	BH059 - 0.25-0.5M	BH059 - 0.5-0.75M	BH059 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44392	B19-Se44393	B19-Se44394	B19-Se44395
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	6.4	5.7	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6	4.9	4.9	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	14
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0

Client Sample ID			BH059 - 0.0-0.25M	BH059 - 0.25-0.5M	BH059 - 0.5-0.75M	BH059 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44392	B19-Se44393	B19-Se44394	B19-Se44395
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	14
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.0
<2mm Fraction	0.005	g	-	-	-	190
>2mm Fraction	0.005	g	-	-	-	< 0.005
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	1	%	-	-	-	11

Client Sample ID			BH059 - 1.0-1.25M	BH059 - 1.25-1.5M	BH059 - 1.5-1.75M	BH059 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44396	B19-Se44397	B19-Se44398	B19-Se44399
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.2	5.5	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.4	4.5	4.7	5.0
Reaction Ratings*[S05]		comment	2.0	2.0	3.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	4.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	23
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	23

Client Sample ID			BH059 - 1.0-1.25M	BH059 - 1.25-1.5M	BH059 - 1.5-1.75M	BH059 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44396	B19-Se44397	B19-Se44398	B19-Se44399
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	1.7
<2mm Fraction	0.005	g	-	-	-	89
>2mm Fraction	0.005	g	-	-	-	1.2
Analysed Material	0.1	%	-	-	-	99
Extraneous Material	0.1	%	-	-	-	1.3
% Moisture	1	%	-	-	-	14

Client Sample ID			BH060 - 0.0-0.25M	BH060 - 0.25-0.5M	BH060 - 0.5-0.75M	BH060 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44400	B19-Se44401	B19-Se44402	B19-Se44403
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.9	5.9	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.4	4.2	4.4
Reaction Ratings*[S05]		comment	3.0	3.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.3	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	11	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	11	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	70	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	10.0	-	-	-

Client Sample ID			BH060 - 1.0-1.25M	BH060 - 1.25-1.5M	BH060 - 1.5-1.75M	BH060 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44404	B19-Se44405	B19-Se44406	B19-Se44407
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.3	5.4	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.6	4.7	4.8	4.8
Reaction Ratings*[S05]		comment	1.0	1.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.4	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	39	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.060	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	15	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.09	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	54	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	4.1	-	-	-
<2mm Fraction	0.005	g	110	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	17	-	-	-

Client Sample ID			BH061 - 0.0-0.25M	BH061 - 0.25-0.5M	BH061 - 0.5-0.75M	BH061 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44408	B19-Se44409	B19-Se44410	B19-Se44411
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.7	5.3	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	3.5	4.3	4.4
Reaction Ratings*[S05]		comment	3.0	3.0	2.0	2.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	41	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.070	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-

Client Sample ID			BH061 - 0.0-0.25M	BH061 - 0.25-0.5M	BH061 - 0.5-0.75M	BH061 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44408	B19-Se44409	B19-Se44410	B19-Se44411
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	0.02	-	-
Net Acid soluble sulfur	0.02	% S	-	0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	51	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.8	-	-
<2mm Fraction	0.005	g	-	140	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	16	-	-

Client Sample ID			BH061 - 1.0-1.25M	BH061 - 1.25-1.5M	BH061 - 1.5-1.75M	BH061 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44412	B19-Se44413	B19-Se44414	B19-Se44415
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.5	5.5	5.7	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	4.8	4.6	4.9
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	24	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.040	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur	0.02	% S	-	0.04	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	21	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.03	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	45	-	-

Client Sample ID			BH061 - 1.0-1.25M	BH061 - 1.25-1.5M	BH061 - 1.5-1.75M	BH061 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44412	B19-Se44413	B19-Se44414	B19-Se44415
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	3.4	-	-
<2mm Fraction	0.005	g	-	100	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	22	-	-

Client Sample ID			BH074 - 0.0-0.25M	BH074 - 0.25-0.5M	BH074 - 0.5-0.75M	BH074 - 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44416	B19-Se44417	B19-Se44418	B19-Se44419
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	6.4	6.3	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	4.1	4.0	4.7
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	5.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	5.5	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	0.010	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur Correction Factor	1	factor	-	2.0	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
<2mm Fraction	0.005	g	-	88	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	1.9	-	-

Client Sample ID			BH074 - 1.0-1.25M	BH074 - 1.25-1.5M	BH074 - 1.5-1.75M	BH074 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44420	B19-Se44421	B19-Se44422	B19-Se44423
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.4	5.9	5.4	5.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.1	4.4	4.4	4.2
Reaction Ratings*[S05]		comment	2.0	2.0	2.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.6	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	5.7	-	-	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	-	-	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	-	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	-	-	-
<2mm Fraction	0.005	g	84	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	8.5	-	-	-

Client Sample ID			BH075 - 0.0-0.25M	BH075 - 0.25-0.5M	BH075 - 0.5-0.75M	BH075 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44424	B19-Se44425	B19-Se44426	B19-Se44427
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	5.9	5.7	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	4.4	4.2	4.4
Reaction Ratings*[S05]		comment	4.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.7	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	4.8	-
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	0.010	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur Correction Factor	1	factor	-	-	2.0	-

Client Sample ID			BH075 - 0.0-0.25M	BH075 - 0.25-0.5M	BH075 - 0.5-0.75M	BH075 - 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44424	B19-Se44425	B19-Se44426	B19-Se44427
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	< 0.02	-
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	< 10	-
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	< 1	-
<2mm Fraction	0.005	g	-	-	140	-
>2mm Fraction	0.005	g	-	-	< 0.005	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	1	%	-	-	2.3	-

Client Sample ID			BH075 - 1.0-1.25M	BH075 - 1.25-1.5M	BH075 - 1.5-1.75M	BH075 - 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			B19-Se44428	B19-Se44429	B19-Se44430	B19-Se44431
Date Sampled			Sep 27, 2019	Sep 27, 2019	Sep 27, 2019	Sep 27, 2019
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.0	5.9	6.0
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.5	4.3	4.9	4.8
Reaction Ratings*[S05]		comment	1.0	2.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	-	6.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	2.7
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	-	-	-	< 0.003
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur Correction Factor	1	factor	-	-	-	2.0
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	-	-	-	< 0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	< 10

Client Sample ID			BH075 - 1.0-1.25M	BH075 - 1.25-1.5M	BH075 - 1.5-1.75M	BH075 - 1.75-2.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**B19-Se44428**	**B19-Se44429**	**B19-Se44430**	**B19-Se44431**
Date Sampled			**Sep 27, 2019**	**Sep 27, 2019**	**Sep 27, 2019**	**Sep 27, 2019**
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	-	-	-	< 1
<2mm Fraction	0.005	g	-	-	-	130
>2mm Fraction	0.005	g	-	-	-	0.60
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	0.5
% Moisture	1	%	-	-	-	13

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Brisbane	Oct 01, 2019	7 Days
- Method: LTM-GEN-7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests			
Chromium Suite (SKCl)	Brisbane	Oct 01, 2019	6 Week
- Method: LTM-GEN-7070			
% Moisture	Brisbane	Sep 30, 2019	14 Days
- Method: LTM-GEN-7080 Moisture			

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Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679874
Phone: 07 5478 9642
Fax:

Received: Sep 30, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	BH056 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44368	X	X	X
2	BH056 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44369	X		
3	BH056 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44370	X		
4	BH056 - 0.75-1.0M	Sep 27, 2019		Soil	B19-Se44371	X		
5	BH056 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44372	X	X	X
6	BH056 - 1.25-	Sep 27, 2019		Soil	B19-Se44373	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
7	BH056 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44374	X		
8	BH056 - 1.75-2.00M	Sep 27, 2019		Soil	B19-Se44375	X		
9	BH057 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44376	X		
10	BH057 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44377	X	X	X
11	BH057 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44378	X		
12	BH057 - 0.75-1.00M	Sep 27, 2019		Soil	B19-Se44379	X		
13	BH057 - 1.0-	Sep 27, 2019		Soil	B19-Se44380	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.25M							
14	BH057 - 1.25-1.5M	Sep 27, 2019		Soil	B19-Se44381	X	X	X
15	BH057 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44382	X		
16	BH057 - 1.75-2.0M	Sep 27, 2019		Soil	B19-Se44383	X		
17	BH058 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44384	X		
18	BH058 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44385	X		
19	BH058 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44386	X	X	X
20	BH058 - 0.75-	Sep 27, 2019		Soil	B19-Se44387	X		

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Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.00M							
21	BH058 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44388	X		
22	BH058 - 1.25-1.5M	Sep 27, 2019		Soil	B19-Se44389	X		
23	BH058 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44390	X	X	X
24	BH058 - 1.75-2.0M	Sep 27, 2019		Soil	B19-Se44391	X		
25	BH059 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44392	X		
26	BH059 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44393	X		
27	BH059 - 0.5-	Sep 27, 2019		Soil	B19-Se44394	X		

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NATA # 1261
Site # 23736

Company Name: Tectonic Geotechnical Pty Ltd
Address: 40A Glen Vista Place
Chevalum
Qld 4555

Project Name: MIBA - NORTH HARBOUR
Project ID: 19210

Order No.:
Report #: 679874
Phone: 07 5478 9642
Fax:

Received: Sep 30, 2019 9:00 AM
Due: Oct 9, 2019
Priority: 7 Day
Contact Name: Mark Thomson

Eurofins Analytical Services Manager : Ryan Gilbert

Sample Detail						Acid Sulfate Soils Field pH Test	Moisture Set	Chromium Suite (SKCl)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.75M							
28	BH059 - 0.75-1.0M	Sep 27, 2019		Soil	B19-Se44395	X	X	X
29	BH059 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44396	X		
30	BH059 - 1.25-1.5M	Sep 27, 2019		Soil	B19-Se44397	X		
31	BH059 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44398	X		
32	BH059 - 1.75-2.0M	Sep 27, 2019		Soil	B19-Se44399	X	X	X
33	BH060 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44400	X	X	X
34	BH060 - 0.25-	Sep 27, 2019		Soil	B19-Se44401	X		

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Site # 1254 & 14271

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.5M							
35	BH060 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44402	X		
36	BH060 - 0.75-1.0M	Sep 27, 2019		Soil	B19-Se44403	X		
37	BH060 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44404	X	X	X
38	BH060 - 1.25-1.5M	Sep 27, 2019		Soil	B19-Se44405	X		
39	BH060 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44406	X		
40	BH060 - 1.75-2.0M	Sep 27, 2019		Soil	B19-Se44407	X		
41	BH061 - 0.0-	Sep 27, 2019		Soil	B19-Se44408	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	0.25M							
42	BH061 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44409	X	X	X
43	BH061 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44410	X		
44	BH061 - 0.75-1.0M	Sep 27, 2019		Soil	B19-Se44411	X		
45	BH061 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44412	X		
46	BH061 - 1.25-1.5M	Sep 27, 2019		Soil	B19-Se44413	X	X	X
47	BH061 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44414	X		
48	BH061 - 1.75-	Sep 27, 2019		Soil	B19-Se44415	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	2.0M							
49	BH074 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44416	X		
50	BH074 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44417	X	X	X
51	BH074 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44418	X		
52	BH074 - 0.75-1.0M	Sep 27, 2019		Soil	B19-Se44419	X		
53	BH074 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44420	X	X	X
54	BH074 - 1.25-1.5M	Sep 27, 2019		Soil	B19-Se44421	X		
55	BH074 - 1.5-	Sep 27, 2019		Soil	B19-Se44422	X		

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Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.75M							
56	BH074 - 1.75-2.0M	Sep 27, 2019		Soil	B19-Se44423	X		
57	BH075 - 0.0-0.25M	Sep 27, 2019		Soil	B19-Se44424	X		
58	BH075 - 0.25-0.5M	Sep 27, 2019		Soil	B19-Se44425	X		
59	BH075 - 0.5-0.75M	Sep 27, 2019		Soil	B19-Se44426	X	X	X
60	BH075 - 0.75-1.00M	Sep 27, 2019		Soil	B19-Se44427	X		
61	BH075 - 1.0-1.25M	Sep 27, 2019		Soil	B19-Se44428	X		
62	BH075 - 1.25-	Sep 27, 2019		Soil	B19-Se44429	X		

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Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X	X	X
Perth Laboratory - NATA Site # 23736								
	1.5M							
63	BH075 - 1.5-1.75M	Sep 27, 2019		Soil	B19-Se44430	X		
64	BH075 - 1.75-2.0M	Sep 27, 2019		Soil	B19-Se44431	X	X	X
Test Counts						64	16	16

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
LCS - % Recovery									
Chromium Suite (SKCl)									
Chromium Reducible Sulfur			%	98			70-130	Pass	
Acid Neutralising Capacity (ANCbt)			%	97			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44368	CP	pH Units	6.2	6.2	pass	30%	Pass	
Reaction Ratings*	B19-Se44368	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44386	CP	pH Units	5.7	5.7	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44386	CP	mol H+/t	4.8	4.9	1.9	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44386	CP	% pyrite S	0.010	0.010	2.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se44386	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44386	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44386	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44386	CP	% S	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - acidity units	B19-Se44386	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44386	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44386	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44386	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se44386	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44386	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44386	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	B19-Se44386	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44398	CP	pH Units	5.5	5.6	pass	30%	Pass	
Reaction Ratings*	B19-Se44398	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	B19-Se44408	CP	pH Units	5.7	5.7	pass	30%	Pass	
Reaction Ratings*	B19-Se44408	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	B19-Se44409	CP	%	16	17	7.0	30%	Pass	
Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
pH-KCL	B19-Se44426	CP	pH Units	5.7	5.7	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	B19-Se44426	CP	mol H+/t	4.8	4.6	5.1	30%	Pass	
sulfidic - TAA equiv. S% pyrite	B19-Se44426	CP	% pyrite S	0.010	0.010	5.0	30%	Pass	
Chromium Reducible Sulfur	B19-Se44426	CP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	B19-Se44426	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	B19-Se44426	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
Net Acid soluble sulfur	B19-Se44426	CP	% S	n/a	n/a	n/a	30%	Pass	

Duplicate									
Chromium Suite (SKCl)				Result 1	Result 2	RPD			
Net Acid soluble sulfur - acidity units	B19-Se44426	CP	mol H+/t	n/a	n/a	n/a	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	B19-Se44426	CP	% S	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity (ANCbt)	B19-Se44426	CP	% CaCO3	n/a	n/a	n/a	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	B19-Se44426	CP	% S	n/a	n/a	n/a	30%	Pass	
ANC Fineness Factor	B19-Se44426	CP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	B19-Se44426	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	B19-Se44426	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	B19-Se44426	CP	kg CaCO3/t	< 1	< 1	<1	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
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised By

Ryan Gilbert	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)



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.

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Certificate of Analysis

Tectonic Geotechnical Pty Ltd
40A Glen Vista Place
Chevalum
Qld 4555

NATA Accredited
Accreditation Number 1261
Site Number 20794

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **567741-S**
Project name BUCKLEY-UHLMANN RD SEWER MAIN
Project ID 17348
Received Date Oct 16, 2017

Client Sample ID			**BH1 0.0-0.25M**	**BH1 0.25-0.5M**	**BH1 0.50-0.75M**	**BH1 0.75-1.00M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B17-Oc17209**	**B17-Oc17210**	**B17-Oc17211**	**B17-Oc17212**
Date Sampled			**Oct 11, 2017**	**Oct 11, 2017**	**Oct 11, 2017**	**Oct 11, 2017**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.4	4.2	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	3.1	2.8	2.8
Reaction Ratings*[S05]		comment	3.0	2.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	4.2	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	59	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.09	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.08	-	-
HCl Extractable Sulfur	0.02	% S	-	0.09	-	-
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.10	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	65	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	4.9	-	-
<2mm Fraction	0.005	g	-	160	-	-
>2mm Fraction	0.005	g	-	< 0.005	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	1	%	-	26	-	-

Client Sample ID			BH1 1.00-1.25M	BH1 1.25-1.5M	BH1 1.5-1.75M	BH1 1.75-2.00M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B17-Oc17213**	**B17-Oc17214**	**B17-Oc17215**	**B17-Oc17216**
Date Sampled			**Oct 11, 2017**	**Oct 11, 2017**	**Oct 11, 2017**	**Oct 11, 2017**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.4	5.1	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	2.7	1.9	1.8
Reaction Ratings*[S05]		comment	1.0	1.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.1	-	-	4.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	70	-	-	47
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.11	-	-	0.08
Chromium Reducible Sulfur[S04]	0.005	% S	0.006	-	-	2.0
Chromium Reducible Sulfur -acidity units	3	mol H+/t	4.0	-	-	1300
Sulfur - KCl Extractable	0.02	% S	0.05	-	-	0.09
HCl Extractable Sulfur	0.02	% S	0.07	-	-	0.10
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.13	-	-	2.1
Net Acidity (Acidity Units)	10	mol H+/t	79	-	-	1300
Liming Rate[S01]	1	kg CaCO3/t	5.9	-	-	98
<2mm Fraction	0.005	g	100	-	-	69
>2mm Fraction	0.005	g	< 0.005	-	-	< 0.005
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	1	%	30	-	-	41

Client Sample ID			BH1 2.00-2.25M	BH1 2.25-2.50M	BH1 2.50-2.75M	BH1 2.75-3.00M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B17-Oc17217**	**B17-Oc17218**	**B17-Oc17219**	**B17-Oc17220**
Date Sampled			**Oct 11, 2017**	**Oct 11, 2017**	**Oct 11, 2017**	**Oct 11, 2017**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	6.2	6.5	6.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.9	1.9	1.8	1.7
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0

Client Sample ID			BH1 3.00-3.25M	BH1 3.25M-3.50M	BH1 3.50-3.75M	BH1 3.75-4.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B17-Oc17221	B17-Oc17222	B17-Oc17223	B17-Oc17224
Date Sampled			Oct 11, 2017	Oct 11, 2017	Oct 11, 2017	Oct 11, 2017
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.6	5.9	6.3	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.7	1.9	2.0	1.8
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	5.0	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	20	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.03	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	2.2	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	1400	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.09	-	-	-
HCl Extractable Sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur	0.02	% S	n/a	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	2.3	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	1400	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	110	-	-	-
<2mm Fraction	0.005	g	65	-	-	-
>2mm Fraction	0.005	g	< 0.005	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	1	%	40	-	-	-

Client Sample ID			BH1 4.00-4.25M	BH1 4.25-4.50M	BH1 4.50-4.75M	BH1 4.75-5.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B17-Oc17225	B17-Oc17226	B17-Oc17227	B17-Oc17228
Date Sampled			Oct 11, 2017	Oct 11, 2017	Oct 11, 2017	Oct 11, 2017
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.5	6.8	6.9	6.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.9	2.1	2.2	2.0
Reaction Ratings*[S05]		comment	4.0	4.0	4.0	4.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	-	-	5.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	5.0	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	< 0.02	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	0.68	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	420	-
Sulfur - KCl Extractable	0.02	% S	-	-	0.05	-
HCl Extractable Sulfur	0.02	% S	-	-	n/a	-
Net Acid soluble sulfur	0.02	% S	-	-	n/a	-

Client Sample ID			BH1 4.00-4.25M	BH1 4.25-4.50M	BH1 4.50-4.75M	BH1 4.75-5.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B17-Oc17225	B17-Oc17226	B17-Oc17227	B17-Oc17228
Date Sampled			Oct 11, 2017	Oct 11, 2017	Oct 11, 2017	Oct 11, 2017
Test/Reference	LOR	Unit				
Chromium Suite (SKCl)						
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.69	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	430	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	32	-
<2mm Fraction	0.005	g	-	-	140	-
>2mm Fraction	0.005	g	-	-	1.9	-
Analysed Material	0.1	%	-	-	99	-
Extraneous Material	0.1	%	-	-	1.3	-
% Moisture	1	%	-	-	21	-

Client Sample ID			BH2 0.0-0.25M	BH2 0.25-0.50M	BH2 0.50-0.75M	BH2 0.75-1.00M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B17-Oc17229	B17-Oc17230	B17-Oc17231	B17-Oc17232
Date Sampled			Oct 09, 2017	Oct 09, 2017	Oct 09, 2017	Oct 09, 2017
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.9	4.5	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.6	3.2	3.7	3.7
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite (SKCl)						
pH-KCL	0.1	pH Units	4.6	-	-	4.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	35	-	-	55
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.06	-	-	0.09
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	0.007
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	5.0
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.06	-	-	0.09
Net Acidity (Acidity Units)	10	mol H+/t	35	-	-	59
Liming Rate[S01]	1	kg CaCO3/t	2.7	-	-	4.4
<2mm Fraction	0.005	g	95	-	-	110
>2mm Fraction	0.005	g	2.3	-	-	< 0.005

eurofins | mgt

Certificate of Analysis

Coffey Geotechnics Pty Ltd S'Coast
Unit 1, 36 Kerryl Street
Kunda Park
QLD 4556

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Attention: **Mark Thomson**

Report **464761-S**
Project name NORTHEAST BUSINESS PARK
Project ID GEOTKPAR01976AC
Received Date Jul 10, 2015

Client Sample ID			**TP301 0.0-0.25M**	**TP301 0.25-0.5M**	**TP301 0.5-0.75M**	**TP301 0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI09603**	**B15-JI09604**	**B15-JI09605**	**B15-JI09606**
Date Sampled			**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	4.0	3.9	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.0	2.9	3.0
Reaction Ratings*[S05]		comment	3.0	2.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.3	-	-	4.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	150	-	-	190
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.24	-	-	0.31
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	0.06
HCl Extractable Sulfur	0.02	% S	0.02	-	-	0.07
Net Acid soluble sulfur	0.02	% S	0.02	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	10	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.02	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.26	-	-	0.31
Net Acidity (Acidity Units)	10	mol H+/t	160	-	-	190
Liming Rate[S01]	1	kg CaCO3/t	12	-	-	15
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	23	-	-	27

Client Sample ID			TP301 1.0-1.25M	TP301 1.25-1.5M	TP301 1.5-1.75M	TP301 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09607	B15-JI09608	B15-JI09609	B15-JI09610
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.8	3.8	4.2	3.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.7	2.6	2.5
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	4.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	180	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	0.29	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	0.05	-
HCl Extractable Sulfur	0.02	% S	-	-	0.05	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.29	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	180	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	14	-
Extraneous Material						
<2mm Fraction	0.005	g	-	-	n/a	-
>2mm Fraction	0.005	g	-	-	n/a	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	0.1	%	-	-	32	-

Client Sample ID			TP302 0.0-0.25M	TP302 0.25-0.5M	TP302 0.5-0.75M	TP302 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09611	B15-JI09612	B15-JI09613	B15-JI09614
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.5	4.4	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.3	3.1	2.7
Reaction Ratings*[S05]		comment	3.0	2.0	1.0	3.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	4.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	160	-	190	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.25	-	0.31	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	0.02	-	0.04	-
HCl Extractable Sulfur	0.02	% S	0.04	-	0.04	-

Client Sample ID			TP311 1.0-1.25M	TP311 1.25-1.5M	TP311 1.5-1.75M	TP311 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09639	B15-JI09640	B15-JI09641	B15-JI09642
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.8	4.4	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.2	2.1	1.9
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.4	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	17	-	140
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.03	-	0.23
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	0.006
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	4.0
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	0.03
HCl Extractable Sulfur	0.02	% S	-	n/a	-	0.06
Net Acid soluble sulfur	0.02	% S	-	n/a	-	0.03
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	15
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.03	-	0.26
Net Acidity (Acidity Units)	10	mol H+/t	-	17	-	160
Liming Rate[S01]	1	kg CaCO3/t	-	1.0	-	12
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	19	-	32

Client Sample ID			TP315 0.0-0.25M	TP315 0.25-0.5M	TP315 0.5-0.75M	TP315 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09643	B15-JI09644	B15-JI09645	B15-JI09646
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	5.0	4.4	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.4	3.0	3.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	-	4.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	150	-	-	200
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.23	-	-	0.32
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	0.02
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	0.02

Client Sample ID			TP315 0.0-0.25M	TP315 0.25-0.5M	TP315 0.5-0.75M	TP315 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09643	B15-JI09644	B15-JI09645	B15-JI09646
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.23	-	-	0.32
Net Acidity (Acidity Units)	10	mol H+/t	150	-	-	200
Liming Rate[S01]	1	kg CaCO3/t	11	-	-	15
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	22	-	-	29

Client Sample ID			TP315 1.0-1.25M	TP315 1.25-1.5M	TP315 1.5-1.75M	TP315 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09647	B15-JI09648	B15-JI09649	B15-JI09650
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.7	5.1	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.2	3.5	2.9
Reaction Ratings*[S05]		comment	1.0	1.0	3.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	3.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	120	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	0.19	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.19	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	120	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	9.0	-

Client Sample ID			TP315 1.0-1.25M	TP315 1.25-1.5M	TP315 1.5-1.75M	TP315 1.75-2.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI09647**	**B15-JI09648**	**B15-JI09649**	**B15-JI09650**
Date Sampled			**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	n/a	-
>2mm Fraction	0.005	g	-	-	n/a	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	0.1	%	-	-	26	-

Client Sample ID			TP316 0.0-0.25M	TP316 0.25-0.5M	TP316 0.5-0.75M	TP316 0.75-1.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI09651**	**B15-JI09652**	**B15-JI09653**	**B15-JI09654**
Date Sampled			**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.1	5.0	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.9	3.8	3.4
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	44	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.07	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	44	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	3.0	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	13	-	-

Client Sample ID			TP316 1.0-1.25M	TP316 1.25-1.5M	TP316 1.5-1.75M	TP316 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09655	B15-JI09656	B15-JI09657	B15-JI09658
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.4	5.0	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	3.8	4.1	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.6	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	48	-	-	64
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.08	-	-	0.10
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.08	-	-	0.11
Net Acidity (Acidity Units)	10	mol H+/t	48	-	-	66
Liming Rate[S01]	1	kg CaCO3/t	4.0	-	-	5.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	12	-	-	16

Client Sample ID			TP317 0.0-0.25M	TP317 0.25-0.5M	TP317 0.5-0.75M	TP317 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09659	B15-JI09660	B15-JI09661	B15-JI09662
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.3	5.5	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.7	4.1	4.1
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.9	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.0	-	27
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	< 0.02	-	0.04
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	n/a	-	n/a

Client Sample ID			TP317 1.0-1.25M	TP317 1.25-1.5M	TP317 1.5-1.75M	TP317 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09663	B15-JI09664	B15-JI09665	B15-JI09666
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	n/a	-
>2mm Fraction	0.005	g	-	-	n/a	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	0.1	%	-	-	14	-

Client Sample ID			TP318 0.0-0.25M	TP318 0.25-0.5M	TP318 0.5-0.75M	TP318 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09667	B15-JI09668	B15-JI09669	B15-JI09670
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.5	5.2	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.5	3.6	3.6
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.9	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.0	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	< 0.02	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	7.2	-	-

Client Sample ID			TP318 1.0-1.25M	TP318 1.25-1.5M	TP318 1.5-1.75M	TP318 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09671	B15-JI09672	B15-JI09673	B15-JI09674
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.7	4.8	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.5	3.5	4.0
Reaction Ratings*[S05]		comment	1.0	2.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.9	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	25	-	-	51
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.04	-	-	0.08
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.04	-	-	0.08
Net Acidity (Acidity Units)	10	mol H+/t	25	-	-	51
Liming Rate[S01]	1	kg CaCO3/t	2.0	-	-	4.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	17	-	-	17

Client Sample ID			TP319 0.0-0.25M	TP319 0.25-0.5M	TP319 0.5-0.75M	TP319 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09675	B15-JI09676	B15-JI09677	B15-JI09678
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.2	5.1	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.9	3.3	4.0
Reaction Ratings*[S05]		comment	2.0	1.0	2.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	5.4	-	4.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	10	-	23	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.02	-	0.04	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	n/a	-	n/a	-

Client Sample ID			TP319 0.0-0.25M	TP319 0.25-0.5M	TP319 0.5-0.75M	TP319 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09675	B15-JI09676	B15-JI09677	B15-JI09678
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	n/a	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	0.02	-	0.04	-
Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	23	-
Liming Rate[S01]	1	kg CaCO3/t	1.0	-	2.0	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	92	-
>2mm Fraction	0.005	g	n/a	-	10	-
Analysed Material	0.1	%	100	-	90	-
Extraneous Material	0.1	%	< 0.1	-	10	-
% Moisture	0.1	%	9.1	-	11	-

Client Sample ID			TP319 1.0-1.25M	TP319 1.25-1.5M	TP319 1.5-1.75M	TP319 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09679	B15-JI09680	B15-JI09681	B15-JI09682
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.9	4.8	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	4.1	4.1	4.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	4.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	73	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	0.12	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.12	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	73	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	5.0	-

Client Sample ID			TP319 1.0-1.25M	TP319 1.25-1.5M	TP319 1.5-1.75M	TP319 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09679	B15-JI09680	B15-JI09681	B15-JI09682
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	90	-
>2mm Fraction	0.005	g	-	-	10	-
Analysed Material	0.1	%	-	-	90	-
Extraneous Material	0.1	%	-	-	10	-
% Moisture	0.1	%	-	-	17	-

Client Sample ID			TP320 0.0-0.25M	TP320 0.25-0.5M	TP320 0.5-0.75M	TP320 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09683	B15-JI09684	B15-JI09685	B15-JI09686
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.0	5.0	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	4.0	4.1	4.3
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	5.7	4.7	-	4.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	4.0	27	-	66
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.04	-	0.11
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	n/a	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	n/a	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	n/a	-	n/a
ANC Fineness Factor		factor	1.5	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.04	-	0.11
Net Acidity (Acidity Units)	10	mol H+/t	< 10	27	-	66
Liming Rate[S01]	1	kg CaCO3/t	< 1	2.0	-	5.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	n/a	-	33
>2mm Fraction	0.005	g	n/a	n/a	-	18
Analysed Material	0.1	%	100	100	-	64
Extraneous Material	0.1	%	< 0.1	< 0.1	-	36
% Moisture	0.1	%	4.8	14	-	16

eurofins | mgt

Certificate of Analysis

Coffey Geotechnics Pty Ltd S'Coast
Unit 1, 36 Kerryl Street
Kunda Park
QLD 4556

NATA Accredited
Accreditation Number 1261
Site Number 1254

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Attention: **Mark Thomson**

Report **465062-S**
Project name NORTHEAST BUSINESS PARK
Project ID GEOTKPAR01976AC
Received Date Jul 13, 2015

Client Sample ID			**TP304 0.0-0.25M**	**TP304 0.25-0.5M**	**TP304 0.5-0.75M**	**TP304 0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI11664**	**B15-JI11665**	**B15-JI11666**	**B15-JI11667**
Date Sampled			**Jul 09, 2015**	**Jul 09, 2015**	**Jul 09, 2015**	**Jul 09, 2015**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.2	4.3	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.7	2.8	3.2
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	160	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.25	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	0.06	-	-
Net Acid soluble sulfur	0.02	% S	-	0.06	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	26	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.04	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.29	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	180	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	14	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	26	-	-

Client Sample ID			TP304 1.0-1.25M	TP304 1.25-1.5M	TP304 1.5-1.75M	TP304 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11668	B15-JI11669	B15-JI11670	B15-JI11671
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.2	4.2	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.5	3.4	3.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.7	-	-	5.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	59	-	-	12
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.09	-	-	0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.09	-	-	0.02
Net Acidity (Acidity Units)	10	mol H+/t	59	-	-	12
Liming Rate[S01]	1	kg CaCO3/t	4.0	-	-	1.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	22	-	-	12

Client Sample ID			TP305 0.0-0.25M	TP305 0.25-0.5M	TP305 0.5-0.75M	TP305 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11672	B15-JI11673	B15-JI11674	B15-JI11675
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.7	4.8	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.2	3.6	3.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	5.1	-	4.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	29	-	33	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.05	-	0.05	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	n/a	-	n/a	-

Client Sample ID			TP305 0.0-0.25M	TP305 0.25-0.5M	TP305 0.5-0.75M	TP305 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11672	B15-JI11673	B15-JI11674	B15-JI11675
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	n/a	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	0.05	-	0.05	-
Net Acidity (Acidity Units)	10	mol H+/t	29	-	33	-
Liming Rate[S01]	1	kg CaCO3/t	2.0	-	3.0	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	n/a	-
>2mm Fraction	0.005	g	n/a	-	n/a	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	0.1	%	11	-	11	-

Client Sample ID			TP305 1.0-1.25M	TP305 1.25-1.5M	TP305 1.5-1.75M	TP305 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11676	B15-JI11677	B15-JI11678	B15-JI11679
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.6	4.4	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.3	3.2	3.5
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.0	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	24	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.04	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.04	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	24	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	2.0	-	-

Client Sample ID			TP305 1.0-1.25M	TP305 1.25-1.5M	TP305 1.5-1.75M	TP305 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11676	B15-JI11677	B15-JI11678	B15-JI11679
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	13	-	-

Client Sample ID			TP306 0.0-0.25M	TP306 0.25-0.5M	TP306 0.5-0.75M	TP306 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11680	B15-JI11681	B15-JI11682	B15-JI11683
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	4.9	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.0	3.1	3.5
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.3	-	4.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	15	-	45
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.02	-	0.07
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	n/a	-	n/a
Net Acid soluble sulfur	0.02	% S	-	n/a	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	0.07
Net Acidity (Acidity Units)	10	mol H+/t	-	15	-	45
Liming Rate[S01]	1	kg CaCO3/t	-	1.0	-	3.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	11	-	15

Client Sample ID			TP306 1.0-1.25M	TP306 1.25-1.5M	TP306 1.5-1.75M	TP306 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11684	B15-JI11685	B15-JI11686	B15-JI11687
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.6	4.4	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.5	3.4	3.6
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	41	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.07	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	41	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	3.0	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	14	-	-

Client Sample ID			TP307 0.0-0.25M	TP307 0.25-0.5M	TP307 0.5-0.75M	TP307 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11688	B15-JI11689	B15-JI11690	B15-JI11691
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.5	4.6	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	2.5	2.8	3.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.3	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	110	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.17	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	-

Client Sample ID			TP307 0.0-0.25M	TP307 0.25-0.5M	TP307 0.5-0.75M	TP307 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11688	B15-JI11689	B15-JI11690	B15-JI11691
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	0.17	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	110	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	8.0	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	25	-	-	-

Client Sample ID			TP307 1.0-1.25M	TP307 1.25-1.5M	TP307 1.5-1.75M	TP307 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11692	B15-JI11693	B15-JI11694	B15-JI11695
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.2	4.9	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.9	3.3	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.7	-	-	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	40	-	-	21
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.06	-	-	0.03
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.06	-	-	0.03
Net Acidity (Acidity Units)	10	mol H+/t	40	-	-	21
Liming Rate[S01]	1	kg CaCO3/t	3.0	-	-	2.0

Client Sample ID			TP307 1.0-1.25M	TP307 1.25-1.5M	TP307 1.5-1.75M	TP307 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11692	B15-JI11693	B15-JI11694	B15-JI11695
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	19	-	-	14

Client Sample ID			TP308 0.0-0.25M	TP308 0.25-0.5M	TP308 0.5-0.75M	TP308 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11696	B15-JI11697	B15-JI11698	B15-JI11699
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.6	5.1	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	3.5	3.1	3.5
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	120	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.20	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	0.20	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	120	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	9.0	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	21	-	-	-

Client Sample ID			TP308 1.0-1.25M	TP308 1.25-1.5M	TP308 1.5-1.75M	TP308 1.75-1.85M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11700	B15-JI11701	B15-JI11702	B15-JI11703
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.7	4.6	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.7	3.7	4.0
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.4	-	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	68	-	-	24
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.11	-	-	0.04
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	0.03	-	-	n/a
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.11	-	-	0.04
Net Acidity (Acidity Units)	10	mol H+/t	71	-	-	24
Liming Rate[S01]	1	kg CaCO3/t	5.0	-	-	2.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	17	-	-	11

Client Sample ID			TP309 0.0-0.25M	TP309 0.25-0.5M	TP309 0.5-0.75M	TP309 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11704	B15-JI11705	B15-JI11706	B15-JI11707
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	4.6	5.3	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.6	2.1	2.9	3.4
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.4	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	120	-	62	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.19	-	0.10	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.008	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.0	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	< 0.02	-

Client Sample ID			TP309 0.0-0.25M	TP309 0.25-0.5M	TP309 0.5-0.75M	TP309 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11704	B15-JI11705	B15-JI11706	B15-JI11707
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	< 0.02	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	0.19	-	0.10	-
Net Acidity (Acidity Units)	10	mol H+/t	120	-	62	-
Liming Rate[S01]	1	kg CaCO3/t	9.0	-	5.0	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	n/a	-
>2mm Fraction	0.005	g	n/a	-	n/a	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	0.1	%	23	-	16	-

Client Sample ID			TP309 1.0-1.25M	TP309 1.25-1.5M	TP309 1.5-1.75M	TP309 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11708	B15-JI11709	B15-JI11710	B15-JI11711
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.3	4.0	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.0	3.7	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	-	4.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	35
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	-	0.06
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.06
Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	35
Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.0

Client Sample ID			TP309 1.0-1.25M	TP309 1.25-1.5M	TP309 1.5-1.75M	TP309 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11708	B15-JI11709	B15-JI11710	B15-JI11711
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	-	n/a
>2mm Fraction	0.005	g	-	-	-	n/a
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	0.1	%	-	-	-	13

Client Sample ID			TP312 0.0-0.25M	TP312 0.25-0.5M	TP312 0.5-0.75M	TP312 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11712	B15-JI11713	B15-JI11714	B15-JI11715
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.8	3.7	4.8	3.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.4	2.7	2.1
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.1	-	4.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	210	-	34
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.33	-	0.05
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	0.04	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	0.06	-	n/a
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.34	-	0.05
Net Acidity (Acidity Units)	10	mol H+/t	-	210	-	34
Liming Rate[S01]	1	kg CaCO3/t	-	16	-	3.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	26	-	16

Client Sample ID			TP333 1.0-1.25M	TP333 1.25-1.5M	TP333 1.5-1.75M	TP333 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08389	B15-JI08390	B15-JI08391	B15-JI08392
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	29	-	-	-

Client Sample ID			TP334 0.0-0.25M	TP334 0.25-0.5M	TP334 0.5-0.75M	TP334 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08393	B15-JI08394	B15-JI08395	B15-JI08396
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.7	4.5	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.3	3.1	2.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.2	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	100	-	99
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.16	-	0.16
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	0.02	-	0.04
HCl Extractable Sulfur	0.02	% S	-	0.03	-	0.04
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.17	-	0.16
Net Acidity (Acidity Units)	10	mol H+/t	-	100	-	99
Liming Rate[S01]	1	kg CaCO3/t	-	8.0	-	7.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	26	-	18

Client Sample ID			TP334 1.0-1.25M	TP334 1.25-1.5M	TP334 1.5-1.75M	TP334 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08397	B15-JI08398	B15-JI08399	B15-JI08400
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	5.1	5.2	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.2	3.0	3.3
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	9.0	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	< 0.02	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	1.0	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	27	-	-

Client Sample ID			TP335 0.0-0.25M	TP335 0.25-0.5M	TP335 0.5-0.75M	TP335 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08401	B15-JI08402	B15-JI08403	B15-JI08404
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.0	4.2	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.9	2.7	2.9	2.9
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0

Client Sample ID			TP335 1.0-1.25M	TP335 1.25-1.5M	TP335 1.5-1.75M	TP335 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08405	B15-JI08406	B15-JI08407	B15-JI08408
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.6	4.9	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.0	2.8	2.5
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0

Client Sample ID			TP336 0.0-0.25M	TP336 0.25-0.5M	TP336 0.5-0.75M	TP336 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08409	B15-JI08410	B15-JI08411	B15-JI08412
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.2	4.0	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.8	2.6	2.7
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	170	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.28	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.068	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	42	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.02	-	-	-
HCl Extractable Sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	0.36	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	220	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	17	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	33	-	-	-

Client Sample ID			TP336 1.0-1.25M	TP336 1.25-1.5M	TP336 1.5-1.75M	TP336 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08413	B15-JI08414	B15-JI08415	B15-JI08416
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.5	4.4	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.6	2.3	2.6
Reaction Ratings*[S05]		comment	1.0	1.0	2.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.6	-	4.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	26	-	48
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.04	-	0.08
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	0.007
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	4.0
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	0.03
HCl Extractable Sulfur	0.02	% S	-	n/a	-	0.03
Net Acid soluble sulfur	0.02	% S	-	n/a	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.04	-	0.09
Net Acidity (Acidity Units)	10	mol H+/t	-	26	-	55
Liming Rate[S01]	1	kg CaCO3/t	-	2.0	-	4.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	29	-	34

Client Sample ID			TP337 0.0-0.25M	TP337 0.25-0.5M	TP337 0.5-0.75M	TP337 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08417	B15-JI08418	B15-JI08419	B15-JI08420
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.2	4.1	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.8	2.9	2.7
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	120	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.20	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.05	-	-
HCl Extractable Sulfur	0.02	% S	-	0.07	-	-

eurofins | mgt

Certificate of Analysis

Coffey Geotechnics Pty Ltd S'Coast
Unit 1, 36 Kerryl Street
Kunda Park
QLD 4556

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Mark Thomson**

Report **464761-S**
Project name NORTHEAST BUSINESS PARK
Project ID GEOTKPAR01976AC
Received Date Jul 10, 2015

Client Sample ID			**TP301 0.0-0.25M**	**TP301 0.25-0.5M**	**TP301 0.5-0.75M**	**TP301 0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI09603**	**B15-JI09604**	**B15-JI09605**	**B15-JI09606**
Date Sampled			**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	4.0	3.9	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.0	2.9	3.0
Reaction Ratings*[S05]		comment	3.0	2.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.3	-	-	4.0
Acid trail - Titratable Actual Acidity	2	mol H+/t	150	-	-	190
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.24	-	-	0.31
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	0.06
HCl Extractable Sulfur	0.02	% S	0.02	-	-	0.07
Net Acid soluble sulfur	0.02	% S	0.02	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	10	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	0.02	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.26	-	-	0.31
Net Acidity (Acidity Units)	10	mol H+/t	160	-	-	190
Liming Rate[S01]	1	kg CaCO3/t	12	-	-	15
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	23	-	-	27

Client Sample ID			TP301 1.0-1.25M	TP301 1.25-1.5M	TP301 1.5-1.75M	TP301 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09607	B15-JI09608	B15-JI09609	B15-JI09610
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.8	3.8	4.2	3.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	2.7	2.6	2.5
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	4.0	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	180	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	0.29	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	0.05	-
HCl Extractable Sulfur	0.02	% S	-	-	0.05	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.29	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	180	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	14	-
Extraneous Material						
<2mm Fraction	0.005	g	-	-	n/a	-
>2mm Fraction	0.005	g	-	-	n/a	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	0.1	%	-	-	32	-

Client Sample ID			TP302 0.0-0.25M	TP302 0.25-0.5M	TP302 0.5-0.75M	TP302 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09611	B15-JI09612	B15-JI09613	B15-JI09614
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.8	4.5	4.4	3.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.3	3.1	2.7
Reaction Ratings*[S05]		comment	3.0	2.0	1.0	3.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	4.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	160	-	190	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.25	-	0.31	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	0.02	-	0.04	-
HCl Extractable Sulfur	0.02	% S	0.04	-	0.04	-

Client Sample ID			TP311 1.0-1.25M	TP311 1.25-1.5M	TP311 1.5-1.75M	TP311 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09639	B15-JI09640	B15-JI09641	B15-JI09642
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.8	4.4	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.2	2.1	1.9
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.4	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	17	-	140
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.03	-	0.23
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	0.006
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	4.0
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	0.03
HCl Extractable Sulfur	0.02	% S	-	n/a	-	0.06
Net Acid soluble sulfur	0.02	% S	-	n/a	-	0.03
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	15
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.03	-	0.26
Net Acidity (Acidity Units)	10	mol H+/t	-	17	-	160
Liming Rate[S01]	1	kg CaCO3/t	-	1.0	-	12
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	19	-	32

Client Sample ID			TP315 0.0-0.25M	TP315 0.25-0.5M	TP315 0.5-0.75M	TP315 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09643	B15-JI09644	B15-JI09645	B15-JI09646
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	5.0	4.4	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.4	3.0	3.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	-	4.2
Acid trail - Titratable Actual Acidity	2	mol H+/t	150	-	-	200
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.23	-	-	0.32
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	0.02
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	0.02

Client Sample ID			TP315 0.0-0.25M	TP315 0.25-0.5M	TP315 0.5-0.75M	TP315 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09643	B15-JI09644	B15-JI09645	B15-JI09646
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.23	-	-	0.32
Net Acidity (Acidity Units)	10	mol H+/t	150	-	-	200
Liming Rate[S01]	1	kg CaCO3/t	11	-	-	15
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	22	-	-	29

Client Sample ID			TP315 1.0-1.25M	TP315 1.25-1.5M	TP315 1.5-1.75M	TP315 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09647	B15-JI09648	B15-JI09649	B15-JI09650
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.7	5.1	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.2	3.5	2.9
Reaction Ratings*[S05]		comment	1.0	1.0	3.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	3.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	120	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	0.19	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.19	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	120	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	9.0	-

Client Sample ID			TP315 1.0-1.25M	TP315 1.25-1.5M	TP315 1.5-1.75M	TP315 1.75-2.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI09647**	**B15-JI09648**	**B15-JI09649**	**B15-JI09650**
Date Sampled			**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	n/a	-
>2mm Fraction	0.005	g	-	-	n/a	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	0.1	%	-	-	26	-

Client Sample ID			TP316 0.0-0.25M	TP316 0.25-0.5M	TP316 0.5-0.75M	TP316 0.75-1.0M
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI09651**	**B15-JI09652**	**B15-JI09653**	**B15-JI09654**
Date Sampled			**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**	**Jul 08, 2015**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.6	5.1	5.0	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.9	3.8	3.4
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.6	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	44	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.07	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	44	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	3.0	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	13	-	-

Client Sample ID			TP316 1.0-1.25M	TP316 1.25-1.5M	TP316 1.5-1.75M	TP316 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09655	B15-JI09656	B15-JI09657	B15-JI09658
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.7	5.4	5.0	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.3	3.8	4.1	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.6	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	48	-	-	64
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.08	-	-	0.10
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	-	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.08	-	-	0.11
Net Acidity (Acidity Units)	10	mol H+/t	48	-	-	66
Liming Rate[S01]	1	kg CaCO3/t	4.0	-	-	5.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	12	-	-	16

Client Sample ID			TP317 0.0-0.25M	TP317 0.25-0.5M	TP317 0.5-0.75M	TP317 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09659	B15-JI09660	B15-JI09661	B15-JI09662
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	5.3	5.5	5.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.7	4.1	4.1
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.9	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.0	-	27
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	< 0.02	-	0.04
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	n/a	-	n/a

Client Sample ID			TP317 1.0-1.25M	TP317 1.25-1.5M	TP317 1.5-1.75M	TP317 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09663	B15-JI09664	B15-JI09665	B15-JI09666
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	n/a	-
>2mm Fraction	0.005	g	-	-	n/a	-
Analysed Material	0.1	%	-	-	100	-
Extraneous Material	0.1	%	-	-	< 0.1	-
% Moisture	0.1	%	-	-	14	-

Client Sample ID			TP318 0.0-0.25M	TP318 0.25-0.5M	TP318 0.5-0.75M	TP318 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09667	B15-JI09668	B15-JI09669	B15-JI09670
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.3	5.5	5.2	5.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.1	3.5	3.6	3.6
Reaction Ratings*[S05]		comment	2.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.9	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	4.0	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	< 0.02	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	< 1	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	7.2	-	-

Client Sample ID			TP318 1.0-1.25M	TP318 1.25-1.5M	TP318 1.5-1.75M	TP318 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09671	B15-JI09672	B15-JI09673	B15-JI09674
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.7	4.8	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.7	3.5	3.5	4.0
Reaction Ratings*[S05]		comment	1.0	2.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.9	-	-	4.5
Acid trail - Titratable Actual Acidity	2	mol H+/t	25	-	-	51
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.04	-	-	0.08
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.04	-	-	0.08
Net Acidity (Acidity Units)	10	mol H+/t	25	-	-	51
Liming Rate[S01]	1	kg CaCO3/t	2.0	-	-	4.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	17	-	-	17

Client Sample ID			TP319 0.0-0.25M	TP319 0.25-0.5M	TP319 0.5-0.75M	TP319 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09675	B15-JI09676	B15-JI09677	B15-JI09678
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	5.2	5.1	5.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.9	3.3	4.0
Reaction Ratings*[S05]		comment	2.0	1.0	2.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	5.4	-	4.8	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	10	-	23	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.02	-	0.04	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	n/a	-	n/a	-

Client Sample ID			TP319 0.0-0.25M	TP319 0.25-0.5M	TP319 0.5-0.75M	TP319 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09675	B15-JI09676	B15-JI09677	B15-JI09678
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	n/a	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	0.02	-	0.04	-
Net Acidity (Acidity Units)	10	mol H+/t	< 10	-	23	-
Liming Rate[S01]	1	kg CaCO3/t	1.0	-	2.0	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	92	-
>2mm Fraction	0.005	g	n/a	-	10	-
Analysed Material	0.1	%	100	-	90	-
Extraneous Material	0.1	%	< 0.1	-	10	-
% Moisture	0.1	%	9.1	-	11	-

Client Sample ID			TP319 1.0-1.25M	TP319 1.25-1.5M	TP319 1.5-1.75M	TP319 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09679	B15-JI09680	B15-JI09681	B15-JI09682
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.9	4.8	5.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.9	4.1	4.1	4.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	4.2	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	73	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	0.12	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	-	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur	0.02	% S	-	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	n/a	-
ANC Fineness Factor		factor	-	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	-	-	0.12	-
Net Acidity (Acidity Units)	10	mol H+/t	-	-	73	-
Liming Rate[S01]	1	kg CaCO3/t	-	-	5.0	-

Client Sample ID			TP319 1.0-1.25M	TP319 1.25-1.5M	TP319 1.5-1.75M	TP319 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09679	B15-JI09680	B15-JI09681	B15-JI09682
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	90	-
>2mm Fraction	0.005	g	-	-	10	-
Analysed Material	0.1	%	-	-	90	-
Extraneous Material	0.1	%	-	-	10	-
% Moisture	0.1	%	-	-	17	-

Client Sample ID			TP320 0.0-0.25M	TP320 0.25-0.5M	TP320 0.5-0.75M	TP320 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI09683	B15-JI09684	B15-JI09685	B15-JI09686
Date Sampled			Jul 08, 2015	Jul 08, 2015	Jul 08, 2015	Jul 08, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.2	5.0	5.0	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	4.0	4.1	4.3
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	5.7	4.7	-	4.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	4.0	27	-	66
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	< 0.02	0.04	-	0.11
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	< 0.02	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	n/a	-	< 0.02
Net Acid soluble sulfur	0.02	% S	n/a	n/a	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	n/a	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	n/a	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	n/a	-	n/a
ANC Fineness Factor		factor	1.5	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.04	-	0.11
Net Acidity (Acidity Units)	10	mol H+/t	< 10	27	-	66
Liming Rate[S01]	1	kg CaCO3/t	< 1	2.0	-	5.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	n/a	-	33
>2mm Fraction	0.005	g	n/a	n/a	-	18
Analysed Material	0.1	%	100	100	-	64
Extraneous Material	0.1	%	< 0.1	< 0.1	-	36
% Moisture	0.1	%	4.8	14	-	16

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Certificate of Analysis

Coffey Geotechnics Pty Ltd S'Coast
Unit 1, 36 Kerryl Street
Kunda Park
QLD 4556

NATA Accredited
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Attention: **Mark Thomson**

Report **465062-S**
Project name NORTHEAST BUSINESS PARK
Project ID GEOTKPAR01976AC
Received Date Jul 13, 2015

Client Sample ID			**TP304 0.0-0.25M**	**TP304 0.25-0.5M**	**TP304 0.5-0.75M**	**TP304 0.75-1.0M**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**B15-JI11664**	**B15-JI11665**	**B15-JI11666**	**B15-JI11667**
Date Sampled			**Jul 09, 2015**	**Jul 09, 2015**	**Jul 09, 2015**	**Jul 09, 2015**
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.2	4.3	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.0	2.7	2.8	3.2
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	160	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.25	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	0.06	-	-
Net Acid soluble sulfur	0.02	% S	-	0.06	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	26	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	0.04	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.29	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	180	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	14	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	26	-	-

Client Sample ID			TP304 1.0-1.25M	TP304 1.25-1.5M	TP304 1.5-1.75M	TP304 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11668	B15-JI11669	B15-JI11670	B15-JI11671
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.2	4.2	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.5	3.4	3.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.7	-	-	5.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	59	-	-	12
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.09	-	-	0.02
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.09	-	-	0.02
Net Acidity (Acidity Units)	10	mol H+/t	59	-	-	12
Liming Rate[S01]	1	kg CaCO3/t	4.0	-	-	1.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	22	-	-	12

Client Sample ID			TP305 0.0-0.25M	TP305 0.25-0.5M	TP305 0.5-0.75M	TP305 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11672	B15-JI11673	B15-JI11674	B15-JI11675
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.7	4.8	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.2	3.6	3.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	5.1	-	4.9	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	29	-	33	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.05	-	0.05	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	n/a	-	n/a	-

Client Sample ID			TP305 0.0-0.25M	TP305 0.25-0.5M	TP305 0.5-0.75M	TP305 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11672	B15-JI11673	B15-JI11674	B15-JI11675
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	n/a	-	n/a	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	n/a	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	n/a	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	0.05	-	0.05	-
Net Acidity (Acidity Units)	10	mol H+/t	29	-	33	-
Liming Rate[S01]	1	kg CaCO3/t	2.0	-	3.0	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	n/a	-
>2mm Fraction	0.005	g	n/a	-	n/a	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	0.1	%	11	-	11	-

Client Sample ID			TP305 1.0-1.25M	TP305 1.25-1.5M	TP305 1.5-1.75M	TP305 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11676	B15-JI11677	B15-JI11678	B15-JI11679
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.6	4.4	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.3	3.2	3.5
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.0	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	24	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.04	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.04	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	24	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	2.0	-	-

Client Sample ID			TP305 1.0-1.25M	TP305 1.25-1.5M	TP305 1.5-1.75M	TP305 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11676	B15-JI11677	B15-JI11678	B15-JI11679
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	13	-	-

Client Sample ID			TP306 0.0-0.25M	TP306 0.25-0.5M	TP306 0.5-0.75M	TP306 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11680	B15-JI11681	B15-JI11682	B15-JI11683
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.4	4.9	4.5	4.7
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	3.0	3.1	3.5
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.3	-	4.6
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	15	-	45
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.02	-	0.07
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	n/a	-	n/a
Net Acid soluble sulfur	0.02	% S	-	n/a	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.02	-	0.07
Net Acidity (Acidity Units)	10	mol H+/t	-	15	-	45
Liming Rate[S01]	1	kg CaCO3/t	-	1.0	-	3.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	11	-	15

Client Sample ID			TP306 1.0-1.25M	TP306 1.25-1.5M	TP306 1.5-1.75M	TP306 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11684	B15-JI11685	B15-JI11686	B15-JI11687
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.6	4.4	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.4	3.5	3.4	3.6
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.5	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	41	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.07	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	0.07	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	41	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	3.0	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	14	-	-

Client Sample ID			TP307 0.0-0.25M	TP307 0.25-0.5M	TP307 0.5-0.75M	TP307 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11688	B15-JI11689	B15-JI11690	B15-JI11691
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.5	4.6	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.6	2.5	2.8	3.2
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.3	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	110	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.17	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	-

Client Sample ID			TP307 0.0-0.25M	TP307 0.25-0.5M	TP307 0.5-0.75M	TP307 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11688	B15-JI11689	B15-JI11690	B15-JI11691
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	0.17	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	110	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	8.0	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	25	-	-	-

Client Sample ID			TP307 1.0-1.25M	TP307 1.25-1.5M	TP307 1.5-1.75M	TP307 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11692	B15-JI11693	B15-JI11694	B15-JI11695
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.2	4.9	5.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	2.9	3.3	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.7	-	-	5.1
Acid trail - Titratable Actual Acidity	2	mol H+/t	40	-	-	21
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.06	-	-	0.03
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur	0.02	% S	n/a	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	n/a	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	n/a	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.06	-	-	0.03
Net Acidity (Acidity Units)	10	mol H+/t	40	-	-	21
Liming Rate[S01]	1	kg CaCO3/t	3.0	-	-	2.0

Client Sample ID			TP307 1.0-1.25M	TP307 1.25-1.5M	TP307 1.5-1.75M	TP307 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11692	B15-JI11693	B15-JI11694	B15-JI11695
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	19	-	-	14

Client Sample ID			TP308 0.0-0.25M	TP308 0.25-0.5M	TP308 0.5-0.75M	TP308 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11696	B15-JI11697	B15-JI11698	B15-JI11699
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.0	4.6	5.1	4.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.7	3.5	3.1	3.5
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	120	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.20	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	-	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	0.20	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	120	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	9.0	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	21	-	-	-

Client Sample ID			TP308 1.0-1.25M	TP308 1.25-1.5M	TP308 1.5-1.75M	TP308 1.75-1.85M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11700	B15-JI11701	B15-JI11702	B15-JI11703
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.7	4.6	4.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.8	3.7	3.7	4.0
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.4	-	-	4.8
Acid trail - Titratable Actual Acidity	2	mol H+/t	68	-	-	24
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.11	-	-	0.04
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	0.02	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	0.03	-	-	n/a
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	n/a
ANC Fineness Factor		factor	1.5	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	0.11	-	-	0.04
Net Acidity (Acidity Units)	10	mol H+/t	71	-	-	24
Liming Rate[S01]	1	kg CaCO3/t	5.0	-	-	2.0
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	n/a
>2mm Fraction	0.005	g	n/a	-	-	n/a
Analysed Material	0.1	%	100	-	-	100
Extraneous Material	0.1	%	< 0.1	-	-	< 0.1
% Moisture	0.1	%	17	-	-	11

Client Sample ID			TP309 0.0-0.25M	TP309 0.25-0.5M	TP309 0.5-0.75M	TP309 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11704	B15-JI11705	B15-JI11706	B15-JI11707
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.1	4.6	5.3	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.6	2.1	2.9	3.4
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.4	-	4.5	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	120	-	62	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.19	-	0.10	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.008	-	< 0.005	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	5.0	-	< 3	-
Sulfur - KCl Extractable	0.02	% S	< 0.02	-	< 0.02	-
HCl Extractable Sulfur	0.02	% S	< 0.02	-	< 0.02	-

Client Sample ID			TP309 0.0-0.25M	TP309 0.25-0.5M	TP309 0.5-0.75M	TP309 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11704	B15-JI11705	B15-JI11706	B15-JI11707
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Chromium Suite						
Net Acid soluble sulfur	0.02	% S	< 0.02	-	< 0.02	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	< 10	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	< 0.02	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	n/a	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	n/a	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	n/a	-
ANC Fineness Factor		factor	1.5	-	1.5	-
Net Acidity (Sulfur Units)	0.02	% S	0.19	-	0.10	-
Net Acidity (Acidity Units)	10	mol H+/t	120	-	62	-
Liming Rate[S01]	1	kg CaCO3/t	9.0	-	5.0	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	n/a	-
>2mm Fraction	0.005	g	n/a	-	n/a	-
Analysed Material	0.1	%	100	-	100	-
Extraneous Material	0.1	%	< 0.1	-	< 0.1	-
% Moisture	0.1	%	23	-	16	-

Client Sample ID			TP309 1.0-1.25M	TP309 1.25-1.5M	TP309 1.5-1.75M	TP309 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11708	B15-JI11709	B15-JI11710	B15-JI11711
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.6	4.3	4.0	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.5	3.0	3.7	4.4
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	-	-	4.7
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	-	-	35
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	-	-	0.06
Chromium Reducible Sulfur[S04]	0.005	% S	-	-	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	-	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	-	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur	0.02	% S	-	-	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	-	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	-	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	-	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	-	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	-	-	n/a
ANC Fineness Factor		factor	-	-	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	-	-	0.06
Net Acidity (Acidity Units)	10	mol H+/t	-	-	-	35
Liming Rate[S01]	1	kg CaCO3/t	-	-	-	3.0

Client Sample ID			TP309 1.0-1.25M	TP309 1.25-1.5M	TP309 1.5-1.75M	TP309 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11708	B15-JI11709	B15-JI11710	B15-JI11711
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	-	-	-	n/a
>2mm Fraction	0.005	g	-	-	-	n/a
Analysed Material	0.1	%	-	-	-	100
Extraneous Material	0.1	%	-	-	-	< 0.1
% Moisture	0.1	%	-	-	-	13

Client Sample ID			TP312 0.0-0.25M	TP312 0.25-0.5M	TP312 0.5-0.75M	TP312 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI11712	B15-JI11713	B15-JI11714	B15-JI11715
Date Sampled			Jul 09, 2015	Jul 09, 2015	Jul 09, 2015	Jul 09, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	3.8	3.7	4.8	3.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.4	2.7	2.1
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.1	-	4.9
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	210	-	34
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.33	-	0.05
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	0.04	-	< 0.02
HCl Extractable Sulfur	0.02	% S	-	0.06	-	n/a
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	n/a
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	n/a
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	n/a
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.34	-	0.05
Net Acidity (Acidity Units)	10	mol H+/t	-	210	-	34
Liming Rate[S01]	1	kg CaCO3/t	-	16	-	3.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	26	-	16

Client Sample ID			TP333 1.0-1.25M	TP333 1.25-1.5M	TP333 1.5-1.75M	TP333 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08389	B15-JI08390	B15-JI08391	B15-JI08392
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	29	-	-	-

Client Sample ID			TP334 0.0-0.25M	TP334 0.25-0.5M	TP334 0.5-0.75M	TP334 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08393	B15-JI08394	B15-JI08395	B15-JI08396
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.9	4.7	4.5	4.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	3.2	3.3	3.1	2.8
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.2	-	4.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	100	-	99
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.16	-	0.16
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	< 3
Sulfur - KCl Extractable	0.02	% S	-	0.02	-	0.04
HCl Extractable Sulfur	0.02	% S	-	0.03	-	0.04
Net Acid soluble sulfur	0.02	% S	-	< 0.02	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	< 10	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	< 0.02	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.17	-	0.16
Net Acidity (Acidity Units)	10	mol H+/t	-	100	-	99
Liming Rate[S01]	1	kg CaCO3/t	-	8.0	-	7.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	26	-	18

Client Sample ID			TP334 1.0-1.25M	TP334 1.25-1.5M	TP334 1.5-1.75M	TP334 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08397	B15-JI08398	B15-JI08399	B15-JI08400
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	5.1	5.2	5.3
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.8	3.2	3.0	3.3
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	5.4	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	9.0	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	< 0.02	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	-
HCl Extractable Sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur	0.02	% S	-	n/a	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	-
ANC Fineness Factor		factor	-	1.5	-	-
Net Acidity (Sulfur Units)	0.02	% S	-	< 0.02	-	-
Net Acidity (Acidity Units)	10	mol H+/t	-	< 10	-	-
Liming Rate[S01]	1	kg CaCO3/t	-	1.0	-	-
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	-
>2mm Fraction	0.005	g	-	n/a	-	-
Analysed Material	0.1	%	-	100	-	-
Extraneous Material	0.1	%	-	< 0.1	-	-
% Moisture	0.1	%	-	27	-	-

Client Sample ID			TP335 0.0-0.25M	TP335 0.25-0.5M	TP335 0.5-0.75M	TP335 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08401	B15-JI08402	B15-JI08403	B15-JI08404
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.7	4.0	4.2	4.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	1.9	2.7	2.9	2.9
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0

Client Sample ID			TP335 1.0-1.25M	TP335 1.25-1.5M	TP335 1.5-1.75M	TP335 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08405	B15-JI08406	B15-JI08407	B15-JI08408
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.2	4.6	4.9	4.9
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	3.0	2.8	2.5
Reaction Ratings*[S05]		comment	1.0	1.0	1.0	1.0

Client Sample ID			TP336 0.0-0.25M	TP336 0.25-0.5M	TP336 0.5-0.75M	TP336 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08409	B15-JI08410	B15-JI08411	B15-JI08412
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.4	4.2	4.0	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.3	2.8	2.6	2.7
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	4.2	-	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	170	-	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	0.28	-	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	0.068	-	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	42	-	-	-
Sulfur - KCl Extractable	0.02	% S	0.02	-	-	-
HCl Extractable Sulfur	0.02	% S	0.03	-	-	-
Net Acid soluble sulfur	0.02	% S	< 0.02	-	-	-
Net Acid soluble sulfur - acidity units	10	mol H+/t	< 10	-	-	-
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	< 0.02	-	-	-
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	n/a	-	-	-
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	n/a	-	-	-
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	n/a	-	-	-
ANC Fineness Factor		factor	1.5	-	-	-
Net Acidity (Sulfur Units)	0.02	% S	0.36	-	-	-
Net Acidity (Acidity Units)	10	mol H+/t	220	-	-	-
Liming Rate[S01]	1	kg CaCO3/t	17	-	-	-
Extraneous Material						
<2mm Fraction	0.005	g	n/a	-	-	-
>2mm Fraction	0.005	g	n/a	-	-	-
Analysed Material	0.1	%	100	-	-	-
Extraneous Material	0.1	%	< 0.1	-	-	-
% Moisture	0.1	%	33	-	-	-

Client Sample ID			TP336 1.0-1.25M	TP336 1.25-1.5M	TP336 1.5-1.75M	TP336 1.75-2.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08413	B15-JI08414	B15-JI08415	B15-JI08416
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.5	4.4	4.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.9	2.6	2.3	2.6
Reaction Ratings*[S05]		comment	1.0	1.0	2.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.6	-	4.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	26	-	48
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.04	-	0.08
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	0.007
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	4.0
Sulfur - KCl Extractable	0.02	% S	-	< 0.02	-	0.03
HCl Extractable Sulfur	0.02	% S	-	n/a	-	0.03
Net Acid soluble sulfur	0.02	% S	-	n/a	-	< 0.02
Net Acid soluble sulfur - acidity units	10	mol H+/t	-	n/a	-	< 10
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	-	n/a	-	< 0.02
Acid Neutralising Capacity (ANCbt)	0.01	%CaCO3	-	n/a	-	n/a
Acid Neutralising Capacity - acidity (ANCbt)	2	mol H+/t	-	n/a	-	n/a
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	-	n/a	-	n/a
ANC Fineness Factor		factor	-	1.5	-	1.5
Net Acidity (Sulfur Units)	0.02	% S	-	0.04	-	0.09
Net Acidity (Acidity Units)	10	mol H+/t	-	26	-	55
Liming Rate[S01]	1	kg CaCO3/t	-	2.0	-	4.0
Extraneous Material						
<2mm Fraction	0.005	g	-	n/a	-	n/a
>2mm Fraction	0.005	g	-	n/a	-	n/a
Analysed Material	0.1	%	-	100	-	100
Extraneous Material	0.1	%	-	< 0.1	-	< 0.1
% Moisture	0.1	%	-	29	-	34

Client Sample ID			TP337 0.0-0.25M	TP337 0.25-0.5M	TP337 0.5-0.75M	TP337 0.75-1.0M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			B15-JI08417	B15-JI08418	B15-JI08419	B15-JI08420
Date Sampled			Jul 07, 2015	Jul 07, 2015	Jul 07, 2015	Jul 07, 2015
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	4.5	4.2	4.1	4.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	2.2	2.8	2.9	2.7
Reaction Ratings*[S05]		comment	3.0	1.0	1.0	1.0
Chromium Suite						
pH-KCL	0.1	pH Units	-	4.1	-	-
Acid trail - Titratable Actual Acidity	2	mol H+/t	-	120	-	-
sulfidic - TAA equiv. S% pyrite	0.02	% pyrite S	-	0.20	-	-
Chromium Reducible Sulfur[S04]	0.005	% S	-	< 0.005	-	-
Chromium Reducible Sulfur -acidity units	3	mol H+/t	-	< 3	-	-
Sulfur - KCl Extractable	0.02	% S	-	0.05	-	-
HCl Extractable Sulfur	0.02	% S	-	0.07	-	-

APPENDIX C

Limitations

LIMITATIONS

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APPENDIX 8 – ADDENDUM TO ACID SULFATE SOIL MANAGEMENT PLAN (TECTONIC GEOTECHNICAL 2023)

31 October 2023 Project No. 19210-032-Rev0

North Harbour Holdings Pty Ltd
Attention: Mr Michael McErlean

Email: michael@northharbour.com.au

ADDENDUM TO ACID SULFATE SOIL MANAGEMENT PLAN
PROPOSED SPORTS FIELDS BULK EARTHWORKS
NORTH HARBOUR MIXED INDUSTRY AND BUSINESS AREA (MIBA)

Dear Michael,

1.0 INTRODUCTION

This report has been prepared to address the acid sulfate soil (ASS) hazard for updated bulk earthworks design, including proposed sports fields and drainage, located in the north-western corner of the integrated industrial and business precinct, known as the North Harbour Mixed Industry and Business Area (MIBA). Tectonic was asked by North Harbour to review the ASS hazard posed by the revised design and to recommend management strategies, if necessary, to mitigate any risk of environmental impacts.

This report has been prepared as an addendum to the existing approved ASS management plan for the North Harbour MIBA (Tectonic ref. 19210-001-Rev0, dated 9 November 2019).

2.0 PROPOSED DEVELOPMENT

2.1 North Harbour MIBA (Approved Development)

The North Harbour MIBA project is located adjacent to the Bruce Highway on the southern bank of the Caboolture River near Burpengary, approximately 8 km inland from the coastline. The 260 ha development area borders tidal waters of the Caboolture River and has relatively low ground surface elevations across some parts, ranging from around RL 2 m to RL 19 m AHD. The precinct is expected to facilitate a mix of industry and business use areas, and will consist of the development of low, medium and high density industrial and commercial spaces, associated road and infrastructure (including an arterial connection to other precincts), compensatory cut areas, drainage wetlands and landscaped public space.

An ASS investigation was completed in 2019 comprising a review of the then proposed MIBA earthworks, local geology and ASS risk mapping, followed by a targeted site investigation including completion of 85 boreholes. Soil sampling and laboratory analysis was conducted on over 850 soil samples, including over 220 quantitative tests using the Chromium Reducible Sulfur (CRS) test method. Based on these investigation results, the soil conditions across the site were characterised and, where proposed works were expected to disturb acidic soils, management strategies were prescribed to mitigate risk to the local environment.

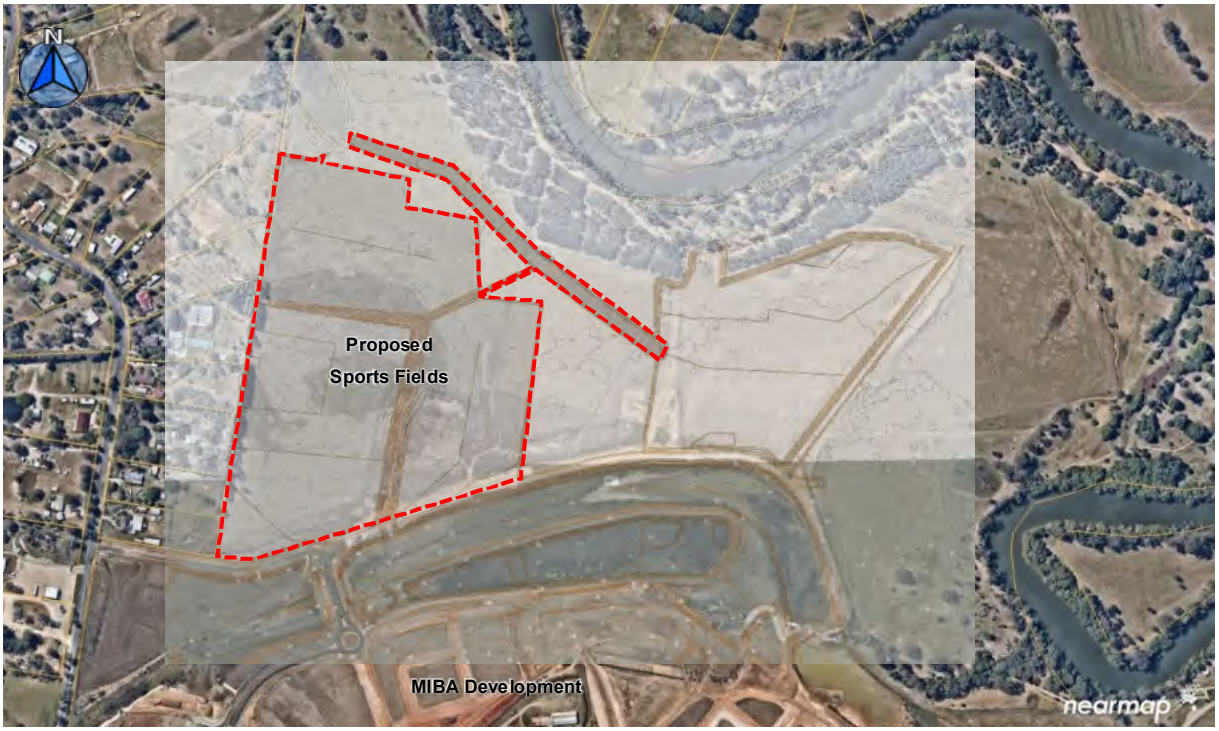
2.2 North-western Sports Fields

Bulk earthworks plans prepared by KN Group (Dwg Nos. 23-138-01 to 23-138-05, dated August 2023) show an updated design for proposed sports fields across an approximate 16 ha area in the north-western part of the MIBA. Earthworks for the proposed sports fields will include shallow cut and placement of up to 1 m of fill to achieve a finished surface level of approximately RL 5 m AHD.

Broad, shallow surface drainage will be constructed as part of the sports fields development to convey stormwater runoff toward low lying land to the north-east. These drains are expected to be up to about 1.3 m below the design surface level (~RL 3.7 m AHD).

A larger formal surface water drain will be constructed to the north of the sports field, within an area formerly delineated as the northern borrow / compensatory cut area. Stormwater flows will generally be directed toward the completed eastern part of the borrow / compensatory cut area, then discharging to the Caboolture River. Construction of this surface water drain will involve excavation up to 1.5 m below existing ground level, extending no deeper than RL 2.5 m AHD. This is generally consistent with previously proposed borrow / compensatory cut excavations for the area. Material won from excavation is expected to be reused as fill across other parts of the site.

Text Figure 1 shows the north-western part of the MIBA development area with the proposed sports fields earthworks plan overlayed.



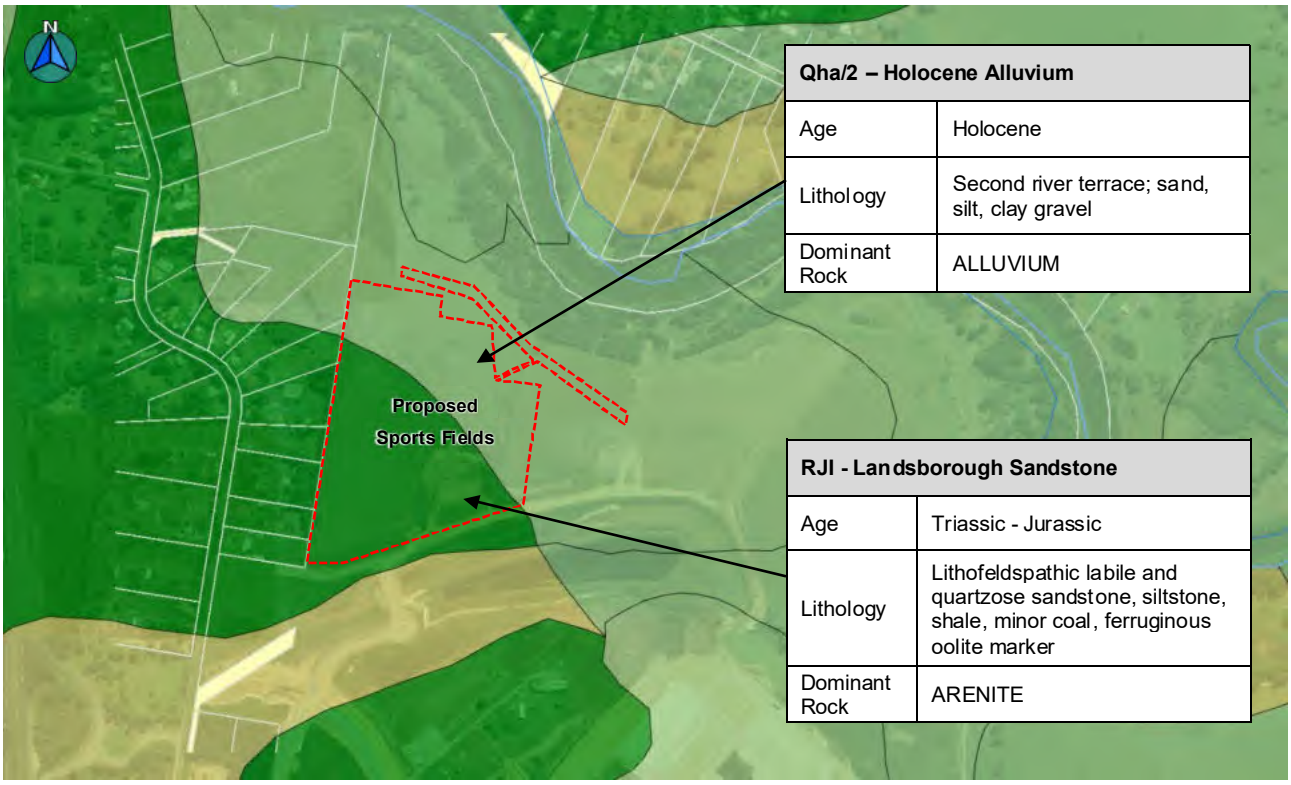
Text Figure 1: Proposed Sports Field and Drainage Development Area

3.0 ASS ASSESSMENT

3.1 Regional Geology & ASS Hazard Mapping

Geological Survey of Queensland 1:100,000 scale Caboolture and Brisbane maps indicate that the soil profile across most of the proposed sports fields comprises Triassic to Jurassic age Landsborough Sandstone, with Holocene age river terrace alluvium present in proximity to Caboolture River (ref. Text Figure 2 overleaf). The freshwater, alluvial formation of the Landsborough Sandstone formation is not associated with the development of ASS. Furthermore, where the much younger river terrace alluvium exists above RL 5 m there is a low potential for ASS materials to exist.

Queensland Government's *Acid Sulfate Soils Redcliffe to Teewah Map 2* (NR&M-SEA-I-A0 3261) covering the region indicates the presence of primarily low probability land types for ASS across parts of the proposed development area situated below RL 5 m. Areas located above RL 5 m are considered beyond the outer limit of Holocene estuarine ASS and therefore also have very low probability of ASS occurrence.



Text Figure 2: Extract of geology map with annotations by Tectonic

3.2 Site Investigation & Laboratory Analysis

As part of the earlier ASS investigation a total of 15 boreholes (BH40 to BH45, BH49 to BH54 & BH83 to BH85) were completed across the currently proposed sports field and drainage areas, being the location of former borrow / compensatory cut area. Boreholes were typically located across areas with ground surface levels below RL 5 m AHD to characterise the presence or absence of ASS within the alluvial soils.

Subsurface conditions typically comprised stiff to very stiff, silty clay (river terrace alluvium) to the investigation target depth of 3.5 m, with some dense, clayey sand recorded within the upper 1 m in boreholes BH40 and BH45. No seepage or standing groundwater was observed in any of the boreholes.

From these boreholes a total of 164 samples were dispatched to a laboratory for testing. All samples were screened to determine field pH (pH_F) and pH after peroxide oxidation (pH_{FOX}), with 47 samples also selected to undergo quantitative analysis using the CRS suite.

Of the 47 samples selected for quantitative testing from these locations, 14 samples recorded TAA values above 18 mol H+ per tonne, thus indicating the presence of some existing acidity variably distributed throughout the soil profile. Levels of soluble sulfur (S_{KCl}) within these exceeding samples were all less than 0.02%, indicating this to be entirely non-sulfuric acidity. The strength of the existing acidity measured was between < 3 to 38 mol H+ per tonne, with an average of 12 mol H+ per tonne.

No oxidisable sulfur (S_{CR}%) was recorded above the lowest recordable limit of 0.005%, this being much less the threshold limit defining potential ASS of 0.03%.

4.0 ASS RISK CHARACTERISATION

While samples were found to contain some actual acidity, the acid present was not sulfuric in nature and was not derived because of oxidation of ASS. These soils are therefore characterised as **Non-ASS but containing minor levels of non-sulfuric acidity (termed ANS)**.

It is noted that the strength of the existing non-sulfuric acidity is less than 38 mol H+ per tonne (on average less than 18 mol H+ per tonne) and is therefore likely to cause negligible environmental impact when disturbed as part of the proposed bulk earthworks for the sports fields. Excavation of materials for the sports fields and associated drainage, together with the reuse of such materials as fill, may therefore be completed without need for specific ASS management measures.

Furthermore, proposed earthworks for the sports fields will involve excavation in residual soils above RL 5 m AHD, and placement of fill across natural stiff (or stiffer) clay soils. These works would not result in alteration to existing groundwater conditions or displacement of ASS.

No further site assessment regarding ASS is warranted for the proposed sports fields bulk earthworks.

Your attention is drawn to the document *Limitations*, which is attached at the end of this report. The statements presented in this document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks associated with the services provided by Tectonic for this project.

Please contact the undersigned should you wish to discuss any of the above matters.

Yours faithfully

TECTONIC GEOTECHNICAL PTY LTD



Mark Thomson BSc, CPESC
Senior Environmental Scientist



Ashley Davey RPEQ 8159
Principal Geotechnical Engineer

Attachments: Limitations

LIMITATIONS

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APPENDIX 9 – EXAMPLE OF CORRECTIVE ACTION REPORT FORM

CORRECTIVE ACTION REPORT			
Report No.			
Prepared By:		**Position:**	
Date		**Time:**	
Details Of Non-Conformance:			
Date:		**Time:**	
Location:			
Inspected By:		**Position:**	
Description of Event:			
Likely Causes:			
Details of Corrective Action/s:			
Proposed Corrective Action/s:			
Dated Submitted to Developer:		**Reply Required By:**	
Dated Submitted to Regulator:		**Reply Required By:**	
Consultant/Expert/Regulator Advice (if required):			
Date Corrective Action Required By:			
Person Responsible for Corrective Action:			
Corrective Action Authorised By:		**Date/Signed:**	
Date Corrective Action/s Implemented:			
Corrective Action Follow-up Required/Completed:			

Circulation:		**Developer**
		Department of Environment
		Moreton Bay Regional Council
		Other